

# Forecast of Roundwood Production from the Forests of Ireland 2001-2015

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## Foreword

COFORD is now in its 9th year of existence, having been set up under the STRIDE programme in 1993. The current Council was appointed in 1999 by the Minister of State at the Department of Marine and Natural Resources, Mr Hugh Byrne, who has responsibility for forestry, in 1999. The new Council identified a number of information gaps that existed within the industry. Among these was the lack of an up-to-date roundwood production forecast, from state and private forests, both north and south. The work reported in this publication aims to fill this information gap. The information is timely and will facilitate the development of industry and any review of national forest strategy.

It is also highly relevant to the work of the Timber Industry Development Group that has been established by the Department of Enterprise, Trade and Employment. The group has been charged with an extremely important task - to chart the future development of the processing sector of the forest industry. Its work is now drawing to a conclusion and will greatly benefit from improved information on raw material supply. Successful planning for the

future development of the processing sector will not occur without accurate information on future supply. While both Coillte and the Northern Ireland Forest Service have long-term production forecasts, this publication is the first step towards quantifying the *full* production potential of the forest resource of the island of Ireland. It also identifies what additional steps are needed so as to ensure that supply information is available to all stakeholders in an accurate and timely manner in future.

In conclusion I want to thank all those who supplied information to COFORD, and to acknowledge the input of all council members and in particular Mr Malcolm Beatty of the Northern Ireland Forest Service and Dr Michael Carey of Coillte.

**David Nevins**

**Chairman  
COFORD  
March 2001**

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## Executive Summary

This forecast of the roundwood production from the forests of Ireland outlines potential wood supplies for the period 2001-2015. It forecasts that annual roundwood production from Irish forests could reach five million m<sup>3</sup> by the year 2015.

The most striking forecasts relate to potential production from the private sector. This source currently has the potential to supply 221,000 m<sup>3</sup> per annum. While the actual figure supplied by the private sector lags behind potential supply at present, a number of initiatives are underway to increase the market focus of the private timber growers. It is estimated that the private sector supplied only 100,000 m<sup>3</sup> of roundwood in 2000, just 50% of the potential. This forecast does not attempt to offer reasons for this shortfall. It does, however, give recommendations on how to redress this problem over the period ahead.

Figure 1 shows that the potential supply from the private sector will rise steadily during the forecast period, to over 1 million m<sup>3</sup> by the year 2015. This will account for 20% of the total potential roundwood supply. Coillte and the Northern Ireland Forest Service also predict increased roundwood production over the period 2001-2015. Both of these organisations will have a change in the product assortment they supply. In particular, sawlog production will increase significantly, corresponding with a drop in their production of pulpwood. The private sector, however, will supply primarily small diameter material suitable for board mills or possible future combined heat and power plants (CHP).

The total annual pulpwood production potential will rise from 835,000 m<sup>3</sup> in 2001 to 1,508,000 m<sup>3</sup> by 2015. Over the same period the production of small sawlog will rise from 1,261,000 m<sup>3</sup> in 2001 to 1,393,000 m<sup>3</sup>. Large sawlog production potential will rise from 1,495,000 m<sup>3</sup> in 2001 to 2,091,000 m<sup>3</sup>. The majority of this rise will occur in the first six years of the forecast period, reaching 2,021,000 m<sup>3</sup> in 2006.

The forecast outlines the need for a more comprehensive national forest inventory to include a sample ground survey. This would provide more data on the growing stock of the different forest types. It is of critical importance that the processing industry is provided with reliable supply forecasts so that the processing capacity can be installed to handle the increasing amount of roundwood coming on stream.

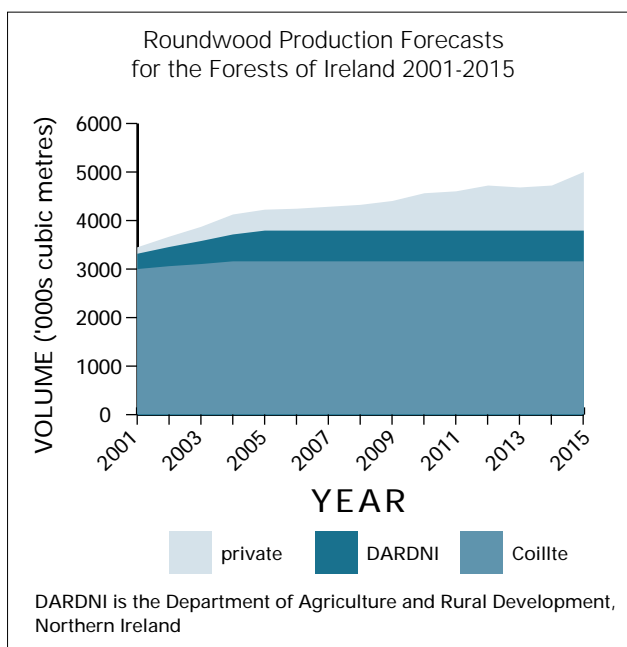


FIGURE 1: COMBINED ROUNDWOOD PRODUCTION FORECASTS 2001-2015

## Introduction

Ireland's private forest estate is expanding at a rate of about 12,500 ha per annum. Although accurate information is available regarding the area and location of new plantations, no accurate information is available on wood production potential of this newly established resource.

The processing sector is investing heavily at present on the strength of wood production forecast figures, published by Coillte. All provisional forecasts to date indicate that the volume of sawlog that will be available to the processing sector will rise dramatically over the coming years. This trend is repeated in Northern Ireland and, more generally, in the rest of the United Kingdom. The impact of increased wood production will be significant in terms of competition for markets. In order to maintain reasonable prices for timber, processing capacity must grow in line with the production of roundwood, both sawlog and pulpwood. Equally so, new markets must be developed for sawmilling co-products such as woodchip and sawdust.

There is an acute need for reliable forecasts to allow the private sector to enter the production phase of forestry in a planned and managed manner. This

forecast covers the period 2001-2015 and aims to provide the best possible estimate based on national information currently available. It is based largely on a desk study and no recent ground survey of the private sector forest estate has been undertaken.

The Forest Inventory and Planning System, FIPS, initiated by the Forest Service is designed to address the requirements of national forecasts (Fogarty *et al.* 2000) but the process is not yet complete and comprehensive growing stock data for private forests are not yet available. However, a Forest Classification System, FCS, has been devised as part of FIPS. The trends indicated in our provisional forecast can realistically be expected to materialise.

This report describes how data additional to that from FIPS were sourced, and what assumptions were made regarding their use.

The figures provided in this forecast are a best estimate of the production potential of the estate. For the production potential outlined in this forecast to be achieved it is vital that management systems are in place. These include establishment practices that ensure fully productive crops and thinning regimes that deliver intermediate production.

## Background

Estimates of the area of woodland in Ireland have been made since the 1800s and inventories to determine the volume of wood available have been undertaken since the early 1940s (Gallagher and Purcell 1976). A critical shortage of timber during World War II persuaded the state to conduct a census of woodland to determine standing volume in Irish forests and hedgerows. Woodlands of 1 ha and over were estimated to total c.44,000 ha comprising 2.7 million m<sup>3</sup>, including firewood.

Three inventories of state forests followed in 1957, 1968, and 1978 and an Inventory of Private Woodlands (IPW) was completed in 1973 and published in 1979 (Purcell 1979). The ground survey for this inventory was conducted between 1970 and 1973. It is, therefore, some 30 years since a comprehensive inventory of the private forest resource has been undertaken. The IPW estimated the forest area at 47,901 ha of high forest and 33,102

ha of scrub. A forecast of annual production of conifer and broadleaf timber production (including firewood) estimated the amount at 98,000 m<sup>3</sup> per annum.

Since the establishment of Coillte in 1989, the company undertakes a continuous, GIS-based, stand-based inventory of its forest. Similarly, the Northern Ireland Forest Service has a comprehensive database of its growing stock, collected through a network of permanent plots. These two organisations are, therefore, in a good position to give indicative medium to long-range wood production forecasts.

