An Roinn Talmhaíochta,
Bia agus Mara
Department of Agriculture,
Food and the Marine

Forest Statistics
Ireland 2018

Prepared by the Department of
Agriculture, Food and the Marine

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The Department of Agriculture, Food and the Marine is responsible for ensuring the development of forestry within Ireland in a manner and to a scale that maximises its contribution to national socio-economic well-being on a sustainable basis that is compatible with the protection of the environment. Its strategic objectives are:

1. To foster the efficient and sustainable development of forestry;
2. To increase quality planting;
3. To promote the planting of diverse species;
4. To improve the level of farmer participation in forestry;
5. To promote research and training in the sector;
6. To encourage increased employment in the sector.

Published by:

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December 2018

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1. Introduction

The Department of Agriculture, Food and the Marine is responsible for the collection and publication of forest statistics.

Forest stakeholders and policy makers require reliable statistics upon which to plan and make decisions. Ireland also has a series of international reporting requirements relating to forests and forestry. These include the United Nations Framework Convention on Climate Change (UNFCCC) for carbon stocks and stock changes; the Decision 529/2013/EU on land use, land-use change and forestry; the Food and Agriculture Organisation (FAO) for series of forest related data including the Global Forest Resource Assessment; EUROSTAT; the United Nations Economic Commission for Europe (UNECE) for wood harvest and trade data (the Joint Forest Sector Questionnaire); the Joint Wood Energy Enquiry of the UNECE, IEA and FAO; and the European Commission in respect of forest health.

Forests Statistics – Ireland 2018 is an annual compilation of statistics on the forest estate and the forest industry in Ireland. Information is presented to the end of 2017.

Data revision and correction policy

While every effort is made to ensure the accuracy of data provided, amendments can occur as new data become available or errors are detected and corrected.

2. Forest Area

2.1 Introduction

This chapter contains statistics on:

- Irish forest area and area changes over time;
- Forest ownership;
- Tree species composition;
- Age structure of the forest estate.

Key Facts

- The area of forest is estimated to be 770,020 ha or 11% of the total land area of Ireland (National Forest Inventory 2017);
- Forest cover is estimated to be at its highest level in over 350 years;
- Of the total forest area, 391,357 ha or 50.8% is in public ownership, mainly Coillte[1];
- The forest estate is comprised of 71.2% conifers and 28.7% broadleaves;
- Nearly three quarters of the stocked forest area is less than 30 years of age.

[1]Coillte is a State-owned company operating in forestry, land-based businesses and added-value processing operations. The company was established as a private limited company under the Forestry Act 1988 which set out its objectives and duties. The company's shareholders are the Minister for Finance and the Minister for Agriculture, Food and the Marine.

2.2 Forest definition

Forest is defined as land with a minimum area of 0.1 ha under stands of trees 5 m or higher, having a minimum width of 20 m and a canopy cover of 20% or more within the forest boundary; or trees able to reach these thresholds *in situ*. The forest definition relates to land use rather than land cover, with the result that open space within a forest boundary either permanently or temporarily unstocked with trees, along with felled areas that are awaiting regeneration, are included as forest.

2.3 Forest area

In 2017, the 3rd National Forest Inventory (NFI) estimated the area of forest to be 770,020 hectares or 11% of the land area, excluding inland water bodies (Table 1 and Figure 1). Of the total forested area, 687,525 ha comprises areas occupied by trees or potentially occupied by trees, while permanently unstocked open area within the forest (roads, ridelines, powerlines, etc.) comprises 82,496 ha (Table 1). Of the stocked forest area, 65.5% is conifer forest, 20.5% is broadleaved forest, and 14% is mixed forest.

Table 1. Forest Area 2017.

Land use category	Area (ha)	% of total forest area
Forest	687,525	89.3
Forest open area	82,496	10.7
Total	**770,020**	**100**

2.4 Hedgerows and Trees outside the Forest

A 2014 report from the Environmental Protection Agency examining the feasibility of a national hedgerow inventory estimated that hedgerow and non-forest woodland and scrub could potentially sequester 0.66 - 3.3 tonnes of CO_2/ha/year[2]. Based on existing national estimates for hedgerow and non-forest woodland and scrub cover, it states that this could result in a net removal of 0.27-1.4 Mt CO_2/year. The value of hedgerows and trees outside of forests is reflected in recently introduced agri-environmental measures which have resulted in the establishment of new hedgerows and trees outside of the forest.

2.4.1 Teagasc Irish Hedge Map (2011)

In 2011 Teagasc produced a hedgerow map of Ireland, based upon 2005 orthophotography[3]. All areas of mature hedgerows, individual trees and non-forest woodland and scrub were digitally mapped to a 1 metre resolution. National cover of hedgerows, individual trees and non-forest woodland and scrub was estimated at approximately 482,000 ha, or 6.4%, with an 80% accuracy. Table 2 displays the results on a county level.

[2] *Carbon Sequestration by Hedgerows in the Irish Landscape*. Climate Change Research Programme (CCRP) 2007–2013 Report Series No. 32. Environmental Protection Agency, 2014.

[3] *The Irish Hedge Map* – Version 1.0. Teagasc, 2011.

Table 2. County level estimates of non-forest hedgerow, scrub and woodland (HSW) cover (The Irish Hedge Map, Teagasc, 2011).

County	Area of HSW (ha)	% of National HWS Stock	% of County under HWS
Galway	30,000	6.7	4.9
Leitrim	11,000	2.4	6.9
Mayo	23,000	5.1	4.1
Roscommon	19,000	4.2	7.5
Sligo	11,000	2.4	6
Carlow	8,000	1.8	8.9
Dublin	5,000	1.1	5.4
Kildare	14,000	3.1	8.3
Kilkenny	19,000	4.2	9.2
Laois	12,000	2.7	7
Longford	8,000	1.8	7.3
Louth	8,000	1.8	9.8
Meath	24,000	5.3	10.2
Offaly	13,000	2.9	6.5
Westmeath	17,000	3.8	9.2
Wexford	20,000	4.4	8.5
Wicklow	10,000	2.2	4.9
Clare	22,000	4.9	7
Cork	57,000	12.7	7.6
Kerry	23,000	5.1	4.8
Limerick	25,000	5.6	9.3
Tipperary	35,000	7.8	8.1
Waterford	12,000	2.7	6.5
Cavan	20,000	4.4	10.4
Donegal	20,000	4.4	4.1
Monaghan	16,000	3.6	12.4

2.4.2 National Forest Inventory (2017)

The third National Forest Inventory (2017) estimates national hedgerow and non-forest woodland at 347,690 ha, or 4.9% cover. The disparity between the Teagasc and NFI data is likely due to differing methodologies. In addition, the Teagasc Irish Hedge Map includes areas of non-forest woodland and scrub that under the NFI were classified as Forest.

2.4.3 Newly Established Hedgerows and Trees

Since the introduction of agri-environmental schemes in 1994 more than 6,000 kilometres of new hedgerows and more than 2 million trees have been established on non-forest land as outlined in Table 3.

Table 3. The total estimate of newly established hedgerows and trees under agri-environmental schemes (Department of Agriculture, Food and the Marine, 2018).

Scheme	Newly established hedgerows (km)	Newly planted trees	Newly planted orchard trees
Rural Environment Protection Scheme (REPS) 1994 - 2010	4,100	-	-
Agri-Environment Options Scheme (AEOS) 2010 - 2014	1,322	464,910	
Green Low Carbon Agri-Environment (GLAS) 2014 - 2018	1,191	1,633,281	11,230
Total	6,613	2,098,191	11,230

