



AIFC Guide to First Thinning of Conifers



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Introduction

This guide to first thinning has been produced by the AIFC, in order to help forest owners who wish to understand more about the details of the specific tasks involved in first thinning and the reasons why the intensity and timing of first thinning are so influential on the future development of the forest crop.

First thinning is one of the most critical operations in forestry, particularly on wet and exposed sites. First thinning not only creates space for the trees left behind but it also lays out a harvesting / access infrastructure which will be used in subsequent thinning and in final felling. The produce from first thinning is generally of low value and in some cases the cost of harvesting, extraction and haulage can outweigh the value of the material produced. This is dependent on a number of factors such as the scale of the plantation, access to the plantation, the ground conditions, the quality of the crop and the accessibility of markets.

However, first thinning is an essential operation with regard to the future profitability of the crop. Regardless of whether or not it produces a positive short term cash flow, first thinning must be regarded as an investment in the future value of the plantation. Without first thinning, it will not be possible to maximise the valuable sawlog content of subsequent thinning and the final crop. If alternative silvicultural systems are being considered, first thinning is also critical in providing silvicultural options at a later stage.

First thinning operations must be carefully timed in order to safeguard the stability of the remaining crop and also to optimise the sustained growth rate of the remaining stand.

Initial Planning

There are a number of actions required that, once completed, will facilitate the decision on whether the crop is appropriate or ready for thinning. These involve an initial assessment of the crop carried out jointly by the owner and a professional forester with experience in this area. The initial assessment is carried out when trees are approximately 8 to 10 meters tall or when the crop is 12 or 15 years old. The following operations are necessary at initial planning stage.

Brash Paths.

These are paths cut into the wood for inspecting the uniformity and productivity of the crop. Without brash paths it is not possible to make a balanced assessment of the crop as productivity often varies. Sections visible from the roadside may not be representative of the entire crop. Brash paths are usually cut by a contractor using a chainsaw but can be cut by the forest owner if he/she is sufficiently competent with a saw and has the necessary safety clothing. The paths are cut by cutting branches from facing sides of two rows of trees to a height of about 2 meters, thus creating a tunnel into the wood. Paths should be approximately 100 meters apart. It is generally a good idea to cut a couple of paths in the opposite direction to the rows, thus forming a grid of paths in the wood.

Sub-Divide Crop.



Description: In some instances, where there is a lot of variation within the crop due to different soil types, species, productivity or other reasons, it may be necessary to sub-divide the crop into a number of different management areas known as sub-compartments. Each sub-compartment will then receive specific management prescriptions best suited to its own particular conditions. In many Forests there will be sub-compartments ready for First Thinning years ahead of others planted even the same year. It is important that First Thinning should go ahead on sub-compartments when they are ready and not to wait for too long.

Determine “Top Height” of Crop.

“Top Height” is the average height of the largest DBH tree in a number of 10m x 10m (0.01 hectare) plots. The relationship between top height and the age of the crop is used in the assessment of crop productivity. Height is measured using a tool called a hypsometer of which there are a number of different types on the market. A professional forester will have such a tool and the ability to measure Top Height.

Determine Crop Productivity.

Forest Productivity is assessed using a productivity index known as “Yield Class”. Yield Class is defined as the maximum mean annual volume increment in cubic meters per hectare of a stand of trees on a particular site. It is expressed to the nearest even integer i.e. 18, 20, 22, 24 etc. For young crops at first thinning age, the relationship between Top Height and age is used in assessing Yield Class.

Determine Suitability of Stand for Thinning.

The suitability of the forest for thinning will be determined by a number of factors which will include: The productivity of the stand (Yield Class), the soil type, exposure and windthrow risk, the size of the forest and the amount of marketable material, the ease of access to the forest for harvesting and extraction of timber, the current market conditions, the availability of forest harvesting contractors. All of these issues should be discussed on site between the forest owner and a professional forester with experience in this area.

Detailed Planning

If a decision is taken that first thinning is appropriate then the following actions will be required and should be carried out by the forest owner with the assistance of a professional forester:

Detailed Harvest Plan

The Forest Service provide guidelines for harvest planning in their booklet “Forest Harvesting and the Environment Guidelines”. In summary, a harvest plan will include:

- A map showing the location of the timber crop to be harvested
- Environmental considerations including contact with relevant government and non-government bodies.
- Safety considerations and who has responsibility for different operations (The Role of the Landowner in relation to safety is clearly defined in the Health & Safety Authorities Code of Practice for Managing Safety & Health in Forestry Operations.)
- The type of thinning (line, selective etc.). Thinning type generally refers to the way in which trees to be thinned are selected. Systematic or line thinning involves removing lines of trees, normally from original planting rows, while selective thinning usually involves removal of suppressed, poorly formed, sub-dominant or competing trees to create an even distribution and size of final crop trees. First thinning normally involves a combination of line thinning and selection in between the lines. The most suitable harvesting methods and machinery are selected at harvest planning stage. The choice of

machinery and methods for first thinning will depend on factors such as thinning type, environmental constraints, terrain classification, machine availability and harvesting cost. On flat level sites there may be many options available while on more difficult sites the options become limited.