However, due to the disparate ownership structure of the private forest estate no such production forecast for the private sector has been compiled. This report is the first such attempt to quantify the potential roundwood production from the private sector.

## Methodology

Three primary supply sources of roundwood exist in Ireland:

- Coillte, the Irish Forestry Board
- Northern Ireland Forest Service
- Private sector

This report aims to combine the potential production from each of these sources to provide a complete forecast of roundwood production.

### Coillte

Coillte maintains a sophisticated GIS that maps their complete forest estate and stores data on the growing stock in each of their forest properties. It enables Coillte management to closely predict future production potential. Currently, Coillte are the predominant supplier roundwood to the processing sector in Ireland. However, the significant afforestation activity by the private sector in recent years will ultimately provide an additional supply of roundwood to Coillte. It must be acknowledged that this scenario is some years away and Coillte will continue to be the major supplier of roundwood on this island for the next 20-30 years.

Coillte has recently issued a detailed ten-year production forecast to the processing sector. It details regional supply and provides provisional assortment forecasts. It is the source of the production data which will be presented in this forecast. While the most recent forecast from Coillte focuses on the period 2001-2010 it is expected that the organisation's production potential will level out from 2010-2015.

### Northern Ireland Forest Service

The Northern Ireland Forest Service is an agency of the Department of Agriculture and Rural

Development, Northern Ireland (DARDNI). It is responsible for the management of the public forest estate in Northern Ireland. The organisation has a long history of gathering growing stock and growth increment data through a series of permanent plots. This ongoing programme of data collection has provided DARDNI with information on future production potential. It publishes this information in its Annual Report. Figures from the Annual Report have been supplemented with additional data from the Forest Service database for use in this forecast.

### Private sector

The methodology for gathering data on privately owned forests is more complicated than for either Coillte or the Northern Ireland Forest Service. The afforestation policy to achieve a national forest cover of 17% was confirmed in 'Growing for the Future', the Government's strategic plan for the development of the forestry sector in Ireland, published in 1996. The Forest Service responded to this need by initiating pilot inventory projects in the period 1993-1996. This initiative led to the Forest Inventory and Planning System (FIPS) being commissioned in 1995 (Gallagher *et al.* 1996).

Three data sources were used to generate the private sector production forecast. The sources used were:

- 1 FIPS - Forest Inventory and Planning System;
2. GAPF - Grant Aided Private Forest data are collated in National Forest Statistics, which have been compiled annually since the 1980s (Anon., 1998);
3. IPW - Inventory of Private Woodlands (1973).

A brief description on each of these data sources is given below.



## Forecast of Roundwood Production from the Forests of Ireland 2001-2015

### 1. FIPS - Forest Inventory and Planning System

FIPS has five discrete but compatible components:

1. a forest classification system comprising of 20 species and development classes;
2. field sampling to characterise these classes and to generate production forecasts;
3. soil classifications related to productivity;
4. landscape categories;

5. a Grants and Premium Administration System (GPAS) which links the inventory with grant aided forests.

Since this ambitious process began FIPS has reached and delivered on many milestones. In particular all forest parcels greater than 0.2 ha have now been mapped. In addition, satellite and orthophotographic images are available for all forest properties. Admittedly these images are all pre 1996, but this is still a significant achievement for Ireland when benchmarked at an international level and with other nations with a forest estate of similar scale.

**TABLE 1: FIPS - FOREST CATEGORIES AND CORRESPONDING AREAS AND LAND COVER**

Class ID	Class Category	Class Maturity	Class Genus Maturity	Parcel Area (Ha)	Land Cover %
1	Conifer forest	Young	Spruce	88,255	1.23
2	Conifer forest	Mature	Spruce	92,319	1.29
3	Conifer forest	Young	Larch	1,030	0.01
4	Conifer forest	Mature	Larch	3,497	0.05
5	Conifer forest	Young	Pine	28,290	0.40
6	Conifer forest	Mature	Pine	32,573	0.46
7	Conifer forest	Young	Pine/spruce mix	10,340	0.14
8	Conifer forest	Mature	Pine/spruce mix	17,240	0.38
9	Conifer forest	Young	Other conifers	6,402	0.09
10	Conifer forest	Mature	Other conifers	9,308	0.13
11	Broadleaf forest	Young	Oak	216	0.00
12	Broadleaf forest	Mature	Oak	5,574	0.08
13	Broadleaf forest	Young	Beech	163	0.00
14	Broadleaf forest	Mature	Beech	3,064	0.04
15	Broadleaf forest	Young	Other broadleaves	5,870	0.08
16	Broadleaf forest	Mature	Other broadleaves	42,655	0.60
17	Mixed forest	Young		4,153	0.06
18	Mixed forest	Mature		24,192	0.34
19	Other forests			1,807	0.03
20	Cleared*			184,505	2.58
<b>Total</b>				<b>571,462</b>	<b>7.99</b>

\* The category Cleared includes both reforestation and recent afforestation.

TABLE 2: FIPS OWNERSHIP CATEGORIES

Ownership	Forest Type	Area (ha)	Area (ha)
<b>Coillte</b>			<b>374,381</b>
<b>Coillte Farm Partnership</b>			<b>860</b>
<b>Dúchas</b>			<b>2,836</b>
<b>Private</b>			
<i>Grant Aided</i>	Planting Grant Application	102,701	102,701
<i>Non Grant Aided</i>	Cleared	11,498	
	Conifer forest	12,618	
	Broadleaf forest	48,988	
	Mixed forest	15,796	
	Other forest	1,784	
	<b>Total non grant aided</b>		<b>90,684</b>
	<b>Total Private</b>		<b>193,385</b>
	<b>Overall Total</b>		<b>571,462</b>

FIPS has involved the definition of 20 forest categories. These are available at a county and national level and are outlined in Table 1.

The figures in Table 1 cover the total forest estate up to 1995. In the following years afforestation has proceeded at the rate outlined in Table 3, bringing the total forest estate at the end of 2000 to approximately 649,918 ha, 9.09% of the total land area.

The national forest estate has also been divided by ownership. Four different ownership classes have been identified and are detailed in Table 2. Levels of accuracy have also been confirmed for the classification of forest categories.

While FIPS offers an excellent platform on which to build a complete national forest inventory it does have some constraints. A sample ground survey to assign yield class, age class and precise species composition to forest categories has not yet been initiated. Also, the ownership categories have not been assigned to the 20 forest categories. This limits the possibility of analysing production from private forests. Soils and landscape classifications are progressing but are, as yet, incomplete. However, it should be pointed out that this aspect of FIPS is on schedule and does not necessarily affect the forecast of roundwood production. The final constraint is that the full functionality of GPAS has not yet been achieved so the FIPS data, while giving complete data up to

1995, are quickly becoming dated. When the GPAS and FIPS data can be seamlessly amalgamated the resulting database will be one of the most comprehensive, up-to-date, national, forest location and ownership information sources available globally.

As stated above FIPS provides useful information on the current structure of private forests. The area of forests under private ownership, including parcels over 0.2 ha, as assessed in 1995 is categorised as:

- current grant aided forests (including Western Package),
- non grant aided forest types
  - Conifer forest
  - Broadleaf forest
  - Mixed forest
  - Other forest
  - Cleared

This allows some comparison between the current status of private forests and their status when assessed in the IPW in 1973.

Although the ownership and development categories are currently available on a total forest basis only, an estimate of their extent in private forests was approximated by applying national percentages to the private woodland data.

#### FIPS forest Categories

A total private forest area of 193,385 ha has been identified. Of this 102,701 ha are grant-aided forests, including planting under the western package

scheme of the 1980s. This includes planting up to the end of 1997. Non grant-aided forest comprises 90,684 ha of which 11,497 ha have been classified as cleared.

