

Management of an Historic Oak Forest - The Royal Forest of Dean

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The Forest of Dean, in South West England, is Britain's premier oak forest. The Dean has been important to man for millennia: its trees (principally *Quercus petraea*) supplied charcoal to smelt the iron already being exploited there over 2000 years ago. The Dean acquired its status as a Royal Forest when it was designated as a hunting forest following the Norman conquest in the 11th Century. Timber felling for charcoal production that was used in iron smelting (armour for the Crusades was crafted from Dean iron) continued and, in addition, large oaks were in demand for building cathedrals, castles and large houses.

But it was the supply of timber for building wooden fighting ships that brought the Forest its reputation. These demands, coupled with grazing by stock, caused the Forest to be severely depleted by the early 17th century (Hart 1966). Steps were then taken to improve regeneration of the trees, including the appointment of the first Deputy-Surveyor in 1633, but progress was impeded by the industrial revolution and increasing demand for ship-building timber. It is estimated that each mid-18th Century warship required 3700 trees (ie the felling of ca 32 hectares) for its construction.

Following the Napoleonic wars between Britain and France, Lord Admiral Nelson visited the Dean in 1802 and expressed his concern about future supplies of timber for ships. By that time, the Forest was similar to its present size of 10,700 hectares (Hart 1995). In the following decades major steps were taken to replant areas, predominantly with English oak (*Q. robur*), and to protect these plantations from unauthorised grazing. Despite some setbacks, this was quite successful. By 1900, the Forest was well stocked with virtually all broadleaved trees, principally oak, although ironically by this

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time, the need for ship-building timber had been greatly reduced because of the use of steel. During the two world wars, the stocks of timber in the Forest were again depleted (a quarter of the Forest was clearfelled in WWII), and to secure a strategic supply of timber for future contingencies, much replanting was undertaken with conifers. This trend continued until 1971 when the proportion of broadleaf timber in the Forest had fallen to 42% and a Ministerial decision was taken to reverse the trend.

The Forest Today

By the year 2000, the proportion of broadleaves in the Forest of Dean has increased to 49%, and the typical character and the reputation of the Forest is largely influenced by oak, which occupies 36%. The remaining broadleaves are composed mainly of beech, sweet chestnut, ash, birch, and sycamore. The coniferous stands are predominantly Douglas fir, Norway spruce and Larch, with smaller amounts of Scots and Corsican pine and other species.

Today the Forest is managed for a variety of uses and values, including:

Traditional rights and privileges: The Forest still caters to a number of traditional rights and privileges practised by local communities.



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This thinning trial in the Forest of Dean is evaluating how spacing affects wood production.

These include freemining for coal (with the rights dating back to the 12th Century), freequarrying for building stone, grazing with sheep, pannage and estover.

Timber production: Most stands of broadleaf and conifer are actively managed for timber production, and the Forest currently produces a sustainable yield of some 48,000 cubic metres of timber per annum (Figure 1). The timber is sold standing to merchants throughout South Wales and South West England.

Conservation of natural heritage: As one of the largest forests in England, the Forest of Dean supports a wide range of special habitats and wildlife species. This is recognised with areas of the Forest being designated Sites of Special Scientific Interest, parts as Forest Nature Reserve, and parts as Sites of Special Conservation Value (Figure 2).

Conservation of archaeological heritage:

The long history of human occupation and intensive past industrial activity has left a legacy of more than two thousand archaeological sites, a number of which are candidates for, or already listed as, Scheduled Ancient Monuments.

Landscape values: The Forest of Dean, covering 107 km², offers a forested landscape experience which is unusual in England, which overall has only 7% woodland cover. Forest planning and the operational practices aim to protect and enhance the landscape.

Recreation: There are 1.5 million visitors per annum to the Forest, as well as 35,000 residents who regularly use it for rest and recreation. To cater for this demand there are 3 visitor centres, 18 car parks/picnic sites, 3 campsites, an arboretum, and 15 trails including all ability trails, a cycle trail, and an internationally famous sculpture trail.

Management of the Oak Forests

The management of the oak in the Forest has to address the age profile of many of the stands - some 800 ha pre-date 1850, and another 1000 ha were planted in the interwar and immediate

post WWII periods 1920-1950. For the purposes of management, all the broad-leaf stands have been classified into working circles as conservation and amenity woods, production woods, or community woods (Everard et. al 1994).

