Battram Wood Case Study

Successful oak and willow regeneration at Battram Wood

Background

Battram Wood covers a 47.7ha site within the National Forest, near the village of Ibstock. The wood is part of a larger, continuous matrix of approximately 150ha of newly created woodland which has become a leading feature in a landscape previously dominated by agriculture, coal mining and quarrying. The young woods were planted on arable farmland over three phases between 1999 and 2001, creating relatively similar aged stands, but with a diverse species composition. There has been a direct effort to ensure all work is not only commercially successful, but also visually appealing, beneficial to local residents and forest users and intrinsically linked to conservation.

The wood is situated within the Midland Coalfield section of the National Forest, and is a prime site for afforestation and visitor activity. The site's high point at Green Lane is 155m above sea level (ASL) and there is a gentle slope to the stream in the north at 140m ASL. There is low annual precipitation (<700mm per annum) and it is hazard class 1 (very low risk) for windthrow. The underlying soil composition varies either side of the stream – to the north there are slightly acidic loams and clays with impeded drainage and moderate-high fertility, and to the south slowly permeable, seasonally wet basic loams and clays with moderate fertility. These are both typical of the lowland Midlands and are suited to a range of tree species. The bedrock consists of Triassic Rocks including mudstone, siltstone and sandstone.

Management Objectives

1) ***Timber*** - maximise timber quality and growth rate through diligent silvicultural intervention by thinning and pruning.
2) ***Economics*** - ensure all operations are run economically with a view to minimising running costs and maximising income from timber and grant funding.
3) ***Access and wildlife*** - maintain existing access facilities and wildlife habitats and review opportunities for enhancement where funding allows.
4) ***Education*** - explore options to further the knowledge of farm woodland management in the forest industries, community and educational establishments.

History

In the late 1990s the RFS was looking for a new site where it could demonstrate how to create a model multi-purpose woodland from scratch. It was proposed that a location within the National Forest would be appropriate for such a project, and in May 1998 the RFS acquired 48ha of arable farmland in the south-east of the National Forest. It was bought under the assumption that it would be sustainably managed through afforestation, with wildlife enhancement, landscape and recreation also central to its management. The acquisition was aided by generous support from the National Forest Company, North West Leicestershire District and Leicestershire County Councils, and the Rural Development Commission.

A national design competition was run in 1998 to select the most imaginative yet appropriate plan for this high profile undertaking; the idea of the right trees in the right places for the right reasons was integral. After consultation between the RFS and Lockhart Garratt (Forest

The site before RFS acquisition resembled typical arable farmland

Management Consultants) the winning design was amended to ensure the plantings were going to be viable, both practically and economically. Funding came from the normal grant schemes, including the Forestry Commission-approved Woodland Grant and Farm Woodland Premium Scheme.

The wood itself was planted, 99% unprotected, over three phases in the winters of 1998-99, 1999-2000 and 2000-2001. The work covered three phases to spread the risk of poor take-up, make the workload manageable and ensure the best contractor is used. 80,000 saplings were planted by hand in carefully planned row layouts so that the woodland would be visually appealing and a good habitat as well as being a successful commercial enterprise. Fast growing poplars and cricket bat willows are grown on the wetter areas near the stream, at 8m x 8m and 9m x 9m spacings respectively. The majority of the wood was planted on a 2.4m x 1.8m grid system, with the oaks and yew at 2.5m spacing. During the second phase of planting the Millennium Circle was created, made up of 350 young English oaks and yews.

Initial Objectives

The primary objective, as quoted from the proposal paperwork, was to “create a commercially viable and productive woodland, with secondary multipurpose benefits”. A lot of the commercial forestry relies on coniferous species, while hardwood/conifer mixes aim to ensure the broadleaves will be high quality timber. Fast growing poplars and cricket bat willows were also planted to generate income in the early years.

Landscaping was fundamental, with plantings aiming to follow the natural contours, and mixed broadleaves and shrubs planted along the ride sides to improve aesthetics and benefit wildlife. The fringes of broadleaf also screened some of the predominantly coniferous plantations from external views. The variety of species aimed to diversify the visual impact, especially during its development stage.

The plan also aimed to respond to the National Forest’s ‘Biodiversity Action Plan (BAP)’, with special reference to the rare native black poplars. These were planted over 0.3ha on a less frequently visited part of the site, at 8m spacings. Other conservation measures include enhancing the ecological value by creating wetland areas adjacent to the pond and stream, creating habitats for barn owls, opening up glades for butterflies and creating diverse grassland habitats.