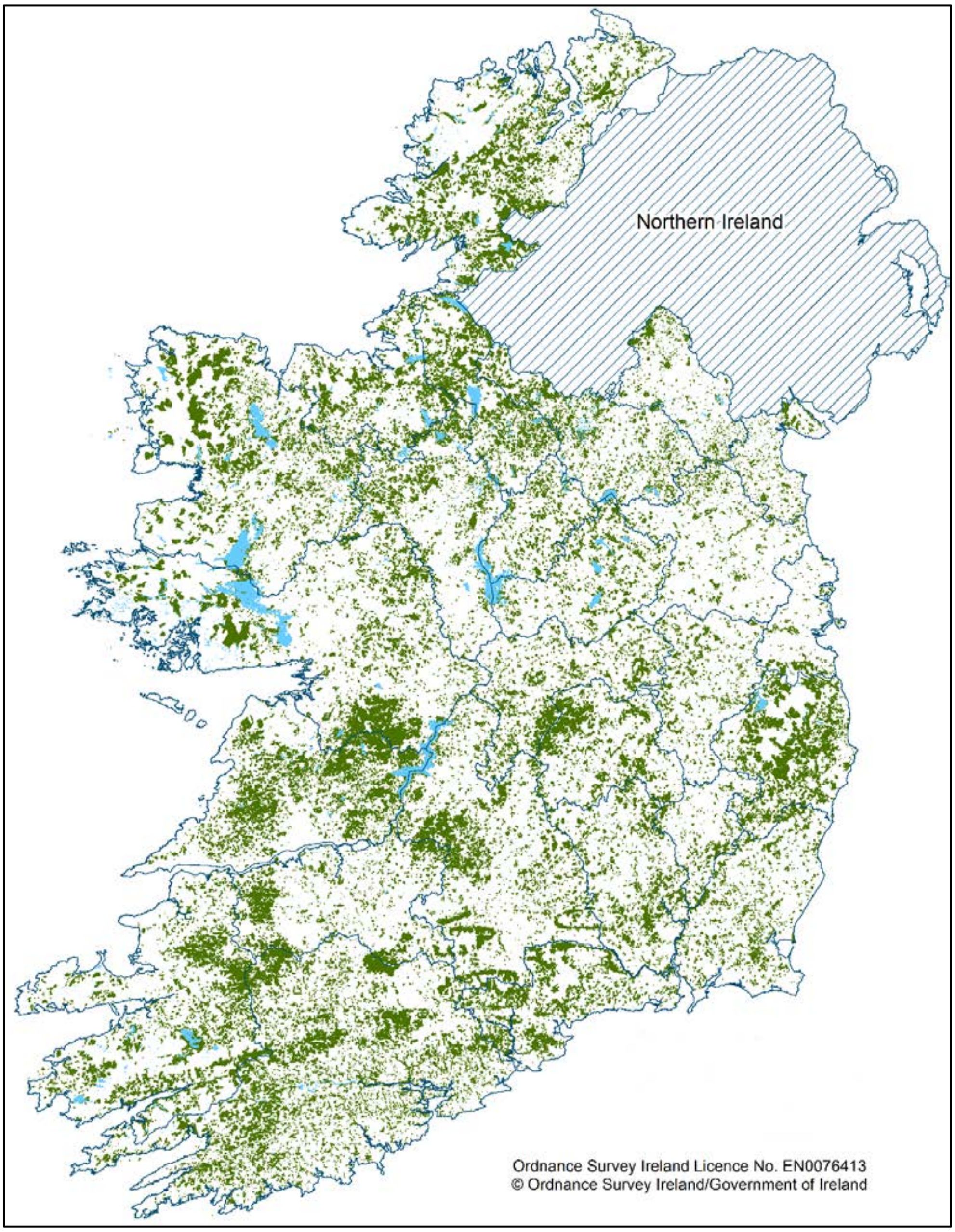

Figure 1. Forest cover in Ireland, 2017.

2.5 Forest area changes over time

The 770,020 ha of forest in Ireland in 2017 represents 11% of the total land area (Figure 1). The changes in forest cover in Ireland since 1656 are indicated in Table 4 and Figure 2. All estimates prior to 1918 relate to the whole of the island of Ireland, thereafter estimates are for the Republic of Ireland only. A 1905 forest cover estimate for the province of Ulster was 15,000 ha, but overall forest cover on the island of Ireland was still declining up to 1928.

Since the foundation of the State, forest cover in Ireland has grown from 1.4% of the land area, to the current 11%. Figure 3 shows the growth in area of both public and private forests over this period. Four inventories of the private forest estate have taken place: 1973, 2006, 2012 and 2017. The area of privately-owned forests has increased from 81,958 ha in 1973 to 378,663 ha in 2017, over a four-fold increase. Over the same period, the State owned forest area has also significantly increased from 242,056 ha to 391,357 ha.

Table 4. Forest area in Ireland.

Year	Area (ha)	% of Total Land Area
1656[4]	170,000	2.5
1841[5]	140,000	2.0
1908[6]	125,200	1.8
1918[7]	100,717	1.4
1928[8]	89,000	1.2
1949[9]	144,000	2.1
1965[10]	254,350	3.7
1973[11]	323,654	4.6
1985[12]	411,529	5.9
2006[13]	697,730	10.1
2012[14]	731,650	10.5
2017[15]	770,020	11.0

[4] Rackham, O.1986. *The History of the Countryside*. Dent & Sons Ltd., London.
[5] Aalen, F.H.A, Whelan K. And Stout M. (Eds). 1997. *Atlas of the Irish Rural Landscape*. Cork University Press
[6] Dept. Of Agriculture & Technical Instruction. 1908. *Report of the Departmental Committee on Irish Forestry*. A. Thom & Co., 1908.
[7] Dept. of Agriculture. 1926. *Forest Lands and Timber Supply in the Irish Free State*. Proceedings of the First International Congress on Sylviculture, Rome, 1926.
[8] Minister for Lands & Agriculture. Dail Eireann, Volume 23, 3rd May 1928.
[9] Estimate generated from Annual Report of the Department of Agriculture 1943/49.
[10] Estimate generated from Annual Report of the Department of Agriculture 1964/65.
[11] Estimate generated from Purcell, T.J, 1973. *Inventory of Private Forests -1973*.Department of Fisheries and Forestry and Annual Report of the Department of Agriculture 1972/73.
[12] Estimate generated from Annual Report of the Department of Agriculture 1985.
[13] *National Forest Inventory Republic of Ireland Results*. 2007. Forest Service, Department of Agriculture Fisheries and Food.
[14] *National Forest Inventory Republic of Ireland Results*. 2013. Forest Service, Department of Agriculture Food and the Marine.
[15] *National Forest Inventory Republic of Ireland Results*. 2017. Forest Service, Department of Agriculture Food and the Marine.

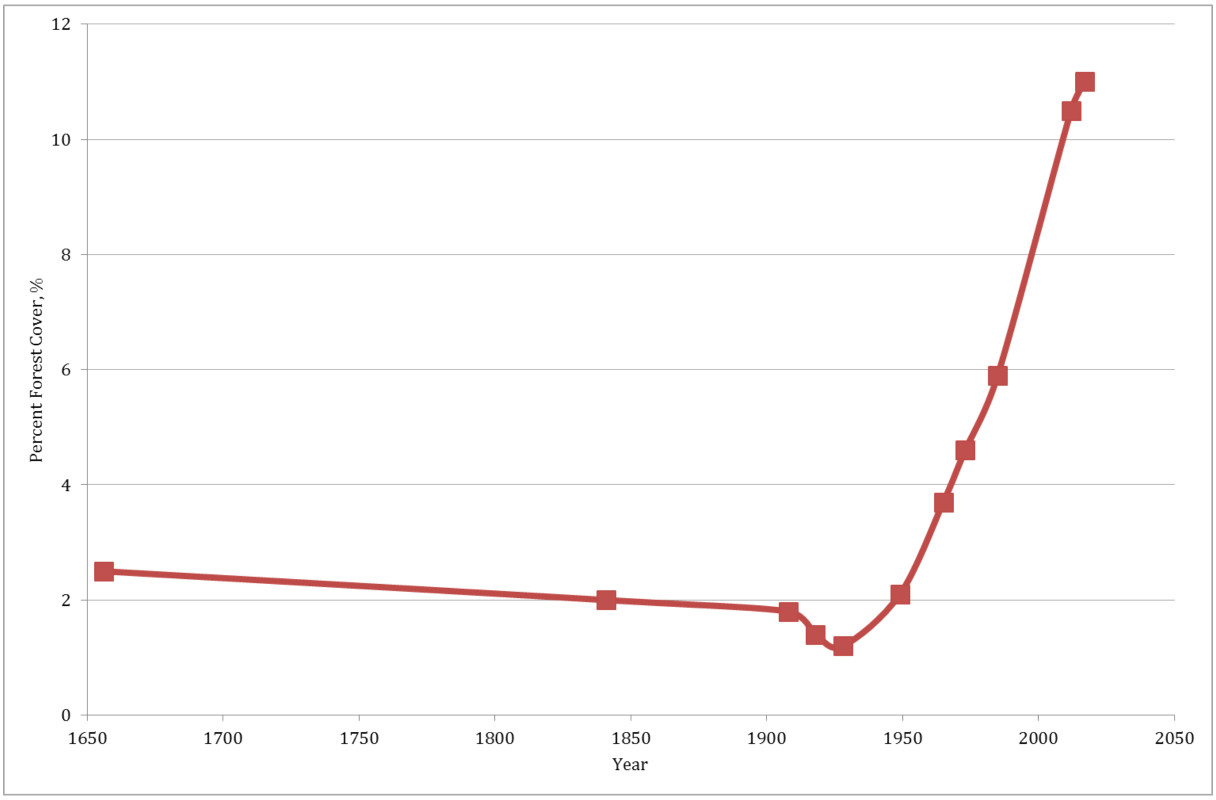

Figure 2. Forest cover, 1656-2017.

