Veteranisation of oak – managing trees to speed up habitat production

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Abstract

Veteranisation has in fact been around for centuries in the form of for example pollarding. It is now known as a technique whereby younger trees are "damaged" in a way which may speed up the process of production of the valuable habitats, found otherwise only on very old trees. The idea is to try and mimic nature using manual tools. The treatments should be relatively mild in character so that the tree survives, but adequate to create decaying wood habitat in living trees. In this way it may be possible to bridge any potential generation gaps which are commonplace in our modern landscape. Veteranisation is generally most suitable on sites, where there are plenty of younger trees, which would otherwise be removed for example to increase the level of light to favour other younger individuals or existing ancient trees. This means that you make use of the existing tree resource instead of removal. Veteranisation in the form described above is a technique that has been developing in different countries including Italy, USA and the UK over the last few decades. Rarely however, has the level of follow up been adequate to properly evaluate the techniques used. This paper will present an international project, initiated by the County Administrative Board of Kronoberg in partnership with Nordens Ark, which will attempt to carry out a number of relatively simple treatments on many oak sites in Sweden, Norway and England with the purpose of implementing a long term research project to establish which techniques provide the best results for nature conservation.

Keywords: oak, veteranisation, decaying wood habitat, ancient trees, habitat creation

Introduction

Ancient trees and primarily ancient oaks are declining in our modern landscape due to agriculture, industrialisation and forestry; wherever they occur, they should be conserved. Oaks that have grown up in a more open landscape are in general those which have the greatest value (Butler, Rose & Green, 2001). They often have significant cultural and historical value, but often also contain a large number of threatened plants and animals which are dependent upon them (Dahlberg &

Stokland, 2004; Alexander, Butler & Green, 2006; Stokland, Siitonen & Jonsson, 2012). The conservation of these ancient trees is seen as the keystone to conserving this biodiversity.

Millions of oaks were felled in southern Sweden in the 1800s up until the middle of the 1900s with a result that the oak landscape of today contains probably only one or two percent of that in 1700s (Eliasson, 2002). Many of the existing sites which currently contain threatened fungi, saproxylic insects, lichens, mosses and bats have few remaining suitable ancient oaks (www.tradportalen.se). The situation is at its worst where the oak sites are isolated. Assessments that have been carried out in England and Sweden suggest that the numbers of ancient oaks we have today are not adequate for the long term survival of the associated threatened species (Bergman 2003, Hedin 2003, Ranius 2007, Bengtsson & Fay, 2008). Empirical data of tree age and age distribution is available for beech and oak from a few sites in Halland (Niklasson, 2002, Bengtsson & Bengstson, unpubl.), but in general this type of data is lacking. There is however reason to believe that there is a lack of oaks in the age class of 100-200 years in many of the oak-dominated sites and landscapes (Niklasson & Nilsson 2005).

With regard to oak (*Quercus robur* and *Quercus petraea*) there are studies which show that a key point for important habitats on oak seems to be at around 200 years of age. After 200 years, the frequency of hollows in oak trees increased relatively rapidly (Ranius, Niklasson & Berg, 2009), as well as the suitability of the trees as a substrate for epiphytic lichens (Ranius et al 2008). Below two hundred years, the numbers of hollow trees are usually few, which are likely due to factors such as the size of the branches and decay fungi, which are not as common on younger trees. A similar relationship between age and the species diversity has been shown for beech and lichens (Fritz et al 2008).

Add to this picture the natural mortality amongst the ancient trees, which seems to lie between 1 and 2% from those sites such as Burnham Beeches, Gripsholm Hjorthage and Ashtead Common (Bengtsson & Fay, 2008; Bengtsson, Bengtsson & Muir, 2011; Bengtsson & Bengtsson, unpubl.) where empirical data has been collected, then the picture for the long term sustainability of oak habitat and the associated species can be very worrying.

What is veteranisation?

