

## **Case Study 9**

### **Wykeham Forest, North Yorkshire**

#### **Location and ownership of woodlands**

This case study deals with the Forestry Commission's Wykeham Forest block on the North York Moors, roughly mid-way between Pickering and Scarborough. The total area of Wykeham Forest is some 1100ha (2720 acres) of which 690ha (1700 acres) has been assessed as having good or moderate potential for adoption of ATC systems. The area of most relevance for ATC demonstration purposes is centred at SE 950887.

Certain of these woodlands ultimately remain privately owned but are managed by Forestry Commission England under a long-term forestry lease. The vast majority of the site consists of mid-twentieth century conifer plantations onto open upland heathland, but some remnant areas of semi-natural woodland persist in valleys to the south along with smaller areas of replanted Ancient Woodland Sites (PAWS).

#### **Significance/ reasons for selection as case-study example**

This site has been selected as a case-study within this project for two main reasons:-

1. It is one of the better developed existing examples of trial implementation of a range of alternative silvicultural systems for the diversification of upland pine and larch stands on poorer sites (adoption scenarios 4, 5). This is a silvicultural context and challenge faced by many commercial forest managers at present, in the light of disease challenges to pine by *Dothistroma* and larch by *Phytophthora*. Work is based on a combination of advance natural regeneration of the main crop species (pine and larch) and of self-sown broadleaves, coupled with earlier enrichment plantings with a range of shade-tolerant conifer species in some areas.
2. As the site forms part of the Forestry Commission's network of alternative silviculture demonstration sites it has been much better studied, quantified and reported upon than many other examples. This experience has the potential to provide valuable information for ATC adopters elsewhere, but there are potential opportunities to increase self-guided interpretation and training site values.

#### **Owner objectives for management (including adoption of ATC systems)**

The Forestry Commission in England manages its holdings for a combination of economic timber production, conservation and recreational amenity objectives. The balance between these objective sets varies with the type of forest and its location. At Wykeham Forest priorities have been economic timber production, and, to a lesser extent, recreation amenity. ATC is employed on a site specific basis by FC in support of management objectives. Alternative silvicultural systems are being adopted within this forest partly for demonstration purposes, due to a perception that conditions were unusually favourable for it here as compared with many upland plantation forests. It should also have significant economic benefits in terms of reduced restocking costs and amenity benefits in terms of maintaining a permanent forest environment.

### **Biophysical characteristics of the site**

The areas of Wykeham Forest of principle interest for ATC demonstration lie on an upland plateau with elevations ranging from 150-210m asl and a gentle southerly aspect. Some other areas of the forest are found on steep valley slopes at 70-210m asl.

The climate of the site is fairly warm and moist [ESC AT<sub>5</sub> ~1320 dd, MD ~150 mm, annual rainfall ~760 mm] with a moderately exposed wind regime [DAMS = 14]. The solid geology is of Jurassic Corallian beds. Soils are primarily of the ironpan heath type, which would often have been disrupted at the time of plantation establishment. Hence these would typically have ESC SMR of Moist and ESC SNR of Very Poor.

Terrain is easy throughout the site, but with a risk of vehicle impacts on softer soils in the winter season. The site has relatively good access for silvicultural management and timber extraction over a network of internal tracks and rides, giving egress onto nearby minor public roads. There is public access to many parts of the forest over a network of Public Rights of Way, although the freeholder retains specified rights.

### **Stand history and current composition**

Wykeham Forest was established on open moorland during the period 1930 to 1970 predominantly using Scots pine and Japanese larch. Some moister sites were stocked with spruce from the outset. In the early 1950's, some older pine stands were thinned and inter-planted with a range of more shade-tolerant trees such as beech, western hemlock, *Abies* firs and western red cedar, diversifying these first rotation plantations [see Mason, W.L (2006) *QJF* 100(1): 31-42]. Later pine and larch plantations have remained less diverse. Over the past 20 years, there has been strong advance conifer regeneration, both of Scots pine and larch in those original stands having reached 40-50 years of age and of the shade-tolerant conifers, spreading through the understorey of these areas as a whole. Some areas also have significant natural regeneration of native broadleaves (mainly oak and birch) and of beech and sycamore. These unusual factors made Wykeham Forest unusually well-prepared for ATC adoption trials.