Conservation and Amenity Woods

The conservation working circle contains most of the 19th Century "Napoleonic" oakwoods. The prime management objective is to main-

tain the existing character and biodiversity of the woods. This depends on a range of woodland habitats, including dead wood on moribund trees, which are particularly important for rare fungi, lichens and insects. Some limited areas are managed by allowing only minimal intervention which is unusual in the English context. Others are coppiced where this has been a traditional management technique. Small coppice coupes are the norm, ranging from 0.1 - 1 ha, and some standard trees (larger overstorey trees raised for timber) are retained. The coppice rotation is determined by marketing considerations, but varies from 8 - 30 years.

In most of the woods, production of timber occurs from thinning aimed at developing the crowns of the remaining trees, and from small coupes of ca 1 ha which are chosen to ensure effective regeneration of the canopy. The felling aims to achieve a balanced age structure with a full rotation of 400 + years. In these coupes, about 15 trees per hectare with the potential for longevity are retained. These potential veteran trees should contribute significantly

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Mixed broadleaved forests provide a wide range of values.

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Production Woods

The majority of the woods in the production working circle date from the 20th Century. Planting is still ongoing, albeit at a modest level (ca 10 ha per annum), and nowadays usually follows the removal of a conifer crop. Felled sites are scarified to clear brash and expose bare soil, and 2700 trees are planted per ha. Protection from deer, sheep and rabbits is a major commitment, with exclusion by fences, supplemented by shooting and poisoning as required. The most problematic weed on these sites is bracken, although rank grass growth may also be supplemented by shooting and poisoning as

occur, and herbicides are deployed to ensure successful establishment. The stands are thinned when trees are about 10 m tall (ca age 30), and subsequently throughout their life every 10 - 20 years. Thinning aims to favour good form and vigour and selected trees, intended for the final crop, are favoured for retention from an early age. Thinning aims to remove poorly formed wolf trees from the crop, and the opening up of the stand encourages an understorey which can help shade out epicormic branches, suppress bramble and help perpetuate native shrubs. It is at this stage that pruning may be required. If so, this is undertaken in winter on epicormic branches, suppress bramble and help



Grey squirrels, introduced from the US, can seriously damage trees. ©British Forestry Commission

perpetuate native shrubs. It is at this stage that pruning may be required. If so, this is undertaken in winter on the identified final crop trees to remove branches and epicormic growth up to 6m.

It is at the pole stage between about ages 10 - 40, that grey squirrels, introduced to Britain from the USA, are a problem – and possibly a major threat to the sustainability of oak in the Forest of Dean. The squirrels strip bark from the stem which often leads to death above that point and/or deformation of the tree (Figure 3). Some control is attained through trapping and poisoning, but the effectiveness of this is currently under review. Ultimately, the final crop trees, with an average spacing of 13 m, will be harvested when they have a desired dbh (diameter breast height) of at least 45 cm (preferably 60). This is usually some decades later than the age of maximum mean annual increment which is about 80 years. The harvesting is a means of securing regeneration using a uniform shelterwood system. This deploys coupes of up to 5 ha in which the canopy is manipulated to ensure that regeneration follows. First a seeding felling is undertaken where 40% of the canopy is removed in order to provide sufficient light for existing seedlings, or those expected in the early years following felling. A second regeneration thinning is made some 3-6 years later, depending on the success of the regeneration and any further operations are driven by the requirements of the next crop.

Community Woods

There are many small settlements in the Forest of Dean. The pattern of settlement was often determined by the practice of encroachment, and the Forest and the dwellings are often intimately located. The community woods are stands of predominantly old oak trees within and adjacent to human settlements. These are managed to provide an attractive backdrop to the settlements, with management focussing on safety and longevity of the trees. In these situations, a safe physical rotation for such

trees can be up to 300-400 years. Trees are only felled if they are unsafe, and regeneration is attempted using natural seeding into small enclosures (5 m x 5 m).

Outlook

The management of the oak woodlands in the Forest of Dean is a story of mixed continuity and adaptability, and management throughout the centuries in this historic and diverse area has presented challenges. The demands that society has placed on the Forest have changed over the millennia, and it is clear that the pace of change is quickening (recently exemplified by the rapid rise in popularity of cycling in the Dean and its associated issues).

The overriding management philosophy is that the sustainability of the oak in the Forest is paramount to preserve the typical character and distinctiveness of this attractive area. However, the management of this resource must be carefully balanced with other management objectives. After a period in the twentieth century of intense coniferisation, it is likely that in the future, the proportion of broadleaves, in particular oak, will continue to increase as plantations on these ancient woodland sites are restored to native woodland. In addition, it is likely that the recreation pressures on the Forest will continue to increase, and incorporating these activities with conservation of the environment will become increasingly challenging.

References

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