The idea where you ”damage” younger trees in a way which speeds up the process of production of the valuable habitats, found otherwise only on very old trees started in England and has been demonstrated on many sites since at least the 1990s (see for example Bengtsson & Malmqvist, 2008; Forbes & Clarke, 2000). Veteranisation, it is hoped, is method by which the delivery time for *new* ancient trees or the time for trees to produce habitats and substrates otherwise only found on ancient trees can be reduced. Green (pers comm) and Jansson's (2009) trials with wooden boxes, re-erected trees or other containers containing artificial wood mould at Windsor and in Östergötland, Sweden show that it is possible to artificially and over a short period create habitats that can attract at least some oak and beech saproxylic insects living in hollow oaks or beech trees.

The aim of veteranisation is thus to bridge the generation gap found in some old tree populations by trying to mimic natural damage caused by for example lightning strikes, branch failure and woodpecker holes using tools. The treatments should be relatively mild in character so that the tree survives, but adequate to create decaying wood habitat in living trees. Veteranisation is generally suitable on sites, where there are plenty of younger trees, which may otherwise be removed to increase the level of light to favour other younger individuals or existing ancient trees and where there is a generation gap (Forbes & Clarke, 2000; Read, 2000). This means that you make use of the existing tree resource as an alternative to removal. This method is never appropriate to use on trees which may already be developing habitat or trees that already have important habitat, nor trees where safety may become an issue, such as in parks or towns. Veteranisation should therefore be seen as a complementary nature conservation tool to help speed up the process of habitat development when nature needs a helping hand.

Why do we need an international trial?

Veteranisation has in fact been around for centuries in the form of for example pollarding. Pollarding appears to encourage hollowing more quickly than trees which are not pollarded (Green, 1996; Read, 2000). Veteranisation is a technique that has been developing in different countries including Italy, USA and the UK over the last few decades.

Some examples of where work has been done on a relatively large scale include Bosco Della Fontana in Italy (Alessandro Campanaro *pers comm*) and in USA (Carey & Sanderson, 1981), however both of these studies have concentrated on red and white oak, and not our own *Quercus petraea* or *Q. robur*. In the UK work has been done on these latter species of oak, but it has been done on a relatively ad hoc basis. The early indications are however positive. Some trees have been colonised by *Fistulina hepatica* following veteranisation. This fungus (along with *Laetiporus sulphurous*) in particular is seen as crucial in the process of developing habitats suitable for other rare species (Green, 2006). Rarely however, has the level of follow up or the scale of the work, been adequate to properly evaluate the techniques used in a scientific way to confirm whether or not veteranisation actually works.

This international project, initiated by the County Board Administrative Board of Kronoberg in relation to their work with threatened species in cooperation with Nordens Ark and funded by The Swedish Environmental Protection Agency, aims to make it possible to evaluate the benefits of veteranisation on a large scale. This will be possible by the establishment of a network of sites over a large geographic area (Southern Sweden (14/15 sites), Norway (1 site), England (3/4 sites) and by keeping the number of treatments tested at a relatively low level. The treatments will still cover a broad enough spectrum so that there is good variation in the type of substrate that will be created and more importantly how it is created (ringbarking, hole creation, bark damage: each stimulate a different type of decay process). It is also crucial however that the mortality rate of the treated trees will not be too high.

A complementary project is underway at one of the sites in Östergötland; Tinnerö Eklandskap where almost 400 oak trees will be veteranised over a five year period testing those methods in this project as well as an additional eight treatments (Bengtsson & Bengtsson, 2010).

We believe that it is important that the techniques tested in this trial mimic nature as closely as possible, as this will help gain wide acceptance for the methods as well as hopefully make the chances of success greater. To damage a tree actively can, for many, be seen as the absolute worst thing for nature conservation! A broken top or branch is however, similar to storm/snow damage and in time will be difficult to distinguish from a natural fracture. Artificial holes can be created to look very natural and are closely associated with a long tradition of making bird boxes. Birds and other animals can make use of the newly created hole immediately.