The non-grant aided high forest is classified as follows:

a. Conifers 12,618 ha

This includes 'pure' and 'mixed' conifers, surveyed in the IPW, plantings between 1970-80 and some 'non Western Package' areas planted since 1980. Also, small woodlands not picked up by IPW would be included.

b. Broadleaf forest 48,988 ha

This includes most IPW broadleaf woodlands (pure and mixed), some scrub and small areas of forest planted before 1980 or in 'non Western Package' plantings.

c. Mixed forest 15,776 ha

This is defined in FIPS as broadleaf/conifer mixtures where the minor category is at least 20% of the canopy. This should include some of the IPW conifer or broadleaf mixtures but the IPW definition of mixed woodland is not clear - so the connection between FIPS and IPW forests is tenuous.

d. Other forest 1,784 ha

This category comprises small woodlands less than 2.0 ha in area picked up by remote sensing in FIPS.

e. Cleared 11,497 ha

This probably represents IPW conifer forests - cleared, non-grant aided areas replanted in the late 1990s

For forecasting purposes, categories (a), (b) and (c) are linked to IPW data to estimate production.

## 2. GAPF - Grant Aided Private Forestry

Grant aided planting since 1980 has been recorded on a national and county basis and national forestry statistics are compiled and disseminated by the Forest Service. It provides a very complete history, therefore, of afforestation activity over this period. This is shown in Table 3. Appendices A and B show a breakdown of afforestation activity by county, for both the private and public sectors, respectively.

TABLE 3: AFFORESTATION ACTIVITY (HECTARES) 1980-1999<sup>1</sup>

YEAR	PUBLIC	PRIVATE	TOTAL
1980	5,922	268	6,190
1981	6,099	275	6,374
1982	6,016	498	6,514
1983	5,968	327	6,025
1984	5,192	473	5,665
1985	4,625	617	5,242
1986	4,688	2,280	6,968
1987	5,395	2,954	8,349
1988	7,111	4,596	11,707
1989	6,629	8,497	15,126
1990	6,670	9,147	15,817
1991	7,855	11,292	19,147
1992	7,565	9,134	16,699
1993	6,827	9,171	15,998
1994	6,622	12,837	19,459
1995	6,367	17,343	23,710
1996	4,426	16,555	20,981
1997	851	10,583	11,434
1998	2,926	10,002	12,928
1999	891	11,776	12,667
<b>TOTAL</b>	<b>108,375</b>	<b>138,625</b>	<b>247,000</b>

<sup>1</sup>Note: The total afforestation in 2000 was 15,800 ha, a breakdown between public and private is not yet available

Species distribution is only available for recent years. However, the GPAS element of FIPS may be able to provide data covering a longer period when the system is fully operational. It can be assumed however, that Sitka spruce constituted most grant-aided planting from 1980 to the present, with increased percentages of non-conifers and broadleaves, occurring only since the early to mid 1990s. The area of grant aided forestry which features in the production forecast (2001-15) will, therefore, be predominantly spruce. GAPF statistics are available up to 1999.

An analysis of the size distribution of the 8,667 grant approvals for the period 1990-1996 indicates that the average plantation was 9.9 ha. This is quite a small unit to economically. However, Table 4 also shows that 2,472 of these approvals were for plantations in excess of 10 hectares and these collectively account for 69% of the total area established.

Figure 2 shows these data more clearly. The largest areas of the total private planting programme in the

TABLE 4: SIZE DISTRIBUTION OF AFFORESTATION GRANT APPROVALS 1990-1996

Size (ha)	No. of approvals	Area (ha)	%
<2	1,383	1,693	2
>2<=4	1,950	5,899	7
<4>=6	1,277	6,354	7
<6>=10	1,585	12,567	15
<10>=20	1,514	21,235	25
<20>=50	784	23,090	27
<50>=100	137	9,524	11
>100	37	5,119	6
<b>TOTAL</b>	<b>8,667</b>	<b>85,480</b>	<b>100</b>

period 1990-1996 consists of plantations between 10 and 50 ha, while 19% of the area consists of plantations greater than 50 ha in size.

This data is encouraging as the economic viability of isolated plantations less than 10 ha is of concern. The cost of roading such plantations will place a high cost on harvested roundwood.

### 3. IPW - Inventory of Private Woodlands

The IPW represents the last comprehensive assessment of private forests and some conclusions can be drawn from it. However, the information is now almost 30 years old. The IPW data are not fully comparable with those of FIPS but by combining both one can arrive at some conclusions.

IPW categories are:

- a. Conifer high forest
- b. Broadleaf high forest
- c. Unstocked and undeveloped
- d. Scrub

Conifer and broadleaf forests were identified in 10-year age categories. Forests established before 1900, pure or mixed, and all large estates were assessed with a 9% aerial survey sample to supplement the data.

- a) Conifer high forest - 1,180 ha (50/50 pure and in mixture)

The main species were Sitka spruce, Norway spruce, Douglas fir, larches and pine (mainly Scots pine).

It can be assumed that many of the older conifer stands have been felled, though some are likely to have remained. These would include low yield class Scots pine and larch and spruce and Douglas fir stands less than 50 years old. These areas would be due a final thinning and/or clear felling within the forecast period, and would also feature in FIPS.

- b) Broadleaf high forest 33,000 ha

The area of broadleaves in IPW is unlikely to have changed significantly due to many constraints on broadleaf felling, though some commercial stands will have been felled. The area

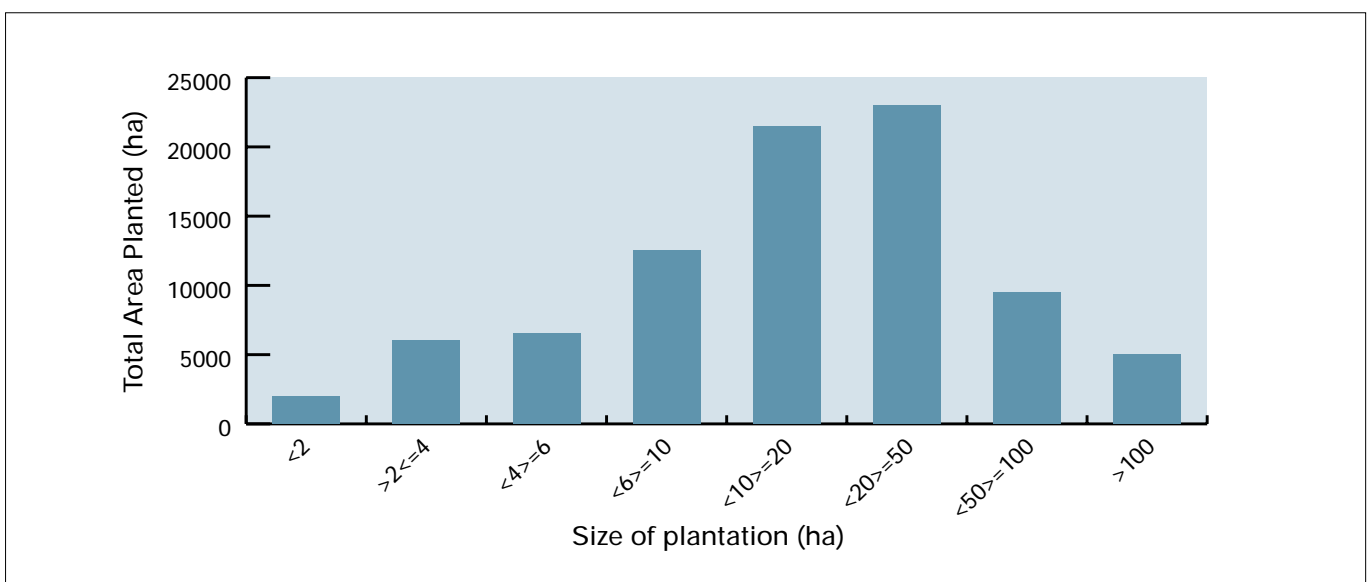


FIGURE 2: SIZE DISTRIBUTION OF PRIVATE PLANTING APPROVALS 1990-1996

of broadleaves in FIPS tends to confirm that the area has stayed more or less constant.

c) Scrub 33,000 ha

It is likely that considerable areas disappeared during the 1970s and 1980s and that some of the remaining scrub areas have found their way into FIPS private forest and D'chas categories. Scrub woodland will not influence timber production but suggests a conservative approach when estimating production from older private broadleaf forests.

d) Cleared and unproductive 2,000ha

This was a relatively small area, probably permanently unstocked or reforested by now.