- Thinning intensity (the proportion of the crop to be removed)
- Felling & Extraction equipment to be used
- An estimate of the volume of timber to be harvested. This is usually based on the Yield Class (productivity) of the crop.
- Plans for access for harvesting, extraction and haulage of timber. Any roading requirements, including lay-bys and turning areas must be detailed in the plan. The layout



of forest roads is critical in minimising harvesting and extraction costs and maximising timber value.

- Site restoration procedures to be undertaken following harvesting operations.

Apply For Felling Licence: For the felling of timber, including thinning, it is necessary to hold a felling license issued by the Forest Service. There are two types of felling license namely Limited and General Felling Licenses.

A general felling license is a license to practice forestry and is normally issued for a period of 5 years in the context of an overall Forest Management Plan. An application for such a license can be made directly to the Forest Service on a standard application form.

For limited felling licenses, which refer to specific lots or once off felling of trees, notice of intention to fell trees must be given to the Garda Síochána. When the Gardaí receive the application they may issue a prohibition notice to the owner and notify the Forest Service to carry out an inspection of the site. Following this inspection a license will issue from the Forest Service. The Gardaí must issue a prohibition notice within 21 days of receipt of the application otherwise the applicant can proceed with the felling of the specified trees.

Prepare Access: If required, forest roads or lay-bys require construction at this stage. New entrances onto public roads require planning permission from the local authority. Normally, forest roads are constructed by a contractor. Details on forest road construction can be read in the “Forest Roading Manual” published by COFORD.

Prepare Sales Package

This involves the preparation of details to be presented to sawmilling / harvesting clients who may be interested in purchasing the timber. At this stage the owner must decide whether the timber is going to be sold “Standing”, at “Roadside” or “Delivered”. Standing

sales are when the timber is sold still standing in the wood and the purchaser employs a harvesting contractor to cut and extract the timber according to the harvest plan. Roadside sales are where the owner employs a harvesting contractor to cut and extract the timber (or does it himself), and then sells the product in a state where it is ready to be collected by a timber lorry. Delivered sales are where the owner takes on the organisation of both the harvesting and the haulage and sells the timber to the customer at the mill gate. Which ever way the timber is sold, the boundaries of the sale must be clearly marked on the ground for the harvesting contractor who will be given the harvest plan from which to work.

The sales pack must also include:

- A map of the area to be harvested
- A copy of the harvest plan
- Timber measurement details indicating the species and dimensions (mean diameter at breast height, mean tree volume, number of fell trees/ha., volume to be removed per ha.) of the product being sold. Timber measurements carried out at this stage are generally regarded as an estimate for advertising purposes only and a definitive measurement takes place after the timber is harvested, either at the roadside or at the weighbridge. Timber measurement should be carried out by a professional forester and details of different timber measurement methods can be found in the Timber Measurement Manual, published by COFORD.
- Details of Environmental & Safety considerations
- A contractual agreement (including start / finish dates and details of timber measurement and Docket system to be used.)

The sales pack should then be circulated to a number of potential purchasers, including timber processors and timber harvesting contractors. A professional forester with experience in this area will advise on the potential customers.

The Market

In order that growers bring their timber to the point of sale they must have a reasonable understanding of the market place, the products required of that market place and the relative position of small scale private concerns in the context of the industry generally.

In Ireland, the timber industry has grown and developed with a single supplier (Coillte) dominating the industry and providing the vast majority of timber to the processing sector. The processing sector (sawmills and board mills) has been innovative in developing markets



at home and abroad for timber products and there has been considerable change and rationalisation of the industry over the years. Currently 14 large sawmills, with a wide geographical spread, process approximately 90% of all timber logs supplied in the country while 2 boardmills buy pulp material in the round (material in the form of dust and chips is purchased direct from sawmills). Excluding small local markets there are potentially 16 outlets nation-wide for private timber.



When geographical distribution of these processors is taken into consideration the number of potential outlets for individual timber sales is further reduced. However, there are also a number of harvesting contracting companies and other forestry companies who may purchase timber and sell it on to various clients.

Harvesting and haulage are both expensive operations and, for first thinning, constitute a high percentage of the value of the timber to be sold. Average standing timber prices per cubic meter, by average tree size, are compiled and published on a regular basis and give forest owners a clear guide in relation to the price they should expect for their standing timber. It should be noted that these are average prices and difficult harvesting/extraction conditions and long haulage distances may reduce these prices considerably. Very small lots of timber may attract no buyers if advertised as standing sales, while roadside and delivered sales may be more saleable. Harvesting costs per cubic meter along with haulage costs per cubic meter per mile can be determined in advance to assist the forest owner in deciding on the best marketing option.

The Product

Timber harvesting can be an exacting operation and in order to maximise the revenue potential from a timber sale, growers must be aware of the various product dimensions which the processing sector require (unless of course, the timber is sold standing). The following table details standard dimensions of typical products or logs required by mills:

Product	Top (smallest) Diameter (cm)	Length (m)
Pulp Wood	7	3.0
Stake Wood	7	1.5, 1.8, 3.7
Pallet / Box Wood / Small Sawlog	14	2.1, 2.5, 3.1, 3.7
Sawlog / Large Sawlog	20	3.1, 3.7, 4.3, 4.9, 6.1

However, many mills require flexibility in relation to log specifications and therefore like to purchase a significant percentage of standing timber, allowing them the facility to cut to



their own requirement. Not all smaller dimension timber is suitable as stake wood which must be straight and with little taper. Most small dimensioned timber is sold as pulp wood.