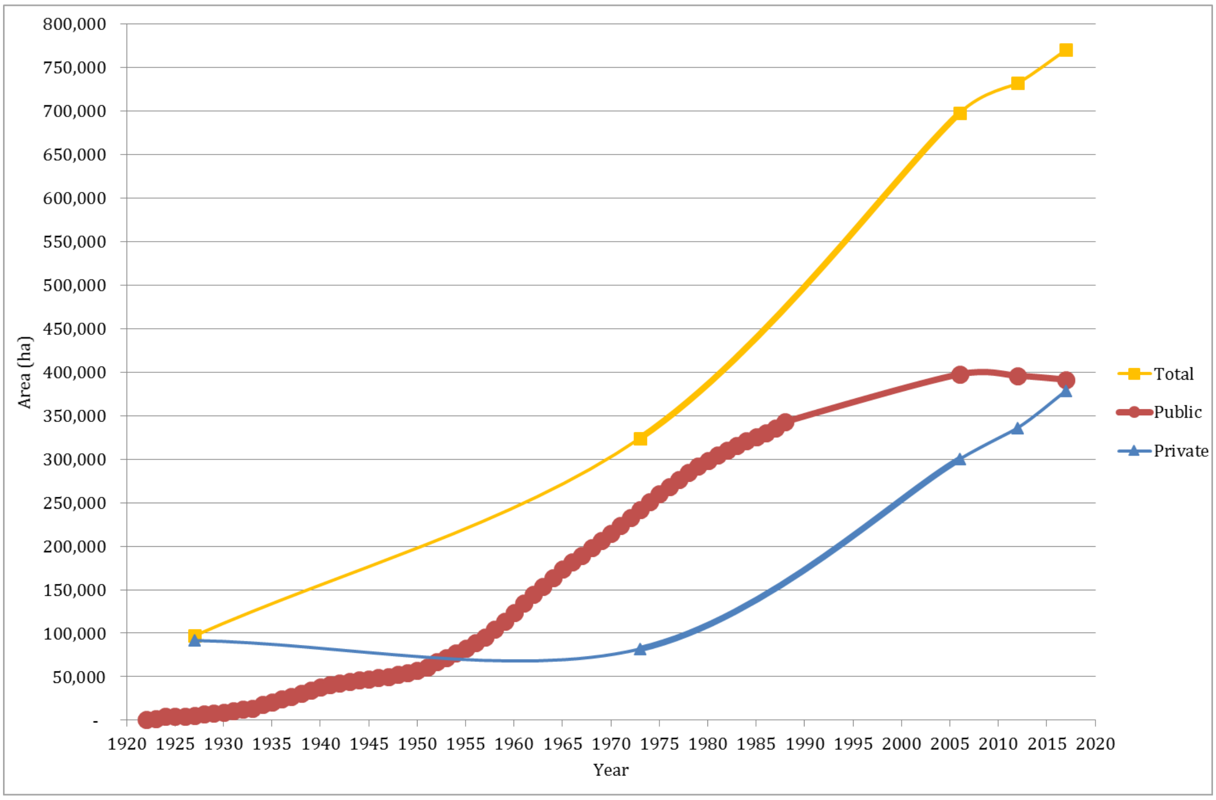

Figure 3. Forest area change since the foundation of the State, 1922-2017.

2.6 Forest Ownership

Within the national forest estate there are three main forest ownership categories:

1. **Public**: all State owned forests, mainly Coillte;
2. **Private (grant-aided)**: private afforested land which was in receipt of either grant and/or premium since 1980;
3. **Private (non grant-aided)**: private forests not in receipt of grant-aid post 1980. Includes areas semi-natural forests that have regenerated naturally and other long-standing plantations on private estate holdings.

In 2017, 50.8% of forests were in State ownership, a reduction from 57% in 2006 (primarily due to private sector afforestation in the intervening period). Of the public forest area (Table 5), the total forest area of 391,357 ha comprises 357,290 ha of stocked forest land and 34,060 ha of forest open area. Of the public forests, Coillte owns 380,156 ha.

Table 5. Forest ownership in Ireland (NFI, 2017)

Ownership	Area (ha)	%
Public	391,357	50.8
Private (grant-aided)	268,100	34.8
Private (non grant-aided)	110,563	14.4
Total	**770,020**	**100**

2.7 Species composition

Sitka spruce is the most common species, occupying 51.1% of the forest area (Table 6). Over one quarter of the forest estate contains broadleaves. Of the broadleaves 33.6% are 'Other broadleaf species' (both long living and short living), of which over half are willow[16]. The next largest broadleaf species group was birch (24.4%), followed by ash (13.1%) and oak (9.2%). Conifers occupy 479,530 ha while broadleaved species cover 193,580 ha.

The interpretation of stocked areas of individual species presented in Table 6 needs to be carefully considered since many forests contain an intimate mixture of species. Methods are used to apportion the constituent individual species from these intimate mixtures into the total area covered by the forest. The total stocked area of a given species therefore does not represent distinct areas of land covered by pure stands of the species, but represent the areas of mixed forest apportioned to them.

[16] For most NFI statistical outputs, it was more convenient to work with the species groups than with individual species. The data would not have been sufficiently representative if processed by species. The species group composition of long living broadleaves are as follows: field maple, maple, horse chestnut, strawberry tree, hornbeam, sweet chestnut, holly, nothofagus spp., white poplar, black poplar, Turkey oak, red oak, whitebeam, small-leaved lime, large-leaved lime, wych elm. The species group composition of short living broadleaves are as follows: crab apple, aspen, cherry, blackthorn, goat willow, other willows, mountain ash, and hazel.

Table 6. Tree Species Composition (Source: NFI, 2017)

Species	Area (ha)	%
Sitka spruce	343,310	51.1
Norway spruce	25,770	3.8
Scots pine	7,660	1.1
Other pine spp.	64,890	9.6
Douglas fir	10,380	1.5
Larch spp.	24,490	3.6
Other conifers	3,030	0.4
Pedunculate and sessile oak	17,880	2.7
Beech	10,030	1.5
Ash	25,280	3.8
Sycamore	10,100	1.5
Birch spp.	47,270	7.0
Alder spp.	17,910	2.7
Other short living broadleaves	53,280	7.9
Other long living broadleaves	11,820	1.8
Total	673,110	100

2.8 *Forest age*

Just under three quarters of the national forest estate consists of trees of 30 years old or less (Figure 4). Conifers tend to have a shorter rotation than broadleaves, and 79.6% of conifers are 30 years old or less while 60.9% of broadleaves are 30 years old or less. The age structure of the national forest estate differs according to ownership: 68.5% of the public forest is aged 30 years or less; 59.6% of the Private (non grant-aided) category is aged 31 years or more; and 97.8% of the Private (grant-aided) category is aged 30 years or less, reflecting the increased afforestation rates in this category since the late 1980's.

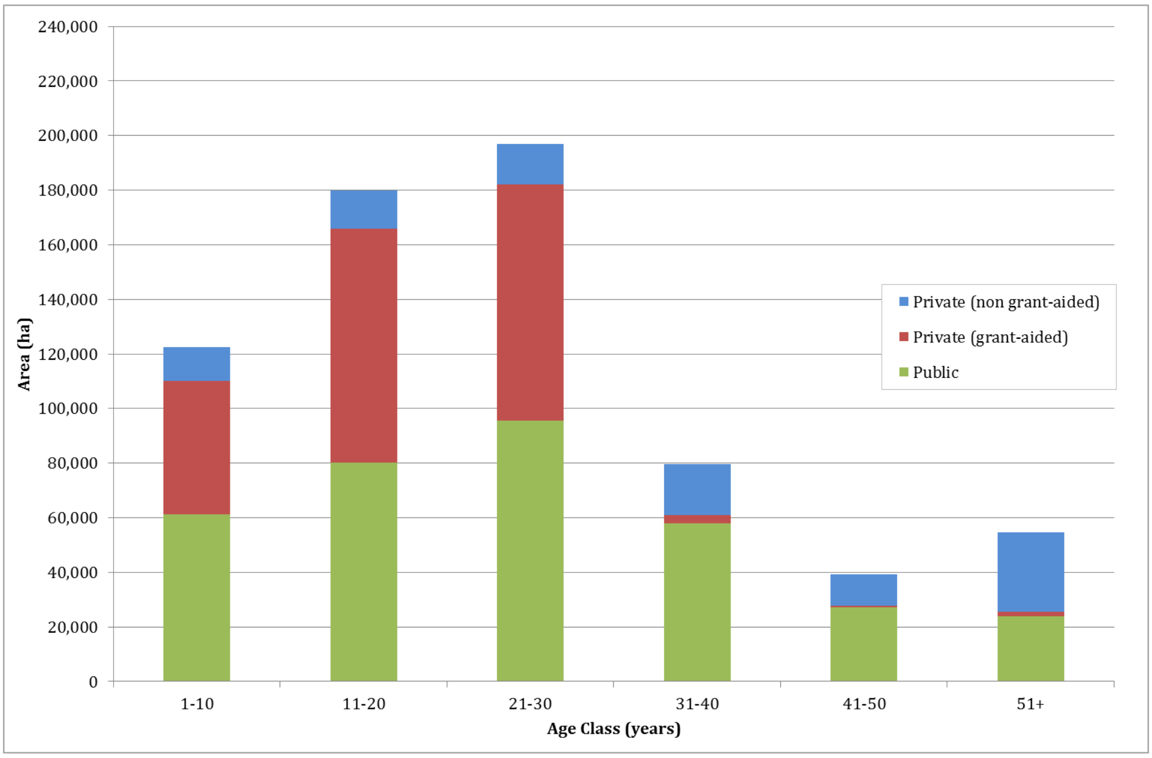

Figure 4. Forest age-class distribution by ownership (Source: NFI, 2017).

3. Afforestation

This section provides information on afforestation levels since the foundation of the State, with a particular emphasis on private afforestation since 1980.

3.1 Introduction

This chapter provides information on:

- Species composition of afforestation;
- Forest size and number of private (grant-aided) afforestation since 1980;
- Ownership and forest size patterns of private (grant-aided) afforestation since 1980;
- Ownership patterns of private forests established prior to 1980.