Other data sources

Forestry Commission yield, production and stand assortment models were used in assigning production data to forecast areas (Hamilton and Christie 1971). The Coillte forecast was used to cross check on per hectare yields (Anon 2000). This is normally lower than production models indicate - probably due to various attritional factors such as windthrow.

Cross reference was also made to Forest Service felling licence approvals, to determine the level of felling activity in the private sector over recent years. This does not provide a great deal of insight, as the number of felling licences, in the absence of some indication of the areas or volumes to which they apply, is a poor indicator of volume production. The data do, however, show that there was steady felling activity in the private sector.

Collating the data sources

The above data sources were used as the foundation for generating the forecast. The forecast for the private sector is the most complicated of the three main sources to quantify, due to the fact that no accurate, recent ground surveys have been conducted. In the absence of physical measurements of the growing stock a number of assumptions had to be made throughout the forecast. These assumptions are given in the next section, for each of the forest types.

Figure 3 illustrates the various data sources that were used. It also shows how these sources were combined to give the total roundwood production forecast. The forest types referred to in this diagram are explained in detail in the following section.

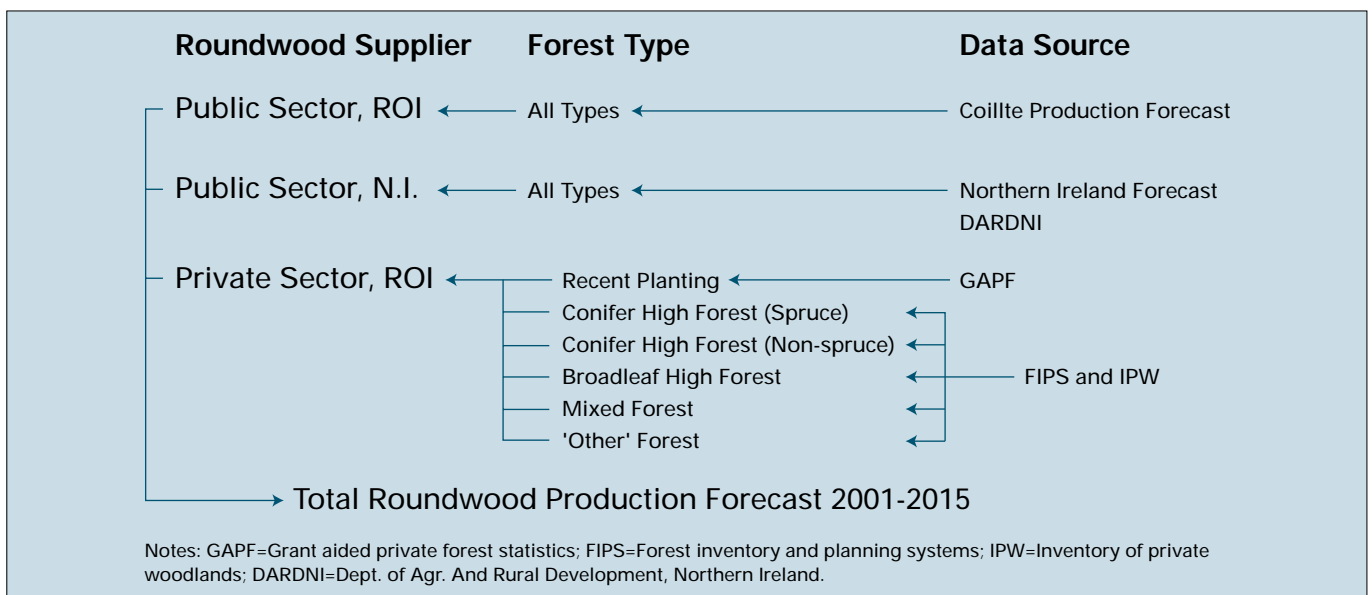


FIGURE 3: COMBINING THE DATA SOURCES TO GENERATE THE FORECAST

## Generating the Forecast

It is obvious that a proportion of the data available are simple estimates of area. Little information is available on the growing stock of the areas of private forestry. A number of assumptions were made to assign production rates to the known forest categories. The estimated production forecast for the private sector was built up from each of the forest types identified as being in private ownership by FIPS. The forecasts from each of the forest types combine to give the national production forecast for the private sector in Ireland. Production forecasts from Coillte and the Northern Ireland Forest Service are then added in to give the total roundwood production forecast for the island.

### Forecast from each private sector forest type

Analysing FIPS and IPW data identifies six forest types in private ownership. These are:

1. GAPF planted since 1980
2. Non grant aided conifer high forest (spruce) identified in FIPS and IPW
3. Non grant aided conifer high forest (non-spruce) identified in FIPS and IPW
4. Non grant aided conifer plantations identified in FIPS but not in IPW
5. Non grant aided mixed and other forests
6. Non grant aided broadleaf forest.

The forecast for each of these categories was calculated separately using the assumption and yield models described below. Where reduction factors have been used the reduction was made to the yield per hectare given in the yield models.

**1. Grant aided private forestry (GAPF) - thinnings**  
The areas planted since 1980 are recorded in Forest Service statistics as shown in Table 3. The forecast assumes an average yield class of 18. The species is assumed to be Sitka spruce and the assumed management regime was for a first thinning to be carried out at age 20 and on a five year cycle thereafter.

A number of constraints were factored into the calculations. A 15% reduction of planted areas has been included to account for roads, ridelines and firebreaks. A further 10% reduction has been included to account for poor 'Western Package' planting and other, less productive conifers. To account for the change in species composition policy and the availability of land more suitable for broadleaves, a further 10% reduction on areas has been factored-in for planting in later years. This will further reduce thinning production from 2011.

The net effect of these reductions is an average assumed production of 47 m<sup>3</sup>/ha for 2001-2010. This reduces to 41 m<sup>3</sup>/ha from 2011 on. Using these productivity rates the potential roundwood supply from this forest type is as shown Table 5.

### 2. Non grant aided conifer high forest (spruce) identified in IPW and FIPS

The IPW recorded c. 15,000 ha of coniferous high forest, broken down into 10-year age class categories. Forty five percent of this figure is considered to be pure spruce stands. It is highly likely that all residual IPW conifers would have been recorded in FIPS. Table 2 shows that FIPS has identified 12,618 ha of CHF in private ownership. For the purpose of this forecast, the assumption has been made that all spruce planted pre 1950 has been felled. This leaves a residual 2,800 ha of spruce CHF from the original IPW.

TABLE 5: GAPF PRODUCTION POTENTIAL

Year	Total Area (ha)	1st thinning (‘000 m <sup>3</sup> )	2nd thinning (‘000 m <sup>3</sup> )	3rd thinning (‘000 m <sup>3</sup> )	Total (‘000 m <sup>3</sup> )
2001	268	13	-	-	13
2002	275	13	-	-	13
2003	498	23	-	-	23
2004	327	15	-	-	15
2005	473	22	-	-	22
2006	617	29	13	-	42
2007	2,280	107	13	-	120
2008	2,954	138	23	-	161
2009	4,596	216	15	-	231
2010	8,497	399	22	-	421
2011	9,147	375	29	13	417
2012	11,292	463	107	13	583
2013	4,134	374	138	23	535
2014	9,171	376	216	15	607
2015	12,837	526	399	22	947

For ease of calculation, and in the absence of further information, an average crop model was applied to this resource. The crop model chosen was that of Norway spruce YC18. It is assumed that clearfelling this resource will occur at a rate of 186 ha per annum over the forecast period at an age 55. It is also assumed the half of the area will receive a final thinning over a 7-year period 2001-2007 at age 50. This would see 200 ha per annum thinned over the next seven years.

Again, a 15% reduction factor has been used to account for roads, rides and firebreaks. A further 15% reduction has been made to account for attrition and stock reduction. Using the Norway spruce model, thinning yields were calculated at 46 m<sup>3</sup>/ha and clearfelling at 374 m<sup>3</sup>/ha, after reduction. The production from this source has the potential to yield the volumes outlined in Table 6. Obviously the time at which private growers offer their produce for sale will depend on the prevailing market conditions.