Recreation and education was also inherent within the plans. The full site is open to informal access, with a car park catering for visitors. Pathways were proposed to link in to the long distance pathways and cycle routes, while picnic sites and interpretation boards were also proposed. These were vital in order for the RFS to achieve its aim of using the woods for education purposes, and trying to demonstrate what good forestry actually looks like using one of their own woodlands.

Past Management

Prior to planting, the ground was prepared by normal agricultural cultivation, subsoiling and sowing of a low competition amenity grass-seed mixture to prevent the incursion of arable weeds such as ragwort and thistle.

The wood has been managed by three annual herbicide applications and beat up (replacing trees that have died shortly after planting) in years 1-3 to achieve strong establishment. Form pruning has been undertaken on timber broadleaves at least twice in years 3-8, and targeted coppicing of alder has been undertaken every 2 years where in mixture with oak. Hazel has also been coppiced as a feature along the rides.

First thinnings were undertaken in 2011-2013 on pure conifer (larch, pine and spruce) and mixed crops to produce chipwood timber, but primarily to increase air flow in the canopy with the aim of reducing the severity of fungal disease.

Rides have been managed by one mow of the central section and one of the outer edges annually. Budget constraints have meant targeted coppicing of the linear shrub zone have been restricted to 200m length for essential access purposes. A former agricultural irrigation pond was cleaned and remodelled in 2008 using county council and National Forest grant funding to enhance this as a habitat for rare National Forest BAP species. This is now being developed as a wetland area too. Interpretation boards have been erected to greet walkers and provide information on crop types, access routes and biodiversity features; twenty tree species signs have also been put up along the rides.

Thinning work has been professionally undertaken (left), while signboards have been erected (top) and a pond and wetland environment created (bottom).

Community Involvement

The local community and volunteers have been closely involved in the project from the start, assisting work including:

- planting the Millennium Circle,
- building log benches and picnic tables,
- planting of a Trafalgar grove of 600 oak, and 10,000 native daffodils,
- hazel coppicing.

Colleges and primary schools have also been involved, including Ellistown Primary School who planted willows by the pond in 2008 and whose paintings formed a wetland wildlife sign.

The Current Situation

In the past 15 years the site has changed beyond recognition. The wood is very well established, with older larch exceeding 12m height and Corsican pine at 10m. A survey of the pine in October 2012 showed consistent leader increase for all phases, and an annual increase in ring increment for the first 7-8 years prior to canopy closure, at which point thinning was undertaken. The only areas of minor failure arose from waterlogged conditions on 1-2% of the site which resulted in larch dieback; these areas have since been restocked with ash or retained as open space. Poplar dieback has been experienced, with leaf rust affecting 30% of the crop in certain areas, however mixed broadleaves planted within the matrix on establishment are filling these gaps.

The plantation has been established using six main woodland types (figure 1). The conifers include pure stands of European larch, Norway spruce and Corsican pine – these often contain small pockets of mixed broadleaves to provide habitat and visual diversity. Broadleaf stands are split into two categories: over 80% are part of a 20-100m wide belt on the margins of the phase 2 area and in exposed areas of the wood, managed by continuous cover to retain a strong woodland boundary. The rest were planted in the north of the woods to mimic natural colonisation using randomly distributed clumps of pure native species. Around a third of Battram Wood is comprised of a mix of one timber broadleaf species with a matched timber conifer species i.e. oak with European larch. In mixed crops the planting matrix was made up of 1-2 pure rows of conifer in every 5 rows, meaning that thinning will be largely systematic. 4.3ha comprise of hybrid poplars with interplanted native broadleaves and shrubs, while there is a small area of black poplar which is included for habitat diversity. Many of the conifer species are yield class 10-16, while the broadleaves average class 5-9.