Key statistics

- State afforestation was relatively low up until the 1950's, but thereafter increased up to the year 2000;
- Private afforestation came to the fore in the mid-1980's: over 292,015 ha of private forests were established between 1980 and 2017;
- The proportion of broadleaf afforestation significantly increased after 1993, and up to the present, comprising 23% of all afforestation since that year;
- Tree diseases such as *Phytophthora ramorum* (mainly affecting larch) and Ash Dieback *(Hymenoscyphus fraxineus*) may influence species diversity into the future;
- 83% of the forests afforested since 1980 have been planted by farmers;
- The average size of private grant-aided afforestation since 1980 is 8.7 ha;
- Since 1980, 22,562 unique private forest owners have received grant aid to establish forests;
- Nearly half (46.1%) of all individual owners have received afforestation grant aid at least twice since 1980, which should contribute to management efficiencies, due to the increased size of the individuals holding.

3.2 Afforestation 1922-2017

As shown in Table 4, forest cover on the island of Ireland continued to decline up to 1928. With the introduction of the first Forestry Act in 1928 the decline of forest area was largely halted, however afforestation levels remained relatively low right up until the 1950's. The level of State afforestation dramatically increased from the 1950's up to 2000, after which State planting declined to a negligible level. One critical factor was the decision by the European Commission in August 1999 that Coillte Teoranta was not entitled to receive annual [non-farmer] forest premiums. The European Court of Justice (ECJ) subsequently upheld this decision. In the 10 years from 1990 to 1999, 43% of all afforestation was on Coillte land. As a result, Coillte reviewed its planting programme and has not engaged in afforestation to any appreciable extent since the ECJ decision.

Private afforestation came to the fore in the mid-1980's following the introduction of a grant and particularly an annual premium scheme for afforestation. Long-run afforestation trends, including the change from State-led to private-led grant-aided afforestation in the 1980's and 1990's are shown in Figure 5.

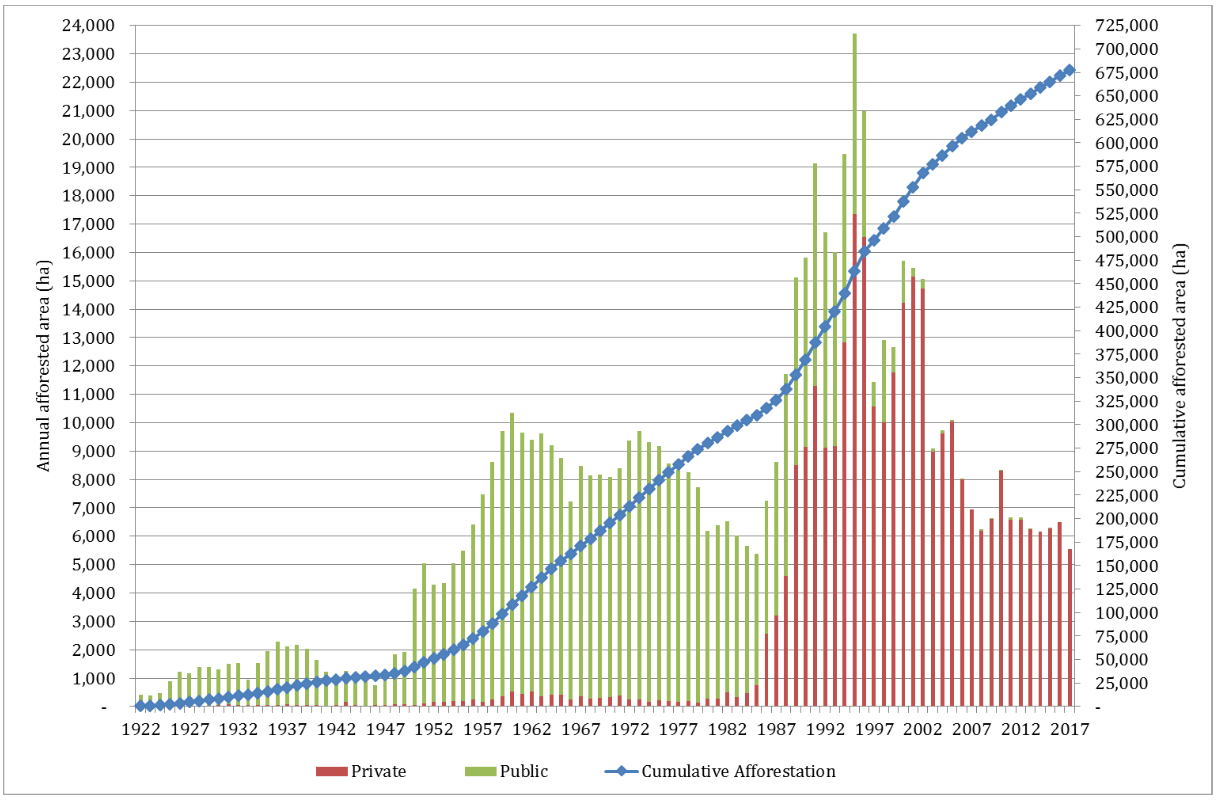

Figure 5. Annual State and private afforestation 1922-2017.

During the 1930's and 1940's, afforestation consisted of approximately 90% conifer species and 10% broadleaf species, and from the late 1940's to the early 1990's, broadleaves comprised approximately 4% of all afforestation. As a result of the positive differential in favour of broadleaf species in both the afforestation grant and premium schemes, the proportion of broadleaves planted increased significantly from 1993 up to the present, with an average of 23% broadleaves planted since that year (Figure 6).

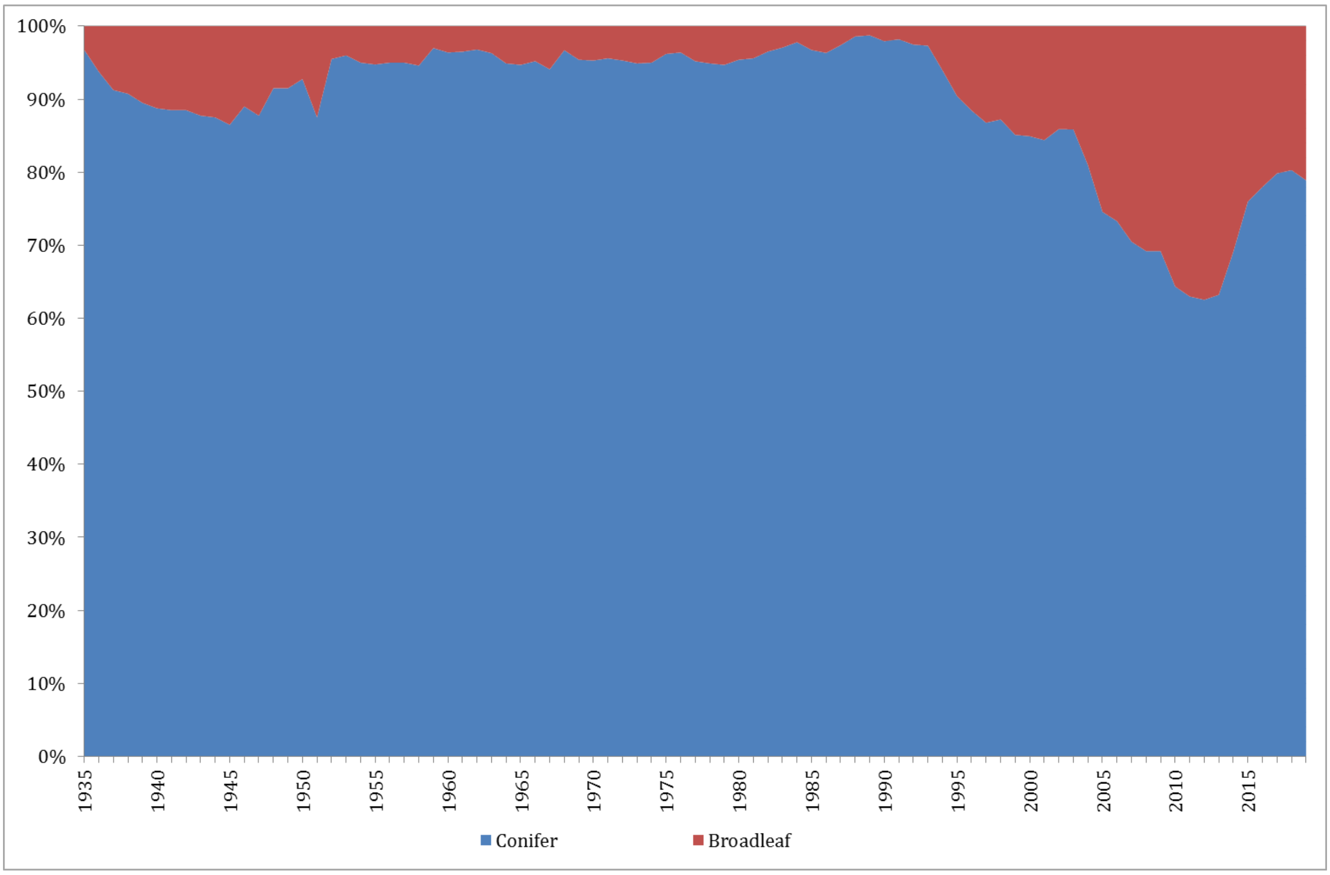

Figure 6. Conifer and broadleaf afforestation 1935-2017.