The trial and the treatments

At each site, 49 oak trees with a diameter of between 25 and 60 cm will be selected with a maximum age of 120 years. The trees should be healthy and have no visual signs of hollowing or holes in the trunk. It is acceptable that the trees have dead branches under 10cms in diameter. 21 of the 49 trees should have at least one branch more than 10cms in diameter below a height of 8m on the trunk. The remaining 28 trees can both have or not have a branch of more than 10cms in diameter below 8m. All the trees will be marked in the field with a numbered tag and their coordinates recorded. 35 trees will be treated with one of the five different selected treatments and 14 trees will be control trees. A random selection process will decide which tree will have which treatment and those which will be control trees. This will avoid bias and ensure that the treatments will be spread across the diameter ranges. It is hoped that sawdust collected from the treated trees will be analysed for the fungal species present in the trees at the start. The cardinal point of the tree where the treatments will be applied also be distributed evenly among treated trees. All of the treatments are carried out using climbing spikes to get up into the trees, with the exception of the ringbarking at ground level. All cut material will be left as far as possible in situ.

The methods have been tested practically during 2011 and 2012 at three different sites to ensure that the method descriptions are accurate and to iron out any potential difficulties in carrying out the treatments. A calibration meeting in April 2012 finalised the treatments and the methods for undertaking them.

Treatment one - nest box in a living oak

This involves cutting a long rectangular hole into the centre of the trunk and putting this back as a “lid”. The lower part of the rectangular hole should be 4m above the ground, see figure 2 below. The width of the hole should be a maximum of 1/3 of the stem diameter or at least 10cm. The small wedge from the lid will be saved so that the age of the tree can be established. The tree will also be topped, ensuring that there are several living branches remaining, and the cut surface given a “natural fracture cut”.

Figure 1: Nest box hole

Treatment two - woodpecker hole

A hole will be sawn into the tree and will be approximately 8cm wide and 12cm long; a slightly oval shape. The lower limit of the hole should be at 4m above the ground.

Figure 2: Woodpecker hole

Treatment three - horse damage to the trunk

The bark will be removed from ground level up to 1m in height and from 1/3 of the girth of the trunk and all living tissue should be removed. Remove bark from the top of any surface roots as well.

Figure 3: Horse damage

Treatment four - a broken branch

The branch must be at least 10 cm in diameter and should be carried out on the lowest live branch which is >10 cm in diameter. The branch should be sawn off approximately 20cm from the trunk with a cut from above which should go half way through the branch. The branch should then be pushed/pulled so that it rips off as much as possible. The remaining part of the branch should be cut so that it looks like a natural fracture.

Figure 4: Broken branch

Treatment five – ringbarking a branch

The fifth treatment involves ringbarking a branch which is over 10cms in diameter. The treatment should be carried out on the lowest live branch which is >10 cm in diameter. The bark and living tissue should be removed all the way around the branch from about 20cm from the main trunk and for a width of 20cm.

Figure 5: Ringbarked branch

Each treatment will be carried out on seven trees on each site. Fourteen trees will be control trees, seven of which are trees with a branch over 10cms below 8m in height and the other seven control trees can either have or not have branches over 10cms in diameter.

The next 25 years

The aim of the project is to establish whether veteranisation works; if habitat is produced which is suitable for species to colonise using tools to stimulate the process, rather than time. The structures created and the speed at which they will be created will be one of the key factors that will be followed up, alongside studies of the species colonisation and succession focusing on fungi, insects, mammals and birds. Discussions are underway with several research teams to establish how and when the follow up research will be carried out.

Acknowledgements

A grant from the Swedish Environmental Protection Agency for project management has made this project possible. Ted Green, with his work at Windsor Great Park and the Ancient Tree Forum have inspired many of the ideas in this project.

Bibliography

Alexander, K., Butler, J., Green, E.E. (2006) The value of different tree and shrub species to wildlife. *British Wildlife* **Vol 18, nr 1,** 18 -28.

