

Background to the Clocaenog CCF Research Area

Overview of Clocaenog Forest

Clocaenog Forest extends to over 4,000 ha at the southern end of the Hiraethog Moor, between Ruthin and Cerrigydrudion. Elevation ranges between roughly 300 m and 500 m above sea level, and the area is underlain by Silurian slates, shales and grits. The forest is in the cool wet climatic zone of the Forestry Commission's Ecological Site Classification. Currently, DAMS windiness scores for the forest generally exceed 16, but these are under review in the light of new tatter flag data. Conifer planting began around 1930, and most stands are now second rotation crops. Clocaenog is largely stocked with conifers managed primarily for production, although management for species such as the red squirrel and black grouse is also important. Public usage of the forest for recreation is relatively limited.

Early stand management of the research area

Elevation within the research area (Map 1) ranges from around 370 m to 407 m. Soils are mostly intergrade ironpans, but vary from upland brown earths through peaty gleys to true ironpans. The ground cover prior to afforestation was almost certainly heather dominated. This influenced the site preparation before planting – which seems to have been complete shallow ploughing – and the planting of a self-thinning nurse mixture of Sitka spruce and pine. The crop was planted in 1948 and 1951, with the simple aim of maximising production under a clearfelling system. After an early thinning the stands were neglected for some time. When a late thinning produced promising signs of advance regeneration it was followed swiftly by another, and this intervention succeeded in securing the regeneration without compromising stand stability. Stand stability has been aided by early self-thinning and the original ground preparation, with the uniform shallow ploughing allowing good, even root distributions.

Tyfiant Coed and subsequent stand management

The abundant natural regeneration under a relatively uniform overstorey made the area very attractive to the staff of the *Tyfiant Coed* project at Bangor University, who were attempting to model the growth and yield of stands managed according to the principles of continuous cover forestry (CCF). CCF essentially entails managing stands so that harvesting and regeneration are achieved without large scale clearfelling, through various thinning strategies and small scale fellings. Starting in 2002, *Tyfiant Coed* and Forestry Commission staff established a number of permanent sample plots which would be used to investigate the growth of stands managed under different CCF systems. Each plot is in a block managed in a specific way; Map 2 below shows the blocks, and the

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following text describes the approach to thinning and felling in each. In addition to these interventions in the overstorey, research in the understorey has included underplanting and respacing of advance regeneration.

Block 1 contains a control area in which no interventions in the overstorey or understorey have occurred since the research area was established. This serves as a comparison with the effects of the other treatments on the growth and survival of trees and seedlings. Outside the control area, block 1 is being managed as a uniform shelterwood as in blocks 4 and 5.

Block 2, in which regeneration is more advanced than in blocks 4 and 5, is being managed as an irregular shelterwood, with thinning varying in intensity to release particularly well developed areas of regeneration. Regeneration has been respaced.

Block 3 is a combination of a group shelterwood and a strip shelterwood. Distinctive cones of regeneration originally formed in pockets of windthrow are being encouraged to widen by the gradual removal of surrounding trees. At the same time, very heavy thinnings on the eastern edge of the stand, sheltered from prevailing winds, are being used to encourage more regeneration in strips. As each strip fills with regeneration, the remaining overstorey trees will be removed and another strip will be cut immediately to the west.