A range of conifer species were planted in the 1930's and 1940's, including Norway spruce, Scots pine and larch, along with Sitka spruce and Lodgepole pine. This reflected the untested nature of the North American species being planted at the time. From the 1950's onwards, confidence in Sitka spruce and Lodgepole pine grew, leading to their dominance in afforestation up to the mid-1990's, after which the role of Lodgepole pine declined, reflecting primarily the improved land quality available for afforestation after this period (Figure 7) and the generally poor form of the species.

From 2006 to 2010 the species composition of afforestation remained largely stable. However the finding of *Phytophthora ramorum* in Japanese larch in 2010, led to its withdrawal from the afforestation programme (Figure 8). From the mid-1990's onwards a wider range of tree species has been planted, with ash and oak dominating broadleaf planting. However, more recently, the fungal disease *Hymenoscyphus fraxineus* (Ash Dieback) was found in ash in 2012, resulting in the cessation of grant aid for this species. Nearly 17,000 ha of ash have been planted since 1990 (Figure 9). This has resulted in a contraction in broadleaf species for afforestation since 2012.

Sitka spruce remains the predominant species used in Irish forestry. It has proven to be one of the most productive conifers in Ireland and as such has become the mainstay in roundwood processing.

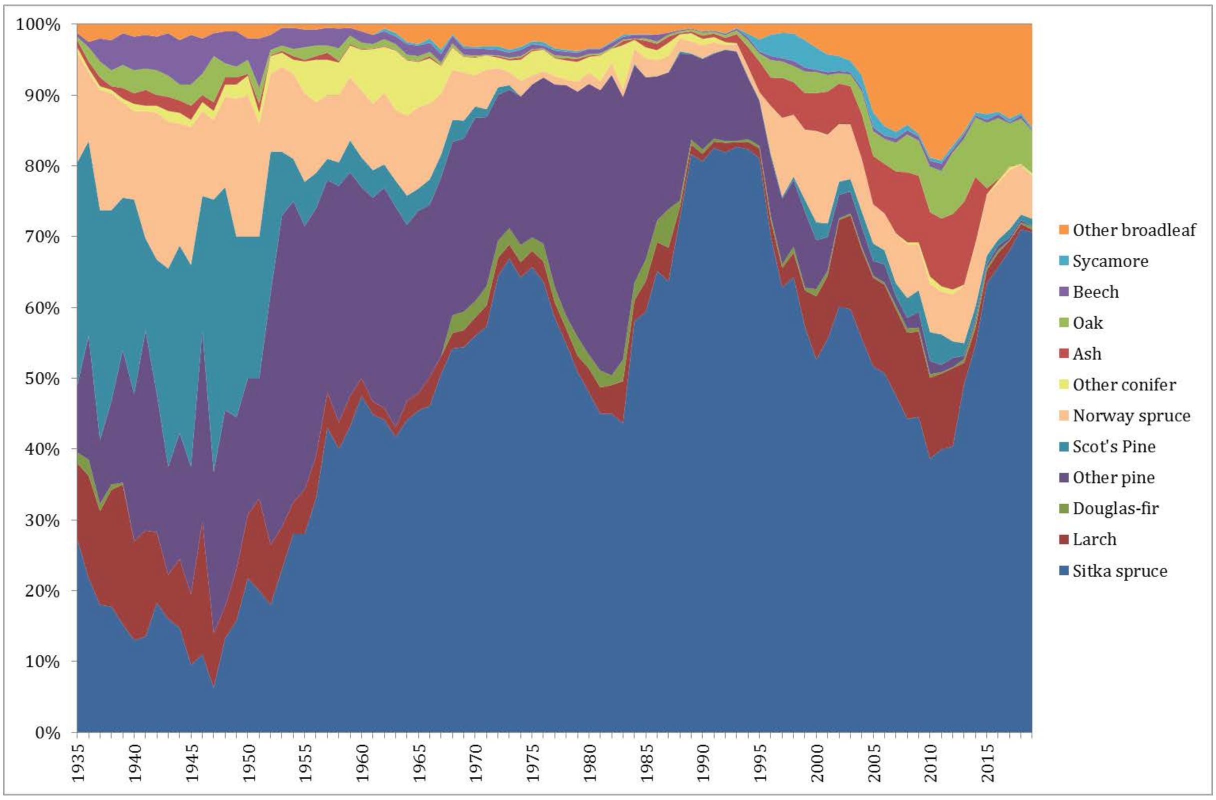

Figure 7. Species groups used in afforestation 1935-2017.

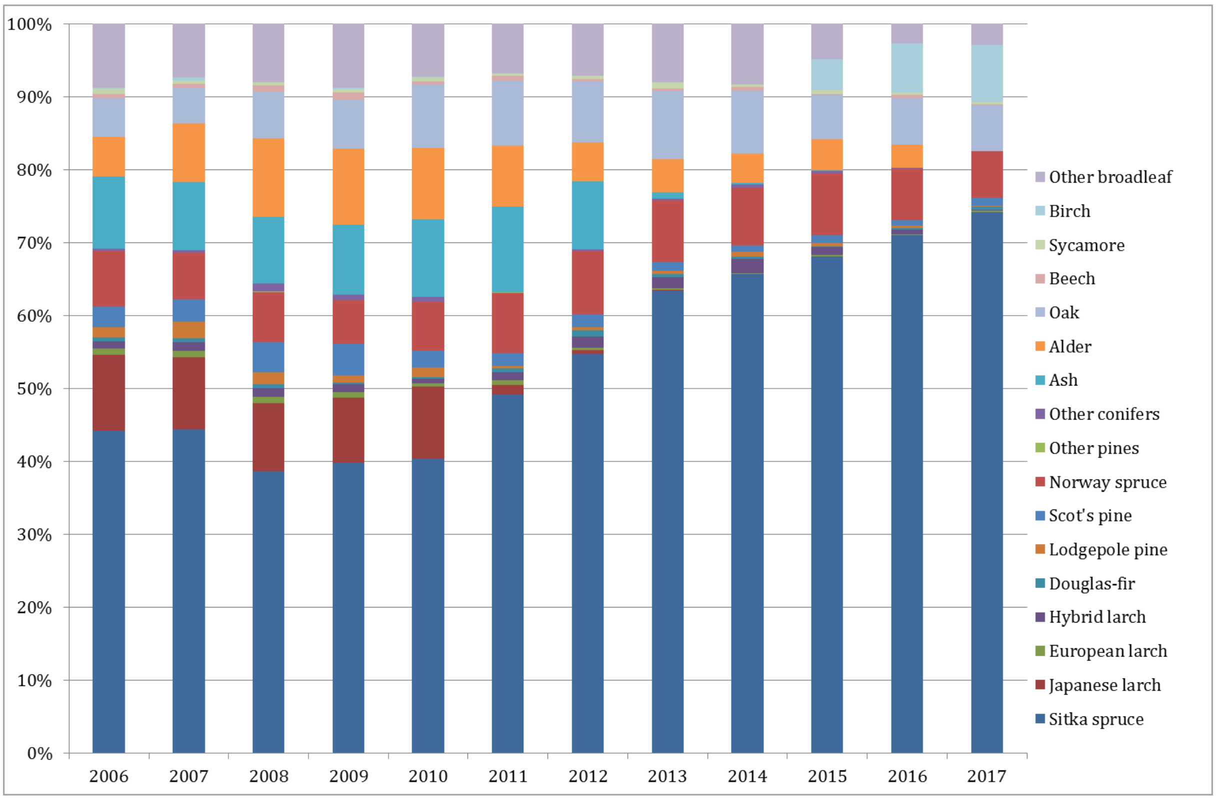

Figure 8. Grant-aided species groups, 2006-2017.

