



A cluster-based approach for identifying farm forest resources to maximise potential markets

PROJECT TEAM

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BACKGROUND

Private individuals or institutions own over 330,000 ha of forest, 46% of the total forest cover, and 5% of the land area of the Republic of Ireland. Recent studies have indicated that the private forest resource has the ability to significantly contribute to the national and rural economies. Current net roundwood production from privately owned plantations was 118,000 m³ in 2008, but has the potential to increase to 2.95 million m³ in 2028. However, the full potential of the private forest resource is not being realised in Ireland, with a significant gap between potential supply and actual output. Although it is the intention of over three-quarters of private forest owners to thin their forests, only 13% of farm forest plantations in Ireland are currently thinned (Maguire 2008). Results from recent research raise doubts whether projections for timber supply from the private forests in Ireland will be realised due to the suitability of areas to be harvested with excessive roading requirements, windthrow risk and poor ground conditions the main constraints. A large number of small and fragmented plantations providing low volumes, coupled with the high cost of harvesting and timber haulage are all significant obstacles to be overcome by the sector.

OBJECTIVES

The aim of this research is to use a cluster-based approach that will aid the development of private forestry in Ireland, specifically to:

- identify large concentrations of private forestry in defined geographic locations.
- evaluate a methodology for improving timber forecast volumes from plantations to derive a cost-effective and efficient methodology.
- enable the rapid assessment of timber resources in a defined local area.

- utilise the outputs from the research for the establishment of forest grower producer groups who may wish to collaborate in the sale and harvesting of forest products and in the grouping of forest operations to achieve economies of scale.

RESULTS

Cluster analysis located 16 viable concentrations or clusters representing 42% of private grant-aided forests (88,143 ha). A study area in Mayo, Sligo and Roscommon around the town of Ballaghaderreen in Co Roscommon was chosen to evaluate the immediate potential output from thinnings. Only forests older than 12 years of age were selected for study, as these had immediate thinning potential. A field-based sample survey of 935 ha was conducted, comprising of 92 forest owners. On average, plantation sizes were small (5.14 ha), with 47% of stands less than 8 ha. The majority of stands assessed were within close proximity to the national road network with 52% of the forest area surveyed having a forest road in place.

Thinning has only been carried out in 11% of stands occupying 30% of the forest area. Thinning operations have been confined solely to pure stands of Sitka spruce. Sitka spruce is the dominant species occupying 75% (705 ha) of the area. North coastal lodgepole pine occupies 14.5% (134 ha) of the area. Broadleaf high forest comprises 3% of the forests surveyed. Sitka spruce was the most productive species with an average weighted yield class across all stands of 24 m³ ha⁻¹ yr⁻¹. North coastal lodgepole pine planted pure and in mixture had an average yield class of 12 m³ ha⁻¹ yr⁻¹, south coastal lodgepole pine had an average of 14 m³ ha⁻¹ yr⁻¹. Coniferous crops such as Japanese larch, hybrid larch and Norway spruce occurred to a lesser extent, with an average yield class of 14 m³ ha⁻¹ yr⁻¹. Across all coniferous species, yield classes in excess of those listed in the Forestry Commission tables were observed.

On average, Sitka spruce stands reach a threshold basal area for thinning, 34 m² ha⁻¹ at 14 years of age. Average standing volume per hectare across all species was 188 m³ ha⁻¹. Total standing volume for all stands (4,597 ha) is 840,698 m³ with 365,990 m³ available as small sawlog, 324,796 m³ as pulp and 149,913 m³ as large sawlog (Table 1). Overall Sitka spruce was the most productive species in the area, and accounted for 90% of the total standing volume (754,146 m³). Findings show that 71% of the surveyed area is suitable for thinning based on an