TABLE 6: CONIFER HIGH FOREST (SPRUCE) ROUNDWOOD PRODUCTION POTENTIAL

Year	Thinning Volume (‘000 m <sup>3</sup> )	Clearfell Volume (‘000 m <sup>3</sup> )	Total (‘000 m <sup>3</sup> )
2001	9	70	79
2002	9	70	79
2003	9	70	79
2004	9	70	79
2005	9	70	79
2006	9	70	79
2007	9	70	79
2008	-	70	70
2009	-	70	70
2010	-	70	70
2011	-	70	70
2012	-	70	70
2013	-	70	70
2014	-	70	70
2015	-	70	70



Each owner should bring forward or postpone clearfelling to optimise market prices. However, owners would be advised to conduct financial appraisals to aid this decision, as postponing clearfelling in the hope of a rise in roundwood prices may not be profitable when inflation and the opportunity cost of the land are factored in.

### 3. Non grant-aided conifer high forest (non-spruce) identified in IPW and FIPS

The remaining 55% of the IPW coniferous high forest comprised non-spruce stands. Here, the assumption was made that all non-spruce stands planted pre-1930 were felled leaving a residual area of 5,700 ha. The species represented include Douglas fir, pines and larches with small areas of other diverse conifers. Scots pine was the largest single category. For this reason a Scots pine model of YC 8 was used to represent the average production of this category. It is assumed that clearfelling of half of this resource will occur, at a rate of 186 ha per annum, over the forecast period. It is also assumed the half of the area will receive a final thinning over a 7-year period 2001-2007. This would see 407 ha per annum thinned over the next seven years.

Again, a 15% reduction factor was used to account for roads, rides and firebreaks. A further 15% reduction was made to account for attrition and stock reduction. Using the Scot's pine model, thinning yields were calculated at 20 m<sup>3</sup>/ha and clearfelling at 240 m<sup>3</sup>/ha, after reduction. Table 7 outlines the production from this source over the forecast period.

### 4. Non grant-aided conifer plantations identified in FIPS but not in IPW

Of the 12,618 ha identified by FIPS as conifer high forest, 8,500 ha is accounted for by the previous two categories. This leaves some 4,000 ha of additional conifers not accounted for by the IPW. Species data are not available but it is most likely that this category represents Sitka spruce planted outside of

TABLE 7: CONIFER HIGH FOREST (NON-SPRUCE) ROUNDWOOD PRODUCTION POTENTIAL

Year	Thinning Volume (‘000 m <sup>3</sup> )	Clearfell Volume (‘000 m <sup>3</sup> )	Total (‘000 m <sup>3</sup> )
2001	8	45	53
2002	8	45	53
2003	8	45	53
2004	8	45	53
2005	8	45	53
2006	8	45	53
2007	8	45	53
2008	-	45	45
2009	-	45	45
2010	-	45	45
2011	-	45	45
2012	-	45	45
2013	-	45	45
2014	-	45	45
2015	-	45	45

grant schemes, in the period 1970-1990. An average production capacity equivalent to Sitka spruce YC16 is assumed. No clearfelling will, therefore, occur over the forecast period. It is assumed, however, that the total area is thinned, with the usual reduction of 15% to account for roads, rides and firebreaks. Due to the species uncertainty a further 20% reduction was also factored in when calculating the production potential outlined in Table 8.

### 5. Non grant aided mixed and other forest

A total of 15,762 ha of mixed forest and 1,780 ha of ‘other’ woodland have been identified by FIPS. This is a substantial area about which little is known. The ‘other’ woodland component comprises small parcels of between 0.2 and 0.5 ha. It was assumed that this area would not be productive over the forecast period and was excluded. The age ratio of all

TABLE 8: CONIFER HIGH FOREST IN FIPS, NOT ACCOUNTED FOR IN IPW

Year	Thinning Volume (‘000 m <sup>3</sup> )	Clearfell Volume (‘000 m <sup>3</sup> )	Total (‘000 m <sup>3</sup> )
2001	32	-	32
2002	32	-	32
2003	32	-	32
2004	32	-	32
2005	32	-	32
2006	32	-	32
2007	32	-	32
2008	32	-	32
2009	32	-	32
2010	32	-	32
2011	32	-	32
2012	32	-	32
2013	32	-	32
2014	32	-	32
2015	32	-	32

mixed forests under FIPS is 83% mature and 17% young. Therefore, the assumption was made that 83% of the 15,762 ha of mixed forest was at the productive stage.

It is extremely difficult to assign a yield model to this category. The broadleaf/conifer mixture is also unknown. Using a low YC model with a significant reduction for low stocking levels it was calculated that this resource would only produce 3 m<sup>3</sup>/ha/annum of softwood and 0.4 m<sup>3</sup>/ha/annum of hardwood, on average, across the full 13,082 ha assumed to be productive. The potential production from this category is shown in Table 9.

## 6. Non grant aided broadleaf forest

The IPW identified 33,000 ha of broadleaf high forest and 33,000 ha of scrub. FIPS has identified 44,988 ha of broadleaf forest in private ownership, in

TABLE 9: PRODUCTION FROM PRIVATE MIXED AND ‘OTHER’ FORESTS IDENTIFIED IN FIPS

Year	Conifer (softwood) Volume (‘000 m <sup>3</sup> )	Broadleaf (hardwood) Volume (‘000 m <sup>3</sup> )	Total (‘000 m <sup>3</sup> )
2001	39	5	44
2002	39	5	44
2003	39	5	44
2004	39	5	44
2005	39	5	44
2006	39	5	44
2007	39	5	44
2008	39	5	44
2009	39	5	44
2010	39	5	44
2011	39	5	44
2012	39	5	44
2013	39	5	44
2014	39	5	44
2015	39	5	44

addition to the broadleaf component of the previous category, mixed high forest. The FIPS figure probably includes a substantial area of the IPW forest plus areas not identified as high forest at the time. This could include some of the scrub area.

The forecast from the broadleaf forest is based on the conservative assumptions made in IPW. While most of the IPW woodlands are still extant, the status of scrub is unclear, and to what extent, if any, scrub features in FIPS. The extent to which broadleaf forests are managed will affect hardwood production. Some D’chas woodlands may have been classified as private forest

Again, it is extremely difficult to select a YC model that would represent this varied resource. While some good oak, beech, sycamore and ash woodland

## Forecast of Roundwood Production from the Forests of Ireland 2001-2015

may achieve YC 6 and above, it is quite likely that such productivity will not be reached in most cases. The management regime of this category is likely to be very varied and could range from commercial felling on maturity to stands constrained by conservation requirements. It was assumed that 20% would be completely unproductive and the remaining areas would yield very low production of about 0.8 m<sup>3</sup>/ha/annum, including a high proportion of firewood. This adds to a potential annual production of 29,000 m<sup>3</sup> per year over the forecast period. The quality of hardwood logs will vary greatly. Obviously, the broadleaf resource requires a different mensuration approach to conifers and merits closer assessment as an individual project.

Table 10 shows the combined forecasts from the six different forest types identified in the private sector.

The production outlined is shown on a county in Appendix C.

Examination of Table 10 for softwood and hardwood production shows that the vast majority of the production from the private sector will be softwood for the foreseeable future. It will be several decades before the broadleaf resource currently being planted produces hardwood in significantly greater quantities than at present. The total production from the private sector is shown in Figure 4.

Figure 4 clearly illustrates the dramatic rise in the production potential of the private forest sector. This is largely due to the fact that the earliest grant aided forests are now reaching the production stages. For this potential to be realised a number of factors must be put in place. These are discussed under recommendations.