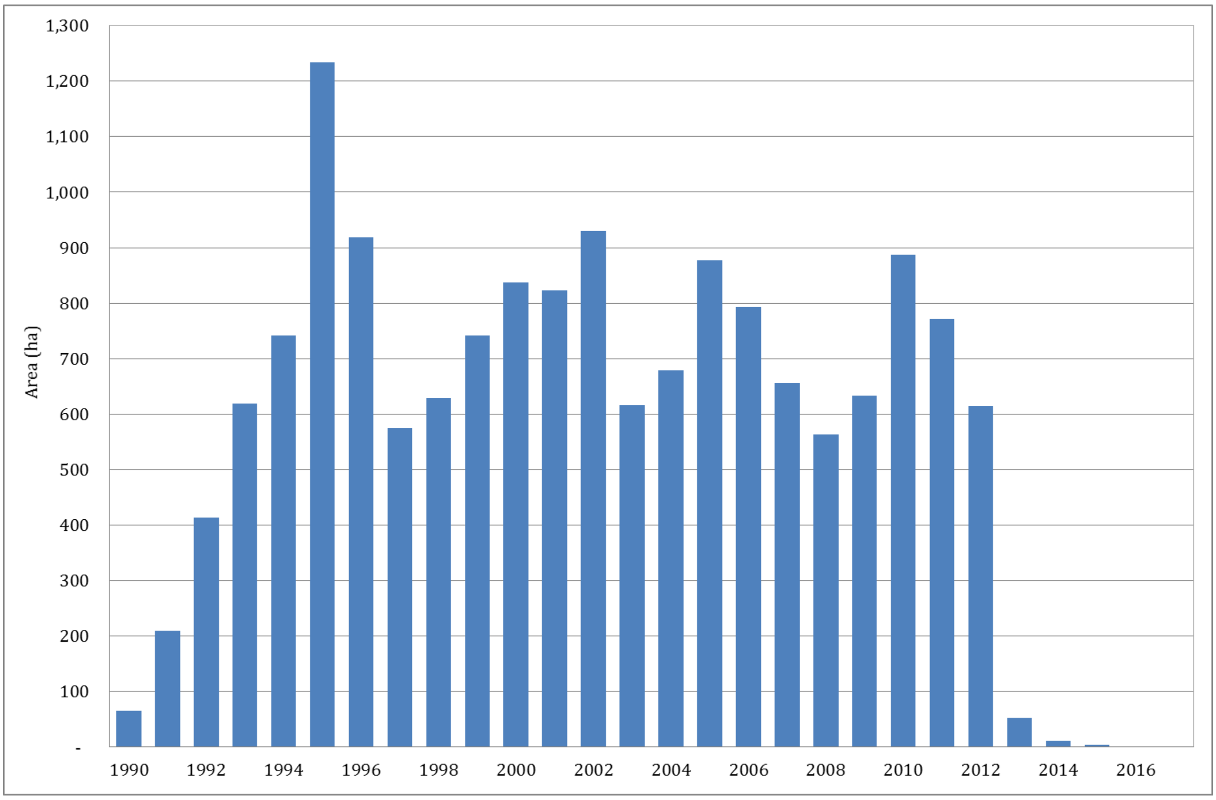

Figure 9. Ash afforestation 1990-2017.

3.3 Private lands afforested, forest size and number

This section provides statistics of private lands afforested over the period 1980 to 2017. The average size of private grant-aided afforestation between 1980 and 2017 was 8.7 ha (Table 7). From 1980 up to the mid-1980's the average afforestation parcel was relatively small at 5.9 ha. With the introduction of the grant and premium scheme average afforestation increased to 9.6 ha.

A significant proportion of private afforestation in the 1990's was "whole farm" planting and planting on unenclosed land. By 2017 the average area afforested has decreased to 6.3 ha as a result of planting mostly within individual agricultural holdings and a movement away from unenclosed land.

In terms of the size class contribution to overall afforestation since 1980, the distribution is slightly skewed towards parcels of 10-30 ha; over a wide range from 0.1 ha to over 100+ ha (Figure 10). Figure 11 shows that large sized individual plantings were a feature of mid 1980's-late 1990's planting. The threshold for a mandatory Environmental Impact Assessment (EIA) was reduced from 200 to 70 ha in 1996. The size of afforestation parcels decreased between 1997 and 2002, with area afforested in parcels greater than 20 ha decreasing from 46% to 35%. In 2001 the EIA threshold was further reduced from 70 to 50 ha along with sub threshold EIAs in the case of afforestation likely to have a significant effect on the environment. Since 2002, 20% of afforestation parcels have been greater than 20 ha; in the last 10 years no individual forest greater than 50 ha has been established. Since 2010 all afforestation applications are screened to determine whether they require an EIA; all developments over 50 ha are subject to a mandatory Environmental Impact Statement. Presently, 33% of the total afforested area (1980-2017) consists of plantations greater than 20 ha, 63% are greater than 10 ha and 75% are greater than 7.5 ha in size.

Table 7. Size and number of individual private grant-aided afforestation 1980-2017.

Year	Number of parcels		Mean forest size (ha)	
	Annual	Cumulative	Annual	Cumulative
1980	53	53	3.4	3.4
1981	46	99	7.0	5.1
1982	70	169	4.2	4.7
1983	82	251	4.3	4.6
1984	108	359	3.2	4.2
1985	156	515	6.7	4.9
1986	269	784	7.8	5.9
1987	386	1,170	7.5	6.4
1988	484	1,654	9.3	7.3
1989	720	2,374	11.7	8.6
1990	718	3,092	11.6	9.3
1991	779	3,871	9.4	9.3
1992	620	4,491	9.3	9.3
1993	1,036	5,527	8.0	9.1
1994	1,341	6,868	10.2	9.3
1995	1,467	8,335	11.2	9.6
1996	1,477	9,812	9.4	9.6
1997	1,275	11,087	9.2	9.5
1998	1,135	12,222	9.7	9.6
1999	1,141	13,363	10.3	9.6
2000	1,292	14,655	10.8	9.7
2001	1,370	16,025	10.4	9.8
2002	1,269	17,294	9.8	9.8
2003	1,132	18,426	8.6	9.7
2004	950	19,376	9.0	9.7
2005	1,342	20,718	8.4	9.6
2006	1,127	21,845	7.9	9.5
2007	836	22,681	7.1	9.4
2008	685	23,366	8.1	9.4
2009	730	24,096	8.7	9.4
2010	945	25,041	8.1	9.3
2011	891	25,932	7.4	9.2
2012	907	26,839	6.4	9.2
2013	1,004	27,843	6.6	9.1
2014	1,018	28,861	6.0	9.0
2015	925	29,786	6.6	8.9
2016	983	30,769	6.6	8.8
2017	872	31,641	6.3	8.7

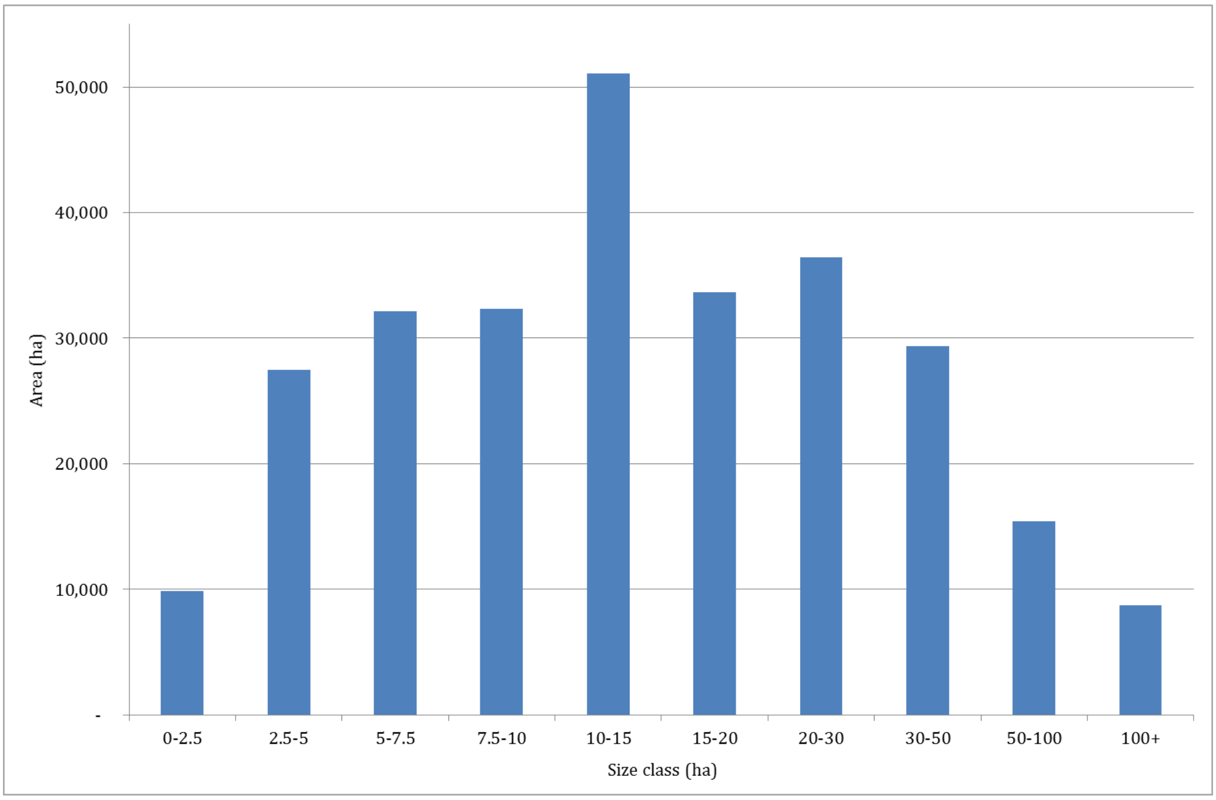

Figure 10. Size class distribution of private grant-aided afforestation 1980-2017.