First thinnings have been of limited market value, and are therefore undertaken at net contracting cost of £100-200/ha to the RFS. These thinnings are intended to achieve maximum growth rate – the model is based on

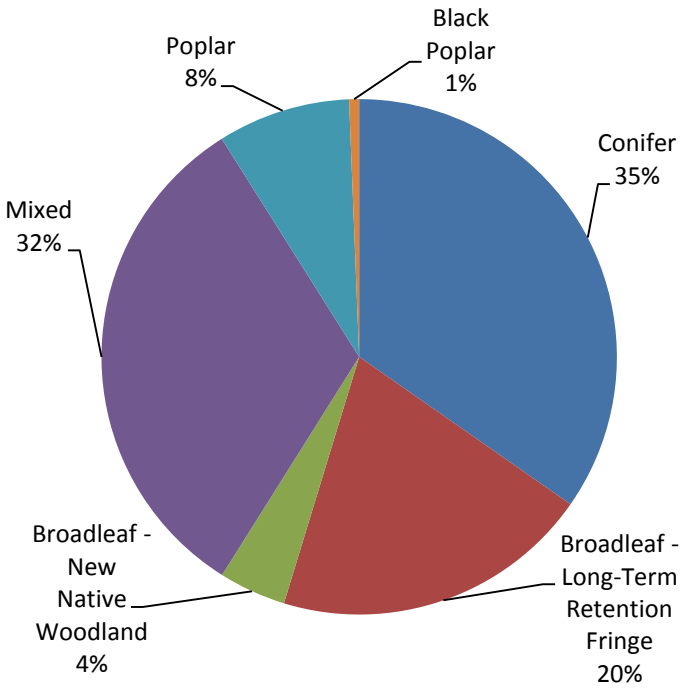

Figure 1: Breakdown of the forest composition at Battram Wood

a frequency of 5 years for conifer and mixed crops and 7 years for broadleaves.

There is also a lot of access work being undertaken, including signage, ride surfacing (pictured below), bench installation and the creation of the Birthday Walk paths.

Economics

The site was originally arable farmland and since afforestation in 1998 it has received around £15,000 per year for 15 years as part of the Farm Woodland Premium Scheme (FWPS) which aims to compensate for agricultural income foregone. The site also received £68,000 in Establishment Grants over a 7 year period. An Annual Woodland Management Grant of around £1400 is claimed for the provision of free and unrestricted informal public access to the site, including maintenance of signs, benches and waymarkers to accommodate the estimated 20,000 visitors a year. Overall the site has received around £20,000 a year in grant income since creation, with peaks nearer £40,000 during the early establishment phase. This money is crucial in order for woodland creation to be economically viable in the setup years before timber can produce an economic return.

The first thinnings in 2011 occurred at a net cost to the RFS of £100-200/ha. With the final FWPS payment due in 2014 and the current crop not yet mature enough to provide economically viable timber or thinnings there will be a deficit in the next few years. This will need to be covered by reducing costs, or by ensuring future timber sales more than make up for this.

Woodland creation requires a large short-term financial sacrifice in order for future gains – around £31,000 was spent each year between 1999 and 2003 in order to establish the woods, but from 2004 onwards annual expenditure has been more than halved. In 2011 and 2013 shortfalls from track surfacing were addressed through Woodland Improvement Grants. As a result of the access improvements subsequent timber harvesting and extraction costs will be reduced as access will be easier, resulting in superior standing sale quotes.

The main expenditures post-planting at Battram Wood are management fees and maintenance - weeding and mowing topped £4000 a year in the establishment stages, and continue at around £1000 a year. An increasing problem is squirrel control, which has cost over £3000 since 2009 and is likely to continue to need financing while the squirrel population remains high and the broadleaf crop remains within the vulnerable age range of 15-40 years.

Expenditure has mirrored income and it is evident that the first 15 years of new woodland creation has not been profitable – but has been managed carefully to cover its costs. However it is expected that future sales of quality timber and thinnings will bring in significant income. The challenge will be to reach this stage as quickly as possible to cover the financial deficit the forest expects to experience between the end of the FWPS payments and the start of economically sustainable timber production.

Challenges of Woodland Management

Pests and diseases: There are currently fatal diseases present at Battram Wood, however management is aiming to restrict their severity.

Red Band Needle Blight has been confirmed in all compartments of Corsican pine, but these crops have been thinned early to try and avoid its spread. This disease has the potential to make Corsican pine an unfeasible option in commercial forestry, which is bad news at Battram Wood given its ability to grow well in heavy Midland soils– this means the main 'engine' of productivity is under severe threat though continual monitoring in the Midlands has so far suggested the disease may be less severe than in the wider conifer forests e.g. Thetford, Sherwood and Dean.

Red Band Needle Blight has raised questions about the viability of using Corsican pine in commercial forestry

Ash is the most suitable broadleaf at the site, and this is also under severe threat from Ash Dieback (*Chalara fraxinea*). There are already cases confirmed in the National Forest and the onus will now be on thinning to encourage a wider diversity of viable broadleaves in the longer-term. In addition the poplar have experienced defoliation from leaf rust fungus which has resulted in 10%-40% death in poplar stands. The interplanting of mixed broadleaves on planting is however providing a backup policy in this area.