**TABLE 10: FORECAST OF POTENTIAL ROUNDWOOD PRODUCTION (TO 7 CM TOP DIAMETER) FROM PRIVATE FORESTS**

Year	Grant aided Private Forest ('000 m <sup>3</sup> )	Conifer high forest (spruce) ('000 m <sup>3</sup> )	Conifer high forest (non-spruce) ('000 m <sup>3</sup> )	Conifer high forest in FIPS but not in IPW ('000 m <sup>3</sup> )	Conifers from private mixed and 'other' forests ('000 m <sup>3</sup> )	Broadleaves from private mixed and 'other' forests ('000 m <sup>3</sup> )	Broadleaves ('000 m <sup>3</sup> )	TOTAL ('000 m <sup>3</sup> )
2001	13	79	53	32	39	5	29	250
2002	13	79	53	32	39	5	29	250
2003	23	79	53	32	39	5	29	260
2004	15	79	53	32	39	5	29	252
2005	22	79	53	32	39	5	29	259
2006	42	79	53	32	39	5	29	279
2007	120	79	53	32	39	5	29	357
2008	161	70	45	32	39	5	29	381
2009	231	70	45	32	39	5	29	451
2010	421	70	45	32	39	5	29	641
2011	417	70	45	32	39	5	29	637
2012	583	70	45	32	39	5	29	803
2013	535	70	45	32	39	5	29	755
2014	607	70	45	32	39	5	29	827
2015	947	70	45	32	39	5	29	1,167

## Forecast of Roundwood Production from the Forests of Ireland 2001-2015

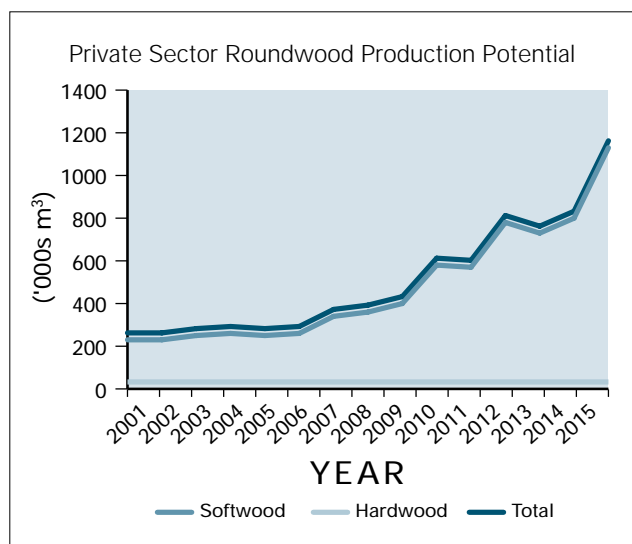


FIGURE 4: PRIVATE SECTOR ROUNDWOOD PRODUCTION POTENTIAL 2001-2015

It is necessary to compare the private sector production potential with the production potential of the other major suppliers of roundwood on the island

TABLE 11: SOFTWOOD PRODUCTION FORECAST

Year	Coillte (‘000s m³)	DARDNI (‘000s m³)	Private Sector (‘000s m³)	Total
2001	2,990	380	216	3,586
2002	3,075	410	216	3,701
2003	3,161	420	226	3,807
2004	3,250	440	218	3,908
2005	3,262	460	225	3,947
2006	3,266	480	245	3,991
2007	3,270	500	323	4,093
2008	3,272	520	347	4,139
2009	3,278	540	417	4,235
2010	3,280	550	607	4,437
2011	3,300	550	603	4,453
2012	3,300	550	769	4,619
2013	3,300	560	721	4,581
2014	3,300	560	793	4,653
2015	3,300	560	1,133	4,993

of Ireland, namely Coillte and the Northern Ireland Forest Service. Table 11 outlines the total production forecasts for both these organisations and private sector.

Table 11 shows the following increases in the annual production potential of the three main sources: Coillte 10%, DARDNI 47% and 415% for the private sector. Total roundwood production is forecast to increase by 39%.

TABLE 12: PRIMARY PRODUCT ASSORTMENTS USED FOR LOG CLASSIFICATION

Product assortment	Top diameter Range (cm)
Pulpwood	7-14
Small Sawlog/Palletwood	14-20
Large Sawlog	>20

While the overall production figure is important in the context of ensuring that sufficient processing capacity is installed to process the roundwood, the product assortment that will become available is also vital. Traditionally top diameter has been used to classify logs into three main product assortments (Table 12).

When the production forecast is analysed on the basis of top diameter interesting trends develop. These are illustrated in Figure 5 which shows an 81% increase in pulpwood production over the forecast period. The pulpwood production potential will rise from 835,000 m<sup>3</sup> in 2001 to 1,508,000 m<sup>3</sup> in 2015. The increases in small and large sawlog production over the same period are 10% and 40%, respectively. This will see small sawlog production potential rise from

## Forecast of Roundwood Production from the Forests of Ireland 2001-2015

1,261,000 m<sup>3</sup> in 2001 to 1,393,000 m<sup>3</sup> in 2015. The corresponding rise in large sawlog production potential is from 1,495,000 m<sup>3</sup> in 2001 to 2,091,000 m<sup>3</sup> in 2015. The majority of this rise in large sawlog production will occur in the first six years of the forecast period, reaching 2,021,000 m<sup>3</sup> by 2006.

It is of further interest to look at the sources of each of these production increases. Over the forecast period 2001-2015 all of the 81% increase in pulpwood production will come from the private sector. Similarly, the vast majority of the increase in small sawlog will come from the private sector also. In contrast, the private sector will not be a significant supplier of large sawlog over this period. The more mature forest resources of Coillte and DARDNI will account for the 40% increase in large sawlog production. Specifically, Coillte will register a 38% increase in their own large sawlog production, while DARDNI will register an 89% increase in large

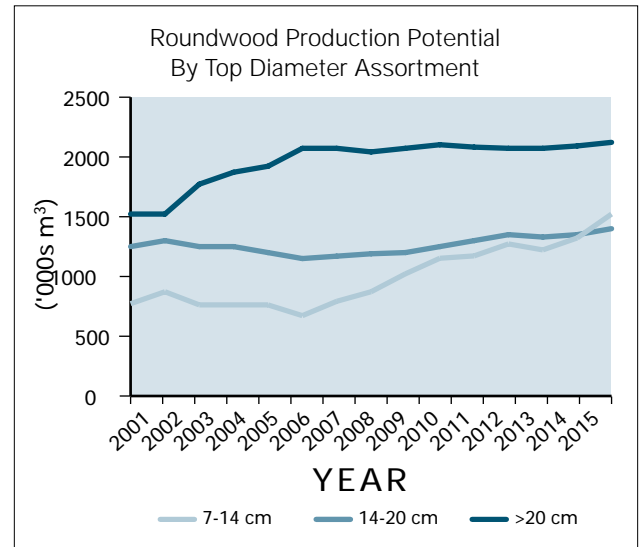


FIGURE 5: TOTAL SOFTWOOD PRODUCTION POTENTIAL BY PRODUCT ASSORTMENT.

sawlog production. Projected assortment production for the private sector, Coillte and DARDNI are shown in Appendix D.

## Conclusions

- The potential production of roundwood from the forests of Ireland will reach 5 million m<sup>3</sup> per annum by the year 2015.
- The vast majority of this production will be softwood.
- Coillte will continue to be the dominant supplier of roundwood over the forecast period 2001-2015. However, Coillte's share of the total roundwood market will drop from 84% in 2001 to 66% by 2015.
- The private sector's market share will rise to 23% by 2015.
- The supply from the Northern Ireland Forest Service rises in line with the total supply and its market share will remain constant at 11%.
- However, when total supply is analysed by product assortment the following trends develop over the forecast period 2001-2015:
  - Pulpwood supply will rise by 81% from 835,000 m<sup>3</sup> to 1,508,000 m<sup>3</sup>
  - Small sawlog supply will rise by 10% from 1,261,000 m<sup>3</sup> to 1,393,000 m<sup>3</sup>
  - Large sawlog supply will rise by 40% from 1,495,000 m<sup>3</sup> to 2,091,000 m<sup>3</sup>
- The private sector will account for all of the increased pulpwood production
- The forecasted increase in roundwood production suggests that there is significant room for additional capacity in the panel board sector.
- This forecast is based on a desk study. A ground survey would be needed to more accurately predict future roundwood production potential.
- The necessary maintenance of stocking levels and fertilisation to ensure productivity in recent established plantations is essential if forecasted yields are to be achieved.