### **Silvicultural treatments applied to date and intended future silviculture**

The main silvicultural approach adopted to date at Wykeham Forest has been transformation thinning. While some of the older stands had received standard thinnings prior to establishment of the ATC demonstration project, younger stands had not. Thinning is carried out using standard forestry harvester and forwarder equipment sets on the ground worked so far, although there may be difficulties with this once steeper slopes are tackled in future. Permanent racks are installed through the crops at 18m spacing, from which the intervening matrix can be thinned by harvester reach without ground pressure within the growing area. Racks are made sinuous through the stands to avoid unsightly lines of sight along straight racks, although this may have adverse implications for deer control. Thinning strategy adopts a frame-tree selection/ crown thinning method by contrast to the standard low-thinning typically used in clearfell-restock forestry. Two different experimental stand treatments are applied depending on the desired final stand structure (a) simple two-storied shelterwood and (b) complex irregular. Generally the aim is to reduce seed-tree stocking to 100 stems per hectare for simple structures, whereas under the

complex option a set of 40-50 frame trees per hectare are selected. Initial thinnings are regulated as to intensity by standard Forestry Commission guidelines, but the selection of trees to remove will be different from that in a standard thinning. As the transformation develops it is expected that perpetual thinning will remain the principle working method but there may be greater selection by species and form. Whether it will be necessary to undertake further enrichment planting is uncertain.

### **Evaluation of current silvicultural status in terms of ATC adoption/ regeneration**

Silvicultural demonstration work at Wykeham Forest over the past 10-15 years has taken some areas into *developmental category 2* (progressive/ mature transformation), especially in older stands where there was good advance regeneration of the main crop species and enrichment interplanting with shade-tolerant conifers had taken place previously. Young pine and larch crops receiving a first transformation thinning remain at *developmental category 3* (early-stage transformation). Advance natural regeneration of a wide range of tree species is well-established in many areas. Continuation of ATC silviculture at Wykeham Forest appears to be secure, as it is proving successful and forms an established part of the FC national ATC network.

### **Commentary on inventory and monitoring protocols/ demonstration potential**

This site forms part of the Forestry Commission ATC demonstration site network and hence has an existing regime of enumeration for inventory and research purposes, employing protocols as set out in FCIN45. The site therefore has considerable and ongoing ATC demonstration value and potential. A number of organised forestry visits have been made to Wykeham Forest, most notably by the ICF in autumn 2007. The site is also potentially suitable for self-guided learning visits, but there would need to be a significant investment in interpretation materials (probably portable).

### **Commentary on economic and operational implications of ATC adoption**

Economic and operational aspects of ATC adoption at Wykeham Forest have been assessed and reported as a case-study within FR IPIN 13/06. Few serious issues had been identified to date from thinning working on the plateau sites, although careful brash management to protect forwarding and extraction routes was required in case of thinning operations generating less brash. Economics of thinning operations were comparable with those predicted for standard even-aged working and timber assortments and values produced to date likewise. Greater issues are expected when thinning on steeper slopes is tackled later, particularly in terms of securing skills and equipment for motor-manual felling, skidding and cable-crane extraction methods.

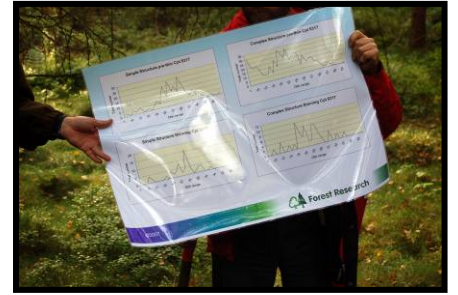
### **Other relevant field examples recorded within the project**

Obvious comparisons here are with other pine and larch plantation examples as at Devilla and Tentsmuir (Case Study 13) and Cawdor Estate (Case Study 4). In many ways, however, Wykeham Forest is a relatively unusual example due to the additional history of enrichment planting with shade-tolerant conifers. The Welsh examples at Coed Preseli/ Nant yr Eira/ Bryn Arau Duon (Case Study 27) are at the inception of that process, as is the underplanting work at Sherwood Forest (Case Study 20).

## Photographic record



Left: demonstrating ATC adoption at Wykeham - ICF visit, 2007



Right: demonstrating ATC adoption at Wykeham - ICF visit, 2007



Left: demonstrating ATC adoption at Wykeham - ICF visit, 2007



Right: monitoring plot within the Wykeham demonstration area



Left: shade-tolerant conifer regen under mature pine-larch stands at Wykeham



Right: shade-tolerant conifer regen under mature pine-larch stands at Wykeham



Left: shade-tolerant conifer regen under mature pine-larch stands at Wykeham



Right: recent thinning work in the Wykeham demonstration area



Left: recent thinning work in the Wykeham demonstration area



Right: recent thinning work in the Wykeham demonstration area



Left: development of hardwood understorey within mature pine-larch stands at Wykeham



Right: development of hardwood understorey within mature pine-larch stands at Wykeham