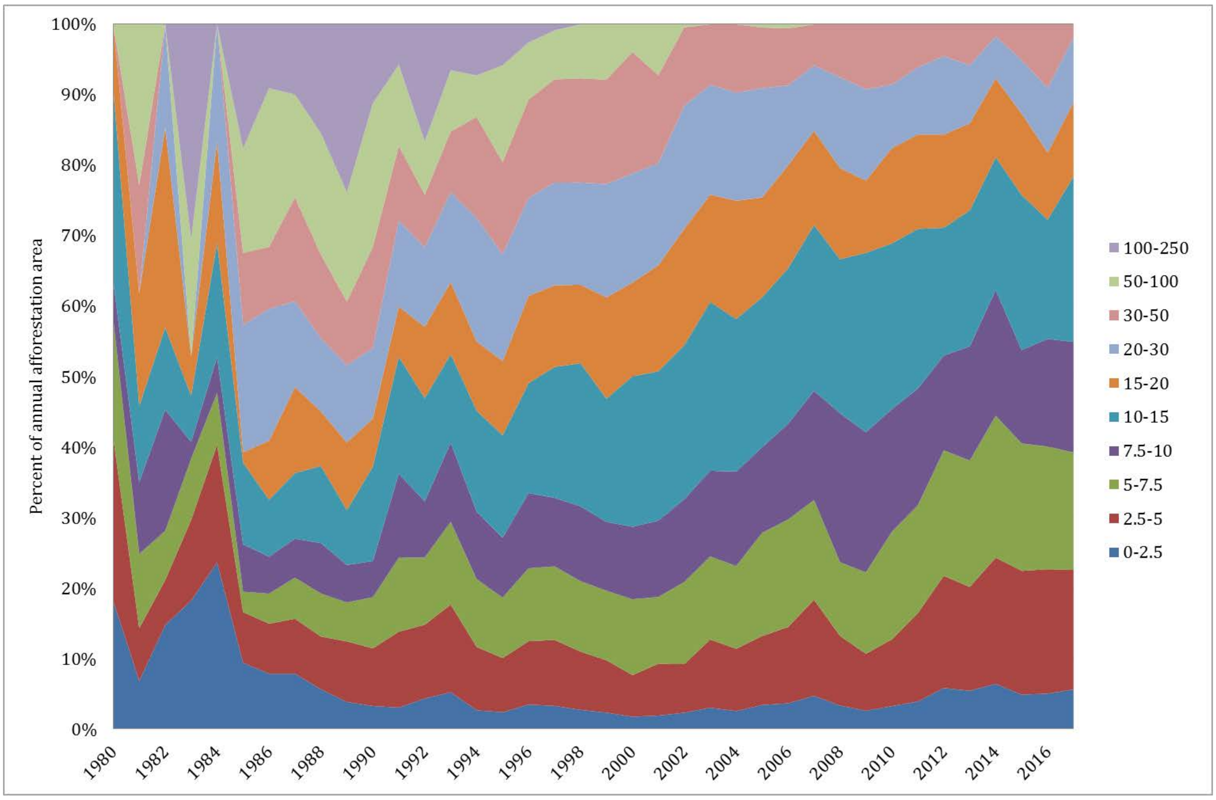

Figure 11. Proportion of annual private grant-aided afforestation area by size class of from 1980-2017.

3.4 Private afforestation ownership

This section provides information on the nature of private forest owners who afforested between 1980 and 2017[17].

3.4.1 Farmer/non-farmer

The category 'Non farmers' includes landowners who in general are not actively farming; this category includes retired farmers, sons and daughters of farmers or other relatives who might have inherited land but who have careers outside of farming and this category also includes other landowners who may have recently bought the land.

Farmers accounted for 82% of private lands afforested between 1980 and 2017. Farmers and non-farmers were planting, on average, equal amounts of forest throughout the 1980's and up to the early 1990's. A feature of the period was the higher average forest parcel size planted by non-farmer investors (15 ha), compared to an average of 5 ha for farmers (Figure 12). From 1993 up to the present day farmer planting has dominated afforestation (Figure 13).

In the Afforestation Grant and Premium Scheme (2014-2020) changes were implemented to the differentiation of Farmers and Non-farmers in terms of grant and premium payments. Prior to 2014 it was necessary for land owners to qualify as farmers to be eligible for the higher rate of premium payments. Farmers and Non-farmers are now eligible for the same rate of grant and premium payments. The result of this change has seen the participation of non-farmers increase to 41% of the area afforested in 2017, which is the highest level since 1995 (15%). The average forest parcel size for non-farmers has increased from 3.6 ha in 2014 to 6.5 ha in 2017, bringing the size in line with the average farmer forest parcel size of 6.0 ha.

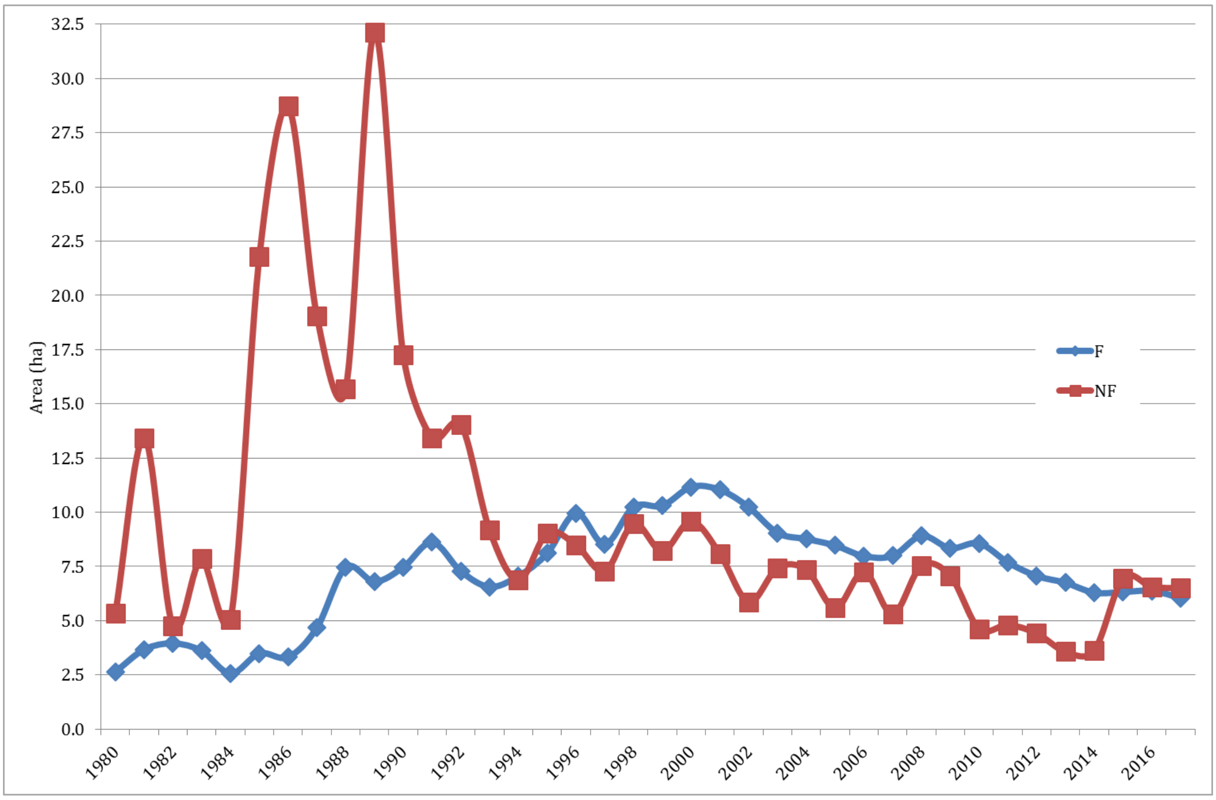

Figure 12. Average area of Farmer/Non-Farmer grant-aided afforestation 1980-2017.

[17] The year data refers to when the forest was planted.

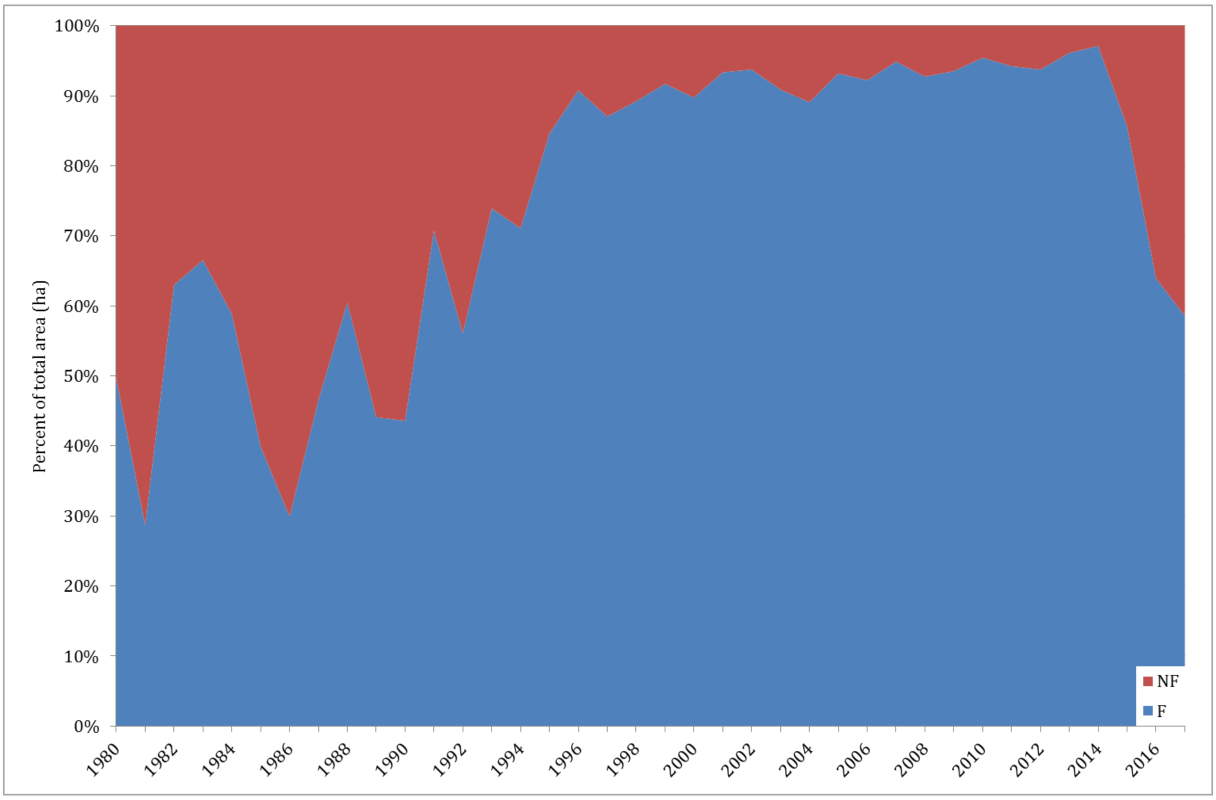

Figure 13. Farmer and Non-Farmer participation in afforestation (1980-2017).