Other markets which are developing include chipping systems and processes associated with bioenergy markets. The development of local markets or private use of timber products also warrants consideration.

Timber Measurement for Payment Purposes

Timber measurement methods for invoicing / payment vary. However, they may be grouped into three main categories namely: standing measurement, roadside measurement and measurement at the final destination (sawmill). A fourth category used predominantly in Scandinavia is harvester head measurement which utilises the computer system on sophisticated timber harvesting machines to measure the timber as it is being cut. This method has definite possibilities in Ireland. Owners must be wary of offers simply quoting payment per hectare for thinning as this may not ultimately be in their own best interest.

The main method currently employed in Ireland is the Volume / Weight Measurement System which uses the weighbridge at sawmills and converts weight to volume using a conversion factor based on samples taken from the sale. For more detail on timber measurement refer to the Timber Measurement Manual published by COFORD.

How the Sawmiller Interprets the Sales Pack Sent by the Forest Owner

Although saw millers will generally wish to view timber on sale in order to assess the timber quality and site conditions the Sales Pack will give them a good picture of what is on offer.

- The size of the sale i.e. the total sale volume, is often a good indication of its attractiveness with big sales being more sought after than small ones.
- The harvest plan, showing the site layout, access etc. will give a good indication of what the harvesting and extraction cost is likely to be.
- The average tree size and the tree species will give the miller a picture of what products may be available from the timber with different mills having different log specification requirements. This parameter also gives an indication of the cost of harvesting the site.
- The mean Diameter at Breast Height (DBH) allows the miller to determine the proportion of the different products in the sale by reference to standard tables.
- The location of the sale in relation to the mills location gives an indication of the costs associated with hauling the timber. Also its location in relation to current and future

harvesting sites and the location of haulage and harvesting contractor bases will be considered.

The Effect of Scale on Harvesting Cost

Machine relocation costs can make a very large contribution to the unit cost of harvesting (€/m³) timber particularly when small volumes of timber are being harvested. It may therefore be important to develop co-operation with neighbouring forest owners, normally through a professional forester, that foster more geographically focused operations and facilitate optimum machine utilisation.

Implementation of the Plan

Once a purchaser has been found for the timber and a contract signed, the following actions will be required of the forest owner and his / her professional forester:

Communication with and Supervision of Harvesting Contractor

A good relationship should be developed with the harvesting contractor and the harvest plan thoroughly understood and agreed at the outset. This will normally save time at a later stage and helps to ensure that operations are carried out as planned. Supervisory checks are advised to ensure that the plan is being followed.

Thinning Control

Thinning control is carried out to ensure that thinning is being done at the prescribed intensity and that the correct amount and type of timber is being removed. This is done by measuring sample plots in areas that have been harvested and ensuring the volume remaining is as prescribed. A poorly monitored thinning operation may result in over thinning or indeed under thinning both of which could reduce the future value of the crop.

Haulage, Forest Dockets and Invoice Control

It is important that the forest owner retains control of timber on the site and that payments are up-front. Timber should not be released from the site that has not been paid for. Normally, control of the removal of timber is achieved through the issuing of forest dockets which permit a timber haulier to come and collect a load of timber. The owner or the forester releases dockets to the approximate value of the timber that has been paid for.

When these dockets have been used, another installment is then due from the timber purchaser which, when paid, allows the owner or forester to issue another batch of forest dockets. It is unacceptable to have hauliers in the wood without a forest docket.

Silvicultural Management & the Cost of Thinning

Costs associated with thinning operations may in certain situations exceed the



revenues generated from the sale of the timber. The likelihood of this increases, as the volume and dimension of the harvested timber decreases and forest owners may defer the silvicultural thinning operation on this basis alone. If plantations are left unthinned their future timber potential and value may be adversely affected. When the forest owner is considering deferring thinning as a consequence of an expected negative stumpage, consideration should also be given to the potential for future revenue loss as a result of not thinning.

Long term Financial Implications

It is possible to estimate this potential loss of not thinning using a combination of timber growth models (Yield Models) and valuation methods. There are a number of well established techniques available for the evaluation of forestry and the most widely used technique is Discounted Cash Flow (DCF) which uses discount rates to equalise or compare future costs and revenues in terms of today's costs and prices. The complex calculations associated with these valuation methods can be facilitated using simple computer programmes, which a professional forester will have access to. The valuation of a stand of timber involving DCF analysis produces a figure for the Net Present Value (NPV) of the stand. It is therefore possible to produce estimated NPV values for timber stands with different management regimes using a range of discount factors. Cost and revenue figures are discounted back to the current year using various rates of return and an NPV is derived for each rate.

This Decision Flow Chart may be of assistance to private growers in assessing their options.