## Recommendations

1. A continuous multi-attribute forest inventory for both state and private forests is needed to more accurately forecast production and monitor growth.
2. Key parameters for forecasting are height, age and species.
3. New remote sensing techniques becoming available for height determination and should be investigated.
4. The completion of GPAS site/crop information transfer to FIPS crop categories is needed to upgrade information on recent grant-aided forest.
5. Upgrading the FS private sector felling application database will be a useful tool to compare annual harvested yield with production estimates. These should include area to be felled, area to be thinned, by species and yield class. In addition, the furnishing of the Forest Service with harvesting returns should be a prerequisite of the issuing of felling licences. This would allow actual harvested volume to be recorded and collated on a national basis. This prerequisite to declare actual production exists across all manufacturing sectors and would not be overly onerous on the private grower.
6. A management survey of woodland owners to determine their intentions with regard to thinning and final felling is desirable. Recent felling licence application activity suggests that owners are consistently thinning their crops but trends are difficult to interpret from this data.

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## APPENDIX A - PRIVATE PLANTING 1982-1999

All figures shown are in hectares

COUNTY	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
CARLOW	0	0	0	0	0	0	4	49.25	36.2	53.3	58	92.9	82.6	87.06	69.05	39.54	52.81	64.29
CAVAN	2.37	0.93	86.52	101.8	92.98	155.27	145.8	67.6	158.41	205.8	125.5	172.7	131.38	330.85	178.15	225.72	228.08	225.13
CLARE	44.92	46.96	71.89	95.5	331.6	515.97	372	714.4	983.91	857.88	558.07	1000.6	1088.3	1439.6	1455.21	668.05	676.711	878.15
CORK	24.83	26.9	19.42	75.23	77.32	287.19	434.3	548.4	766.06	1038	448.23	801.49	973.24	1422.8	1117.33	761.23	1038.56	1285.73
DONEGAL	2.4	1.4	16.35	3.64	12.58	27.9	152.5	243.1	505.14	943.25	806.8	844.8	1310.4	2544.3	1889.33	1232.81	840.72	824.87
DUBLIN	0	0	0	0	0	0	0	58.9	0	66.88	29.48	46.03	52.45	189.58	114.38	79.82	63.01	5.35
GALWAY	16.42	0	7.58	16.5	380.4	358.81	530.4	787.5	965.98	751.2	826	510.9	519.09	739.99	806.79	464.68	458.42	406.83
KERRY	0.66	10.5	27.66	71.47	361	403.79	524.4	713.1	1428.8	1820.6	1052.8	884.45	1444.7	1857.3	1905.13	1312.58	842.922	1105.55
KILDARE	0	0	0	0	0	0	2.4	58	76.4	122	77	157.1	70.43	323.16	210.16	237.01	249.651	155.94
KILKENNY	0	0	0	0	0	0	24.21	287.8	143	382.45	463.45	373.4	440.03	454.49	434.58	408.11	227.16	488.39
LAOIS	0	0	0	0	0	0	6.28	233.8	177.68	275.8	281.1	321.8	529.87	447.63	646.28	368.59	224.17	267.80
LEITRIM	2.4	27.09	14.24	35.45	411.2	263.61	469.2	499.6	160.63	417.7	539.76	521.96	206.53	430.74	722.87	587.13	490.16	411.23
LIMERICK	0	0	0	0	73.92	153.57	91.16	314.1	268.26	339.7	248.05	166.4	392.65	550.79	462.05	534.58	289.19	505.32
LONGFORD	23.47	17.79	9.17	6.14	8.5	79.77	22.18	43.64	28.8	124.7	137.65	104.3	177.67	136.94	222.05	201.29	144.19	194.85
LOUTH	0	0	0	0	0	0	6.7	12.1	2.7	6.2	31.05	18.65	0	11.17	18.92	13.5	77.9	2.19
MAYO	0.5	2.12	12.45	26.08	55.41	248.28	1124	1533	1259.4	875.03	537.6	549.5	1306.3	967.42	1022.78	795.07	961.781	652.50
MEATH	0	0	0	0	0	0	2.68	20.71	13.43	17.7	53.3	88.75	337.71	288.11	247.29	180.86	171.5	339.77
MONAGHAN	0	2.25	0.96	13.39	5.48	27.21	15.2	24.95	8.5	70.9	43.5	31.7	26.38	60.25	94.36	42.3	44.08	23.31
OFFALY	0	0	0	0	0	0	50.6	92.23	199.86	406.4	188.9	372	533.81	685.37	676.76	116.53	295.9	654.48
ROSCOMMON	19.02	1.75	3.1	126.7	371.9	273.37	239.6	502.7	493.95	498.6	720.2	246.4	592.78	494.66	736.67	449.24	263.77	435.24
SLIGO	50.51	22.6	14.48	45.41	97.92	159.14	339	590	279.81	366.8	337.2	207.35	333.34	542.73	892.44	378.4	303.54	148.65
TIPPERARY	0	0	0	0	0	0	1.05	740.4	528.94	828.7	401.5	535.7	893.57	1123	1031.54	562.14	787.66	1140.26
WATERFORD	0	0	0	0	0	0	7.6	147.9	234.62	397.6	338.4	287.45	301.5	422.43	385.68	176.36	308.85	386.51
WESTMEATH	0	0	0	0	0	0	0	34.94	54.1	132.05	199.6	292.7	279.77	973.61	356.36	407.78	370.27	335.72
WEXFORD	0	0	0	0	0	0	6.47	6.7	34.51	52.1	144.9	175.66	248.3	282.47	286.76	137.36	250.5	471.94
WICKLOW	0	0	0	0	0	0	24.4	173	338.15	240.8	486.4	366.1	564	536.71	572.69	202.21	340.83	366.10
TOTAL	187.5	160.29	283.82	617.31	2280	2953.88	4596.13	8497.82	9147.24	11292.14	9134.44	9170.79	12836.8	17343.16	16555.61	10582.89	10002.335	11776.10