Bengtsson, V. & Fay, L. (2009) 2009 Veteran Tree Survey, Ashtead and Epsom Commons. City of London Open Spaces Department; City of London report.

Bengtsson, V & Malmqvist, A. (2008) Ljungen - en sammanfattning av åtgärder och resultat i projektet Lärande Natur II, 2005 – 2008. Tekniska förvaltningen, Lunds Kommun.

Bengtsson, V. & Bengtsson, O. (2010) Veteraniseringsplan för Naturreservatet Tinnerö Eklandskap. Linköpings kommun rapport.

Bengtsson, V., Bengtsson, O. & Muir, P. (2011) Burnham Beeches NNR Population Analysis (Fagus sylvatica and Quercus sp.). City of London report.

Bergman, K-O, (2003) Bedömning av långsiktig överlevnad för hotade arter knutna till ekar på Händelö. Rapport till Norrköpings kommun. *Natur i Norrköping 3.*

Butler, J.E., Rose, F. & Green, E.E. (2001). Ancient trees, icons of our most important wooded landscapes in Europe. In: Read, H., Forfanf, A.S., Marciau, R., Paltto, H., Andersson, L. & Tardy, B (Eds.) *Naconex Tools for preserving woodand biodiversity*. Töreboda Tryckeri AB: Sweden. 20:26.

Carey, A B & Reed Sanderson, H. (1981) Routing to accelerate tree-cavity formation.*Wildlife Society Bulletin* **Vol 9(1)** 14:21.

Dahlberg, A. & Stokland, J.N. (2004) Vedlevande arters krav på substrat - sammanställning och analys av 3 600 arter. **Rapport 7:2004**. Skogsstyrelsen ISSN: 1100-0295

Eliasson, P. (2002) Skog, makt & människor. Doktorsavhandling. Lunds Universitet.

Fritz, Ö., Niklasson, M. & Churski, M. (2008) Tree age is a key factor for the conservation of epiphytic lichens and bryophytes in beech forests. *Applied Vegetation Science* **12**: 93-106.

Forbes, V & Clarke, A. (2000) Bridging the Generation Gap. *Enact* **8 (3)**: pp 7-9
Green, E.E. (1996). Thoughts on pollarding. In: Read, H.J. (Ed.) *Pollard and veteran tree management II*; City of London, 1-5.

Green, E.E. (2006) Fungi, trees and pollards. In 1er colloque européen sur les trognes, Vendôme, 26, 27 et 28 octobre 2006

Hedin, J. (2003) Metapopulation ecology of Osmoderma eremita – dispersal, habitat quality and habitat history. Doktorsavhandling. Lunds Universitet.

Jansson, N. (2009) Habitat requirements and preservation of the beetle assemblages associated with hollow oaks. Doktorsavhandling. Linköpings Universitet.

Niklasson, M. (2002) En undersökning av trädåldrar i halländska skogsreservat. *Meddelande nr* **28**. Länsstyrelsen i Hallands län.

Niklasson, M. & Nilsson, S. G. (2005) Skogsdynamik och arters bevarande. Studentlitteratur.

Ranius, T. (2007) Extinction risk in metapopulations of a beetle inhabiting hollow trees predicted from time series. *Ecography* **30**:716-726.

Ranius, T. Johansson, P. Berg, N. & Niklasson, M. (2008) The influence of tree age and microhabitat quality on the occurrence of crustose lichens associated with old oaks. *Journal of Vegetation Science* **19**: 653-662

Ranius, T., Niklasson, M. & Berg, N. (2009) Development of tree hollows in pedunculate oak (*Quercus robur*). *Forest Ecology and Management* **257**: 303-310.

Read, H. (2000) (ed). *Veteran Trees – A Guide to Good Management*. English Nature: Peterborough.

Stokland, J.N., Siitonen, J. & Jonsson, B.G. (2012) *Biodiversity in dead wood*, Cambridge University Press, Cambridge.