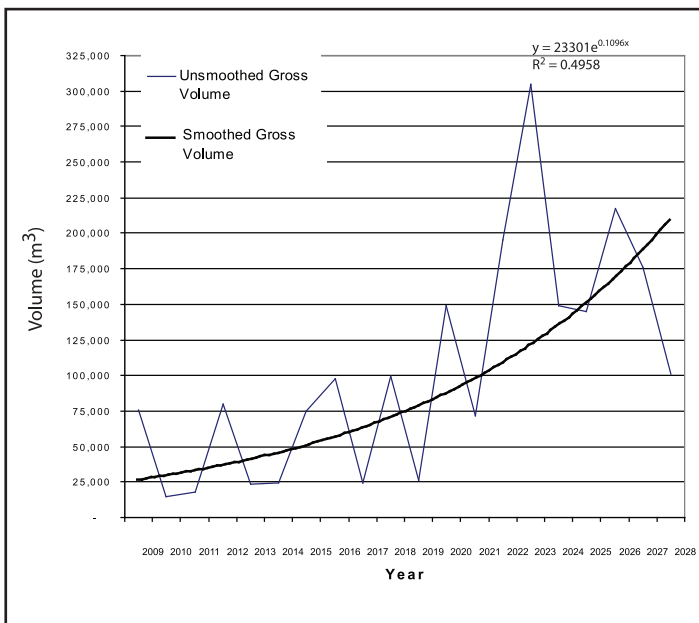
Table 1: Total standing volume for stands greater than 12 years old (4,597 ha).

Age class	Pro. area (ha)	Net area (ha)	7-13 cm	14-20 cm	>20 cm	Total
1-5	68	58	0	0	0	0
11-15	1,450	1,116	102,886	46,649	2,270	151,806
16-20	1,684	1,339	144,136	153,897	49,784	347,817
21-25	1,302	1,028	73,667	160,528	97,160	331,355
26+	60	45	4,106	4,915	698	9,720
Total	4,564	3,586	324,796	365,990	149,913	840,698

examination of basal area windthrow risk. A further 10% of the forest area was deemed past thinning stage.

Total estimated volume production for the 4,597 ha over the period 2009 to 2028 is 2.06 M m³. The unsmoothed forecast indicates peaks and troughs in the forecast from 2009 to 2028 (Figure 1). Spikes in timber output in occur throughout the forecast period. The smoothed forecast gives a better indication of the long-term increase in timber output, increasing from an average of 25,000 m³ in 2009 to 200,000 m³ per annum by 2028 (Figure 1). Large sawlog makes up the bulk of harvest material with 76% of total volume, small sawlog makes up 17%, and pulpwood 7%.

The study illustrates the potential from timber output from small-scale forest plantations through clustering the geographic concentrations of forests. The study will provide a template for developing local level forecasts and should encourage co-operation between growers and industry to achieve economies of scale in harvesting.



OUTPUTS

Farrelly, N., Clifford, B. and Green, S. 2008. Unlocking Farm Forest Potential. *TResearch* 3 (1): 22-25.

Farrelly, N., Clifford, B. and Green, S. 2008. Using GIS Cluster Analysis to Quantify Timber Production from farm forestry plantations. *Irish Timber and Forestry* 17 (5): 30-33.

Farrelly, N. 2008. *Fuelling Your Future – The Growing Forest Resource*. Proceedings from the Teagasc/COFORD/SEI Wood Energy Conference, Westport 10 September 2008. www.coford.ie/iopen24/pub/westport1.pdf

Clifford, B., Green, S. and Farrelly, N. 2008. *A cluster-based approach for the identification of private forest resources*. 2nd Annual Irish Earth Observation Symposium, Opportunities for Earth Observation in Ireland, 6-7 November 2008.

Farrelly, N., Clifford, B. and Green, S. 2008. Forest Focus Unlocking Farm Forestry. *Irish Farmers Monthly* July 2008. p42-44.

Clifford, B. 2009. *A cluster-based approach for identifying thinning material for wood energy users*. Proceedings from the Teagasc/COFORD/SEI Wood Energy Conference, Wednesday 17 June 2009, Kilkenny.

Farrelly, N. and Clifford, B. 2009. *CLUSTER – A Cluster based approach to identifying farm forest resources to maximise potential markets*. Final project report, COFORD, Dublin.

Farrelly, N. and Clifford, B. 2010a. A Cluster-Based Approach to Creating Economies of Scale in Harvest Output from Small-Scale Forests in Ireland. *Small scale forestry* (in press).

Farrelly, N. and Clifford, B. 2010b. *A preliminary evaluation of the application of multi-return LiDAR for forestry in Ireland*. COFORD Connects (in press).

Farrelly, N. and Clifford, B. 2010c. *Estimating Height in Sitka spruce Stands using airborne laser scanning data (LIDAR) in Ireland*. Internal Report, Teagasc Forestry Research, Athenry, Co Galway.

Figure 1: Forecast of production smoothed and unsmoothed for stands ready for thinning from the cluster study area over the period 2009-28.