

Managing a woodland with acute oak decline: Bell Coppice

Bell Coppice is a family-owned woodland of 80 ha in the Midlands. Part of an extensive ancient woodland, areas of the Wyre Forest, including Bell Coppice, are designated Sites of Special Scientific Interest (SSSI), due to the diverse flora and fauna present within a mosaic of woodland and meadows. Disease outbreak presented an opportunity to plan for future management and include measures to adapt to climate change. This involved looking ahead to the local impacts of climate change and taking action to mitigate these where possible.

Bell Coppice consists primarily of approximately 120-year-old high forest dominated by sessile oak (*Quercus petraea*), with a limited understorey and shrub layer, characteristic of National Vegetation Classification 'W10-type' oak-brackenbramble woodland.

Acute oak decline (AOD) was first identified in Bell Coppice in 2008 from characteristic 'bleeding' patches on the oak stems and was confirmed by Forest Research with molecular diagnostics. Over the next few years, more than 40 additional trees were observed with symptoms. Targeted trapping by Forest Research identified a healthy population of *Agrilus biguttatus*, a native beetle that is closely associated with **AOD**.

Management objectives

Bell Coppice is managed so as to balance both commercial and conservation requirements. Oak remains the most appropriate crop for the soil conditions and SSSI status of Bell Coppice. Rides have been widened with 'scalloped' edges to create more open and diverse habitats for wildlife within the wood, while timber is extracted using low impact, continuous cover techniques.

Risks and opportunities

Main climate change risks

Climate change has the potential to affect forest **pests and diseases** and their impact on trees through warmer temperatures, altered rainfall events and more extreme weather. In general, damage by many insects is expected to increase as the climate warms due to shorter generation times, changing distributions and more frequent drought stress, which can make trees more susceptible to attack. It is not currently clear whether AOD has become more frequent as a result of climate change, but impacts associated with climatic changes are believed to be a contributing factor.



Find detailed information in UKFS Practice Guide Adapting forest and woodland management to the changing climate.

Information on the UK Forestry Standard and supporting guidance is available at www. forestresearch.gov.uk/ukfs

Vulnerabilities

It is presently unknown how AOD spreads between trees or whether certain factors trigger it. It is apparent that a particular 'AOD community' of bacteria and the beetle *A. biguttatus* are always present in affected trees, but additional environmental factors are also usually evident. These may include drought stress or pest and disease damage, poor soil conditions or lack of appropriate management, usually leading to reduced root or canopy health. Reducing the impacts of one or more of these factors through management and looking ahead to take account of the main risks from climate change are good adaptation strategies. The majority of AOD-affected trees at Bell Coppice have been identified on or near south-facing ride edges. This may be related to the preference of *A. biguttatus* for open grown, sun-warmed oak stems, upon which to complete its life cycle.

Identifying and selecting measures

Increasing the percentage of tree species expected to do well under a future climate, diversification of species and age structure were identified as key adaptation measures. Thinning of the stand was also identified as a measure that could encourage the health and resilience of dominant timber trees. Modification of drainage could also be an appropriate adaptation measure to change soil moisture conditions, while adjusting planting density to reduce between-tree competition and improve growth and yield.

Implementing adaptation measures

Because AOD can lead to the rapid decline and death of affected trees, a proactive decision was taken by the woodland co-owner and manager to fell the affected trees. The intention was to try and reduce the risk of cross-infection of other nearby trees and realise income from the trees before they were potentially killed by the disease. A mix of broadleaf species expected to do well under a future climate were planted, which increased the species diversity and age structure. The mix included oak, which remains a good future investment economically, as well as being environmentally important, with the potential to supply mid-term return on an otherwise very long-term investment. As the mix of young trees grow, it is hoped that they will begin to shade the stems of the mature oak trees, making them less thermally suitable for *A. biguttatus*, and perhaps reducing the risk of AOD occurrence.

Newly open areas have been protected using deer fencing to allow naturally regenerating oak seedlings to establish. The species mix in these areas (coupes) was diversified, by planting a variety of young broadleaf trees appropriate for the area and SSSI status, including lime, hornbeam, cherry and hazel, and allowing silver birch to naturally regenerate. This will spread the risk of any future pest and disease damage, or indeed climatic impacts. As well as diversifying the species mix, a management plan has been developed to alter the predominantly evenaged structure of the woodland.

Monitoring and assessment

The number of newly symptomatic trees has decreased in recent years and AOD has been observed less frequently at Bell Coppice, possibly representing a more widespread, albeit anecdotal, trend in England, where more AOD-affected trees



Forestry Commission Practice Note *Managing acute oak decline*



Forest Research, Research Note *Ecological implications of oak decline in Great Britain*

Further information on acute oak decline

appear to be exhibiting a 'remission' of symptoms. This may be due to recently favourable climatic conditions enhancing oak vigour. AOD symptoms are, however, still observed intermittently on trees throughout the site.

By adopting a continuous cover (shelterwood-type) approach in appropriate areas, harvesting has been selective and careful to minimise damage to the remaining trees. This has resulted in a more open canopy and is intended to reduce competition for resources among the remaining 'parent' crop. Deadwood habitats have been created for the purpose of conservation and younger age classes of trees present now have an improved opportunity to establish. Young oak trees have been found to be much less susceptible to AOD.

Although the woodland evidently has a good seed bank present, some of the youngest regenerating trees are at risk of being smothered by bramble and bracken and require some protection. Bark stripping by squirrels is being increasingly noted on the trees once they reach the age of 10–15 years. This can be a serious problem for woodland establishment, and young oak trees are particularly susceptible.

Natural regeneration of oaks to promote a mixed age stand.



Squirrel damage on a young oak tree at Bell Coppice.



Lessons learnt

Proactive management in the form of sanitation felling may have helped to reduce the incidence of AOD at Bell Coppice. This approach gave a return on the felled trees and allowed the owner to undertake a range of management activities with the aim of improving resilience and reducing the susceptibility of individual trees to AOD. Critically, the owner has sought out relevant expert advice and support throughout this period of adaptation, on both the disease affecting the woodland and the most appropriate management options.

Intended future outcomes

Bell Coppice has been adapted by encouraging regeneration, diversification of species and moving to an alternative cover system. The broader age structure and tree species diversity have enhanced the resilience of the forest to pests and diseases and potential climatic stresses, which has, in turn, reduced its vulnerability to damage from AOD.



Forestry Commission Research Note The influence of climate change on forest insect pests in Britain

Tree health information available at **Observatree**

Report tree health concerns at **TreeAlert**

This case study is one of a number supporting the UKFS Practice Guide on Adapting forest and woodland management to the changing climate