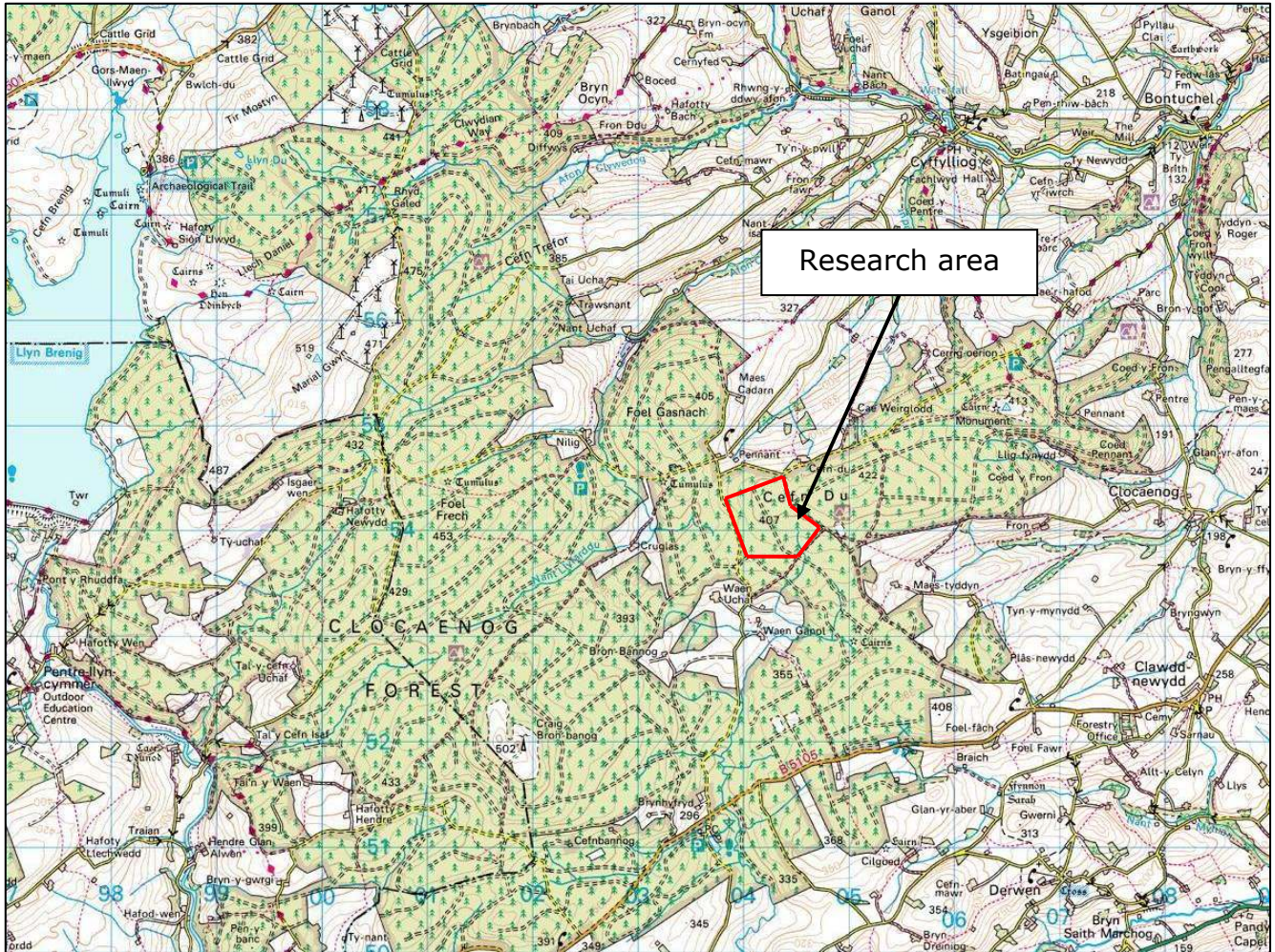
Blocks 4 and 5 are both being managed as uniform shelterwoods, thinned evenly to a low enough basal area to allow seedlings to establish in the understorey. In block 4 the natural regeneration has been respaced. In block 5, natural regeneration was cleared with a flail and an underplanting experiment was established.

Transformation to CCF has begun late in the life of the crops in these stands – which would ordinarily have been clearfelled by now – following the success of delayed thinnings. Ideally, thinnings with a view towards transformation would have taken place regularly from the outset. Thinnings according to the stand treatments described above were carried out in 2004 and 2009 with a target residual basal area of 25 m² per ha, which is considered low enough to maintain the growth of Sitka spruce advance regeneration. Thinning was regulated by selecting frame trees – well spaced trees of good form, vigour and wind stability – and crown thinning to remove their competitors. Frame trees have been marked with white paint bands. In research plots, trees to be removed were marked with paint spots; outside the plots, trees to be removed were selected by the harvester operator. So far all felling has been by harvester and all extraction has been by forwarder. A network of permanent extraction racks, reinforced in some places with stone, is vital to ensure access to all parts of stands and to prevent ground damage. Harvester head visibility is an issue in dense regeneration, but so far damage to regeneration has been minimal.

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Map 1

Location of the CCF research area within Clocaenog Forest.