## APPENDIX B - PUBLIC PLANTING 1982-1999

All figures shown are in hectares

COUNTY	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
CARLOW	30.6	50.1	0.6	51.5	28.9	59.2	117	60.1	56.5	58.5	59.1	45.3	23.1	0	65.4	0.6	43.3	26.50
CAVAN	0.5	0.5	35.1	32.1	24.6	36.3	24.5	78.6	111.5	258.5	252.2	169.9	115.1	49.3	125.19	84.85	190.89	0.00
CLARE	383	507	226	262	304	596	669	527	472.1	624.4	742.9	792.6	399.7	0	276.93	94.47	204.4	53.57
CORK	648	368	423	257	429	447	569	714	724.1	748.8	791.1	872.9	741.6	519	431.39	39.19	358.66	20.63
DONEGAL	739	721	712	499	586	554	807	756	678.1	688.9	738.5	269.7	12.3	0	505.55	114.12	351.52	51.91
DUBLIN	35.7	3.2	0	7.4	0	0	3.5	24.3	32.6	19.2	10.2	40.9	58.6	15.3	0	0	0	0.00
GALWAY	787	634	774	762	629	462	595	416	442.9	714.7	585.8	1063	1099	587	644.2	63.76	309.64	38.94
KERRY	494	350	190	128	134	190	243	245	226.7	344.1	196.1	323.5	346.3	199	313.58	107.14	211.67	20.94
KILDARE	0.9	75.2	0.3	54.6	32.2	39.6	276	93.3	79.2	39.9	10.2	0	0	0	0	0	0	0.00
KILKENNY	56.8	47	68.1	84	128	302	291	205	184.8	157.5	185.4	270	224	489	158.23	36.1	135.8	14.50
LAOIS	242	260	118	118	172	134	482	254	194.2	281.4	282.3	215.6	412.9	589	141.4	24.3	60.7	18.90
LEITRIM	167	241	159	113	286	239	283	206	184	277.7	306.7	32.8	0	0	195.28	28.09	101.24	66.55
LIMERICK	177	159	201	168	179	159	164	202	198.9	329.1	250.4	191.5	223.3	848	230.43	18.72	199.35	79.16
LONGFORD	36.6	26.9	13.6	12.1	22.7	18.8	4.2	28.3	56.8	94.5	118.4	49.1	144.1	0	68.1	12.75	106.02	21.00
LOUTH	0	0	0	0	0	0	0	24.3	34.1	7.8	9.5	15.4	11.4	3.5	0	0	21	0.00
MAYO	1327	1493	1252	1228	1000	847	857	528	767.7	711.3	468.6	529.5	533.9	232	274.75	0	132.51	188.75
MEATH	5.7	1.9	8.5	0	0.8	2.6	0	4.5	5.1	7	23.5	5.1	0	0	0	0	13	6.20
MONAGHAN	21	10.7	35.1	29.8	33.9	23	4.9	27.1	28.4	59.4	44.6	118.8	147.9	0	8.6	0	31.55	0.00
OFFALY	59.1	21.9	0	46.8	26.6	37	237	523	220	359.1	369.9	189.5	121.3	180	10.1	0	0	0.00
ROSCOMMON	147	39	78.8	160	66.6	149	186	79.3	175.7	213.4	376.1	234.4	248.6	45.7	248.94	30.55	96.43	81.51
SLIGO	60.7	103	172	48.8	132	126	83.5	129	238.9	480.2	229.5	1.6	0	0	176.05	41.47	102.53	27.04
TIPPERARY	249	232	253	184	141	418	483	494	591.1	524.4	540.9	520.6	844.1	1061	258.45	59.3	110.22	13.79
WATERFORD	69.6	216	189	146	138	157	266	271	223.4	254.6	308	482.5	494.3	1105	166.42	61.15	24.03	55.25
WESTMEATH	55.2	0	40.5	11.1	64.3	3	103	88.1	69.8	38.4	57.8	142	108.2	105	14.1	0	77.45	0.00
WEXFORD	27.8	18.9	1	0	5.4	74.3	71.6	128	131.4	145.4	193.8	90.2	84.6	13.6	3.4	2.4	0	44.20
WICKLOW	198	120	243	224	124	323	291	524	542.2	417.1	413.6	161	227.6	325	109.5	41.85	44.2	61.55
TOTAL	6018.2	5699.3	5193.6	4627.2	4688	5396.8	7111.2	6629.9	6670.2	7855.3	7565.1	6827.4	6621.9	6366.4	4425.99	860.81	2926.11	890.89

## APPENDIX C - PRIVATE SECTOR SOFTWOOD PRODUCTION POTENTIAL

County	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Carlow	3	3	3	3	3	3	3	2	2	6	2	7	6	6	6
Cavan	5	5	5	5	13	10	9	11	9	15	17	17	15	18	20
Clare	12	12	16	13	15	16	28	41	28	46	57	65	63	70	94
Cork	23	23	24	24	23	26	26	37	45	46	55	68	56	80	88
Donegal	4	4	4	4	5	4	5	5	21	17	26	42	39	45	70
Dublin	4	4	4	4	4	4	4	4	4	8	4	9	4	8	8
Galway	13	13	16	12	13	14	31	30	36	48	54	62	64	56	69
Kerry	11	11	11	12	11	14	28	29	35	43	72	100	74	73	101
Kildare	7	7	7	7	7	7	7	7	7	11	11	12	11	15	16
Kilkenny	3	3	3	3	3	3	3	3	3	15	11	17	22	18	31
Laois	10	10	10	10	10	10	10	9	9	21	17	18	20	20	42
Leitrim	5	5	5	8	6	7	24	18	30	29	15	42	40	52	39
Limerick	5	5	5	5	5	6	8	11	8	20	16	21	22	16	36
Longford	3	3	4	3	2	3	3	8	3	5	3	8	12	7	10
Louth	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Mayo	7	7	7	7	8	8	10	17	59	80	60	46	39	82	138
Meath	6	6	6	6	6	6	6	5	5	5	5	5	9	9	21
Monaghan	4	4	4	4	4	5	5	5	4	4	5	10	5	4	4
Offaly	7	7	7	7	7	7	7	6	8	10	13	24	13	23	31
Roscommon	6	6	7	5	5	12	23	19	14	28	30	40	49	26	55
Sligo	9	9	9	7	6	11	14	16	23	34	22	28	31	32	50
Tipperary	9	9	9	9	9	9	9	8	8	44	30	40	23	30	81
Waterford	15	15	15	15	15	15	15	14	14	22	21	32	29	25	32
Westmeath	7	7	7	7	7	7	7	7	7	7	7	12	14	18	17
Wexford	11	11	11	11	11	11	11	10	10	10	10	10	17	18	20
Wicklow	28	28	28	28	28	28	28	26	26	34	41	35	45	43	55
Total	216	216	226	218	225	245	323	347	417	607	603	769	721	793	1133

Note: Figures shown have been rounded to the nearest '000 m<sup>3</sup> for clarity

## APPENDIX D - PRODUCT ASSORTMENT FORECAST 2001-2015

All Figures shown are in '000 m<sup>3</sup>

Year	Private Sector			DARDNI			Coillte			Total		
	7-14 cm	14-20 cm	>20 cm	7-14 cm	14-20 cm	>20 cm	7-14 cm	14-20 cm	>20 cm	7-14 cm	14-20 cm	>20 cm
2001	58	42	121	80	125	175	697	1094	1199	835	1261	1495
2002	58	42	121	111	156	144	724	1119	1232	893	1317	1497
2003	66	44	121	92	134	193	670	1103	1388	828	1281	1702
2004	60	42	121	110	150	180	656	1084	1510	826	1276	1811
2005	66	43	121	78	133	248	685	1072	1505	829	1248	1874
2006	80	49	121	91	144	245	603	1008	1655	774	1201	2021
2007	142	65	121	100	165	235	616	974	1680	858	1204	2036
2008	173	68	111	99	151	270	640	999	1634	912	1218	2015
2009	229	82	111	108	167	265	642	978	1658	979	1227	2034
2010	381	120	111	72	143	336	662	978	1640	1115	1241	2087
2011	374	122	111	99	171	281	660	990	1650	1133	1283	2042
2012	500	161	111	105	176	270	660	990	1650	1265	1327	2031
2013	456	155	111	106	179	274	660	990	1650	1222	1324	2035
2014	509	175	111	106	168	286	660	990	1650	1275	1333	2047
2015	764	257	111	84	146	330	660	990	1650	1508	1393	2091

Note: these forecasts are merely indicative trends of future roundwood supply. They are based on the assumption that markets will exist for all produce. The realisation of these volumes is not guaranteed.

Net forest depletion is calculated as the product of unit resource rents and the excess of roundwood harvest over natural growth. Ireland | Economy & Growth.Â Iran Iraq Ireland Isle of Man Israel Italy Ivory Coast Jamaica Japan Jordan Kazakhstan Kenya Kiribati Kosovo Kuwait Kyrgyzstan Laos Latvia Lebanon Lesotho Liberia Libya Liechtenstein Lithuania Luxembourg Macau Macedonia Madagascar Malawi Malaysia Maldives Mali Malta Marshall Islands Mauritania Mauritius Mayotte Mexico Micronesia Moldova Monaco Mongolia Montenegro Morocco Mozambique Myanmar Namibia Nepal Netherlands Netherlands Antilles New Caledonia New Zealand Nicaragua Niger Nigeria North. Forecast of Roundwood Production from the Forests of Ireland 2001-2015. 1. FIPS - Forest Inventory and Planning System FIPS has five discrete but compatible components: 1. a forest classification system comprising of 20 species and development classes; 2. field sampling to characterise these classes and to generate production forecasts; 3. soil classifications related to productivity; 4. landscape categories; 5. a Grants and Premium Administration System (GPAS) which links the inventory with grant aided forests.