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## Research Factsheet Woodfuel experiment - North Thurlbar, Newton Rigg

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An experiment has been set up to assess the economic viability and environmental impacts of woodfuel harvesting in North Thurlbar, a small woodland on the University of Cumbria Newton Rigg campus estate. This factsheet describes the aim of the study and the experiment design. **Experimental plots should not be disturbed by students, staff, or other users of the site.**

### Introduction

The Forestry Commission's Woodfuel Strategy (2007) predicted that an extra 2 million tonnes of woodfuel per year could be supplied from UK forests by 2020. It suggested that under-managed woodlands could provide a high proportion of this. However, many of these woodlands are small, or divided into parcels under different ownership.

North Thurlbar is an example of these small woodlands. This study aims to assess whether the current woodfuel market makes it economically viable for owners to bring small woodlands into management and whether thinning to provide biomass for bioenergy (woodfuel) would have positive impacts on biodiversity and natural tree regeneration.

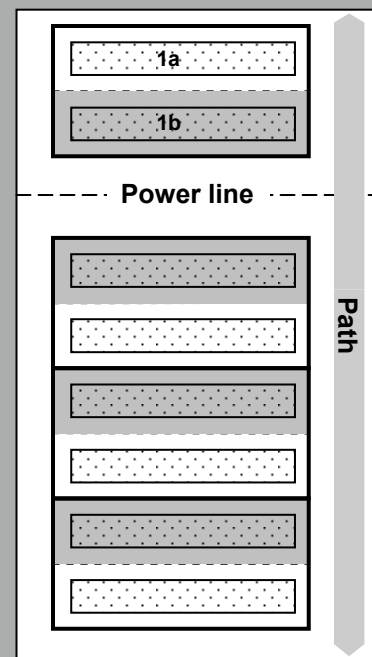
The effects of other factors, such as grazing, may mean that increased management, in the form of thinning, does not create favourable habitat features to increase biodiversity at either local or landscape scales.

### Research Questions

Three main questions are being considered in this study:

1. Can the woodfuel market make management operations in a small under-managed woodland economically viable?
2. Does thinning for woodfuel have any effect on ground flora biodiversity and natural regeneration in an under-managed woodland?
3. What effect does grazing have in thinned and un-thinned woods?

### Schematic plan of experiment design in North Thurlbar



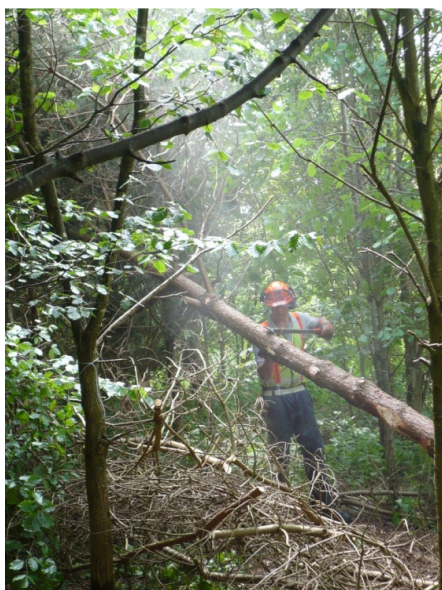
#### Key

- Site boundary
- Plot boundary
- Thinned
- Control
- ▣ Central area monitored with quadrat samples

1a Plot number



North Thurlbar post-thinning, July 2008: paired plots above power line, 1a and 1b on schematic plan. 1a - thinned plot and 1b - control plot.



**James Mingay (Forestry student) thinning in May 2008.**

### Study Site

North Thurlbar (grid ref. NY491318) is a 1 ha mixed plantation. Planted in 1991 for timber, game cover and habitat diversity, it is a typical small farm woodland. Species include Scots pine, larch, sycamore, oak and ash. It covers a rectangular area of about 200 x 50 m on a south-west facing slope and is divided into two blocks by a ride under a power line.

### Methods

Woodland structure and composition were assessed in May 2008. This included diameter at breast height (dbh) of all trees, height of every tenth tree, approximate positions of all trees and gaps in planting lines and species of all trees. These data were used to estimate the number of stems per hectare, basal area and timber volume per hectare.

### Experimental Design

Four replicate blocks (30 x 36 m) were established along planting lines and each was divided into two equal plots (30 x 18 m), giving eight paired plots in total. These are marked with small posts with fluorescent yellow marking. Four plots (one per pair) were thinned in May 2008 to remove 20-33% of stems. The remaining plots were left undisturbed as controls.

To monitor the effects of thinning on ground vegetation, ten 1 m<sup>2</sup> permanent quadrats were randomly located in the central area of each plot (the outer areas are buffer zones to minimise edge effects). Quadrat corners have been marked with 90 cm wooden stakes. To compare the effects of grazing in thinned and un-thinned plots five quadrats in each plot have been caged, with the remaining five left open. Caged and un-caged quadrats and their markers should not be disturbed.

### Economic analysis

The costs of all operations and the volume of fuelwood extracted were estimated. Prices for sale of the timber as woodfuel will be obtained from local sources to assess the economic feasibility of this type of management.

### Biodiversity analysis

Quadrats are being surveyed in June 2008 and June 2009. The number of plant species (including tree seedlings) and their percentage cover plus the percentage covered by moss, bare ground and brush/deadwood is being recorded. Data are being used to compare ground flora species diversity between thinned and un-thinned and grazed and un-grazed treatments.

### Total number of quadrats per treatment in North Thurlbar

Treatment	Quadrats
Un-thinned, un-grazed	20
Un-thinned, grazed	20
Thinned, un-grazed	20
Thinned, grazed	20
<b>Total</b>	<b>80</b>



**Stack of fuelwood from thinning**

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**Dave Atkinson (Forestry lecturer) uses small forwarder to extract felled timber in June 2008. Staked quadrats and brush can be seen in the foreground. Brush was left to decompose on site.**