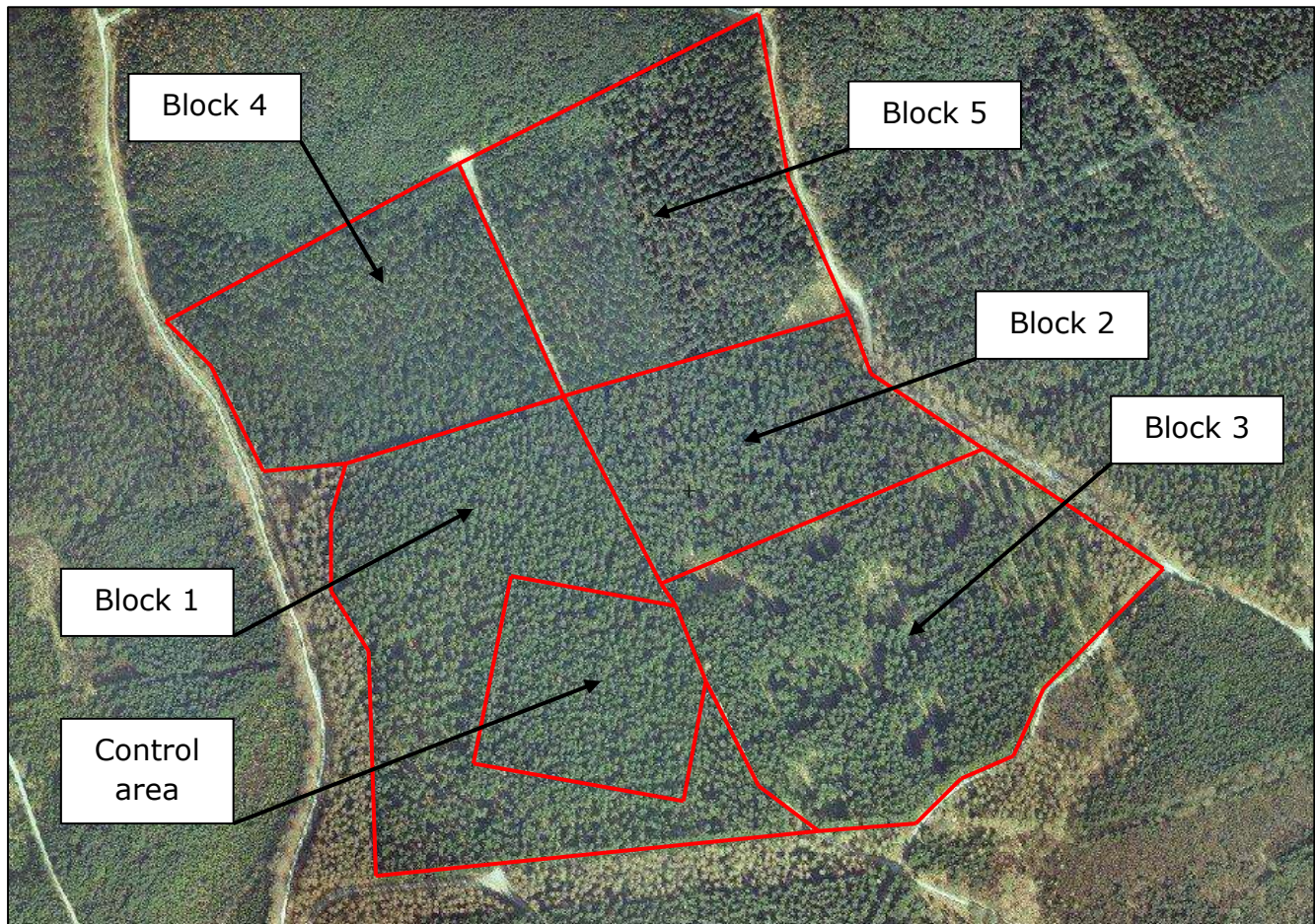


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Map 2

Blocks under different management in the research area.



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Further reading

Available for free download from www.forestry.gov.uk/publications.

Forestry Commission Information Note 29, What is Continuous Cover Forestry?

Forestry Commission Information Note 40 (revised), Transforming Even-aged Conifer Stands to Continuous Cover Management.

Forestry Commission Information Note 63, Managing Light to Enable Natural Regeneration in British Conifer Forests.