Squirrels are a problem on the site, with browsing damage identified in 2007 and 2013. However the trees are now in the vulnerable age range of 15-40 years and as a result squirrel feed hoppers are employed to control the population.

An example of the poplar defoliation and death near the stream at Battram Wood

There is also regular monitoring of deer bark damage, however as the site is now well established even moderate deer browsing would have little influence on the growing trees.

Climate Change: The changing climate is expected to bring with it increased risks to our woodlands, with more severe drought damage in summer and waterlogged conditions expected in winter. Conditions may become more suitable for pests and diseases which will make certain species more susceptible and therefore a less viable forestry option. This includes Corsican pine, a species which is historically successful but which will not be planted in the future due to the threat of red band needle blight which damages the crop.

Financial viability: A fundamental issue facing most woodland owners is financing their operations. Creating a new wood has many financial challenges and requires a long-term view; it will be many years before the wood is sustainable through timber sales and patience is required. However grant schemes can mean the losses are minimised initially, with Battram managing to make a small cumulative surplus by year 10, mainly due to the Farm Woodland Premium Scheme which provides a substantial payment (as income replacement) in the first 15 years of new woodland projects.

People: Battram village is immediately adjacent to the wood and, with over 20,000 visits per year, human impact has the potential to be severe. However vandalism is minimal, with locals respecting the wood and seeing them as their own; this level of community engagement

makes public access a notable benefit. Key to this is education of the public regarding what is occurring in their woods, and why certain decisions or management techniques have been employed. However dogs off the lead can still be an issue, especially in disturbing any ground nesting birds or disrupting the delicate wetland ecosystem.

Travellers have been an issue at the site, with 14 caravans trespassing the site in 2007. There were significant associated costs to the RFS in legally removing them and the litter left behind. In response a NFC grant helped to construct barriers to the car park and large boulders blocking vehicular access to the site.

Future Management Objectives

The long term vision is for Battram Wood to be an exemplar of multi-objective working forestry in the lowlands, meeting the RFS' charitable aims by furthering forest education and demonstrating good forestry practise. The woods will be managed to the best of their potential by a regular thinning and pruning regime. The provision of walks, information boards and other educational material is inherent within this. Alongside these aims there will also be a focus on maintaining and enhancing the wildlife habitats within the wood, and a drive to protect trees from the damage caused by pests and diseases.

Thinning in mixed stands will favour the retention of the straightest, least forked and most dominant timber broadleaf trees. The lines of conifers in the matrix will be systematically removed so that the proportion of conifers will be reduced. The proportion of conifers removed will be dependent on the success of the broadleaf crop; for example the sweet chestnut is failing in some areas due to *phytopthora* which means the conifer:broadleaf ratio will be managed more towards conifers than in areas where ash and other broadleaves are in a similar mixture. The pure broadleaf and conifer stands will be thinned, selectively choosing the best timber broadleaf trees and systematically removing 1 row in 5 of the conifers. However where red band needle blight is present thinning may be more selective and more severe. This relies on finding a standing sale buyer for the product as otherwise costs may be prohibitive.

Access is a crucial part of the strategy, with the focus on the rides and paths, however the site is fully open for people to explore first-hand the harvesting, access management and habitat works. This is a crucial part of the education objectives so that visitors are made aware of what is occurring in their woods and why. Further community events will also be held at the site, and community engagement will be encouraged with grant assistance from the National Forest Company.

Conservation measures may include further work on the wetland area and the pond, and attempts to make the ride sides and glades the perfect habitat for butterflies and insects. The RFS will allow the retention of deadwood for conservation purposes where it does not pose a hazard to the public or the forest workers, and brash will generally be left on the site.

Conclusion

Battram Wood is the perfect site for the RFS to demonstrate how to create model multi-purpose woodland from scratch. The long-term objective is to create high quality timber, and the RFS has aimed to ensure the wood has the best chance to succeed economically while also meeting its education, conservation and recreational objectives. The test of this plan will come over the next few years when grant income must be replaced by income from timber sales, at the same time as managing the impact of various pests and diseases, and also ensuring community involvement continues. It is also hoped that the site will help encourage and support those undertaking other woodland creation projects.

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