3.4.2 Number of grant aided forests planted by individuals

It has been common for individual forest owners to afforest more than one forest. Table 8 details the number of individual forest owners who have had one or more grant aided forests planted since 1980. Some 78.8% of owners have planted one forest, accounting for 148,930 ha. In terms of overall area, 46.1% of the individual owners have had two or more grant aided forests planted. For individual owners with one forest planted the average size is 8.4 ha, while individual owners with two or more forests planted have an average size of 26.7 ha. While these forests may not be all contiguous, the information presented shows that the private grant-aided forest estate is less fragmented than considered heretofore. It also shows potentially more consolidated forest holdings among individual owners than was heretofore assumed.

Table 8. Private grant aided forests planted by individual owners (1980-2017).

No. of forests	No. of individual owners	Area ha	Owner %	Area %
1	17,777	148,930	78.8	53.9
2	3,242	52,620	14.4	19.0
3	903	22,911	4.0	8.3
4	301	10,868	1.3	3.9
5	123	6,448	0.5	2.3
6-7	104	7,386	0.5	2.7
8-9	43	3,920	0.2	1.4
10-19	45	8,291	0.2	3.0
20-49	20	8,067	0.1	2.9
50+	4	7,027	0.0	2.5
Total	22,562	276,508	100	100

3.4.3 Annual grant applications by individual owner

As stated, when assessing the average size of the total forest holdings of individual owners a profile of a less fragmented private forest estate emerges when compared to using a simple average of individual afforestation areas. By 2017, the average cumulative area afforested by unique owners was 12.3 ha (Table 9), compared to the average individual afforestation areas of 8.7 ha (Table 7). Looking only at the average size of individual afforestation areas ignores the fact that some owners have afforested multiple forest holdings over time (Figure 14).

Table 9. Annual grant applications by individual owners (1980-2017).

Year	No. of unique owners		Mean forest size (ha)	
	Annual	Cumulative	Annual	Cumulative
1980	46	46	3.9	3.9
1981	41	74	7.8	6.8
1982	70	133	4.2	6.0
1983	78	193	4.5	6.0
1984	104	272	3.3	5.5
1985	142	382	7.4	6.7
1986	229	573	9.1	8.1
1987	353	860	8.2	8.7
1988	464	1,239	9.7	9.7
1989	658	1,789	12.8	11.4
1990	646	2,331	12.9	12.3
1991	764	3,058	9.6	11.8
1992	594	3,581	9.8	11.7
1993	938	4,410	8.8	11.4
1994	1,249	5,504	10.9	11.6
1995	1,355	6,626	12.1	12.1
1996	1,363	7,713	10.1	12.2
1997	1,163	8,601	10.0	12.3
1998	1,043	9,391	10.6	12.4
1999	1,037	10,186	11.4	12.6
2000	1,161	11,020	12.0	12.9
2001	1,247	11,965	11.5	13.1
2002	1,133	12,785	11.0	13.2
2003	1,005	13,465	9.7	13.3
2004	830	14,063	10.3	13.3
2005	1,185	14,907	9.5	13.3
2006	1,025	15,636	8.7	13.3
2007	759	16,169	7.9	13.2
2008	629	16,624	8.8	13.2
2009	694	17,151	9.2	13.2
2010	897	17,837	8.5	13.1
2011	858	18,523	7.7	12.9
2012	844	19,189	6.9	12.8
2013	935	19,901	7.1	12.7
2014	947	20,610	6.5	12.5
2015	859	21,249	7.1	12.4
2016	922	21,965	7.0	12.3
2017	798	22,562	6.9	12.3

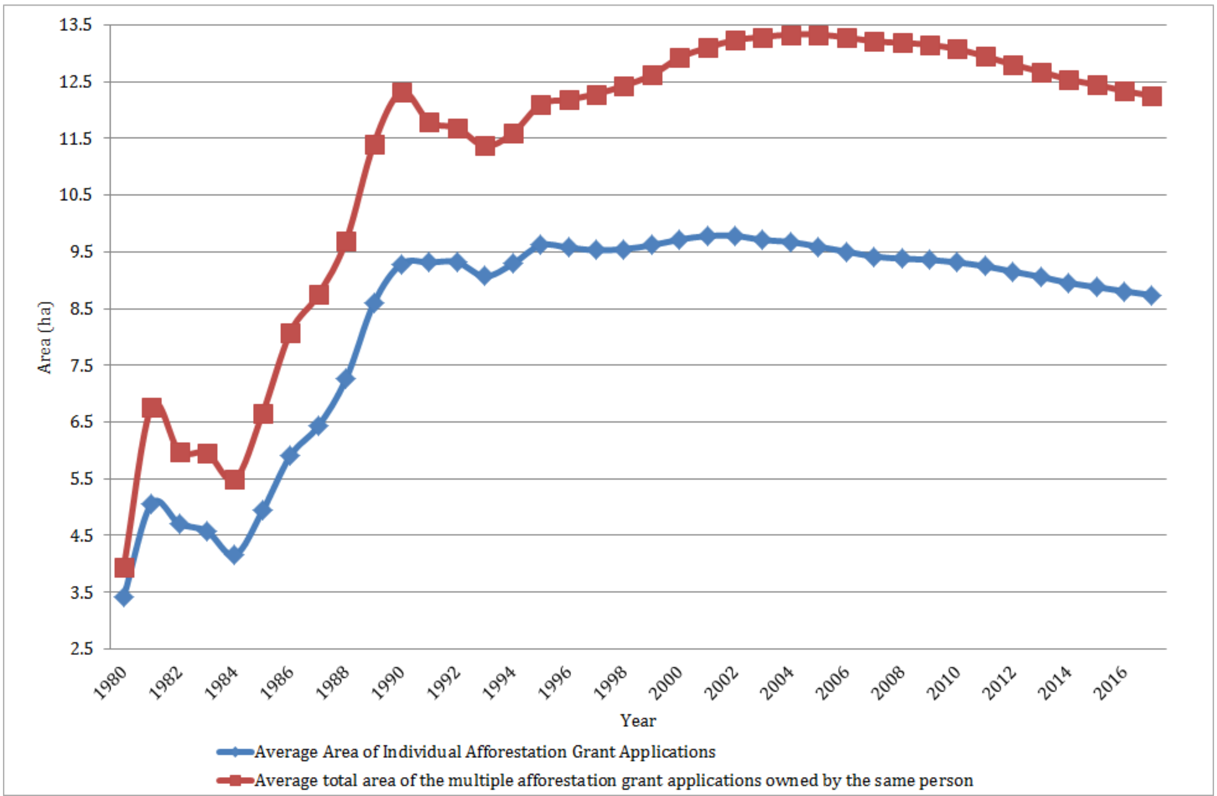

Figure 14. Average area of individual afforestation grant application vs. the average area of the combined multiple afforestation grant applications owned by the same person (1980-2017).

3.4.4 Number of individual private forest owners per county

The number of unique owners that have afforested by county between 1980 and 2017 is detailed in Table 10. It should be noted that individual owners recorded in any one year may have subsequently planted again in the following years.

Table 10. Cumulative number of unique owners and area by county in 1980–2017.

County	No. owners	Area (ha)
Carlow	220	1,772
Cavan	768	8,091
Clare	1,822	22,653
Cork	2,852	30,429
Donegal	936	15,709
Dublin	84	833
Galway	1,460	16,060
Kerry	2,086	28,992
Kildare	344	3,313
Kilkenny	825	9,428
Laois	545	7,089
Leitrim	773	11,412
Limerick	1,059	13,337

County	No. owners	Area (ha)
Longford	575	5,509
Louth	80	702
Mayo	1,694	19,354
Meath	436	4,420
Monaghan	287	1,897
Offaly	673	8,434
Roscommon	1,133	12,249
Sligo	838	8,874
Tipperary	1,481	18,709
Waterford	692	7,641
Westmeath	550	7,214
Wexford	662	5,550
Wicklow	582	6,836

3.4.5 Age profile of forest owners

In this section information is presented on the age of the persons at the time of when their land was afforested. It is clear from Figure 15 that between 2006 and 2017, the age of people engaged in afforestation has been increasing. In 2006, 28% of the area afforested was by people aged 60 years or more, and in 2017 this had increased to 49%. Figure 16 details the age profile of the forest owners in receipt of premium. In 2017, 52% of the total area that received premium payments was owned by people aged 60 years or more.

3.4.6 Gender of forest owners

This section presents on the gender of forest owners at the time of when their land was afforested. Over the 12 year period (2006-2017) 83% of owners were male (Figure 17).

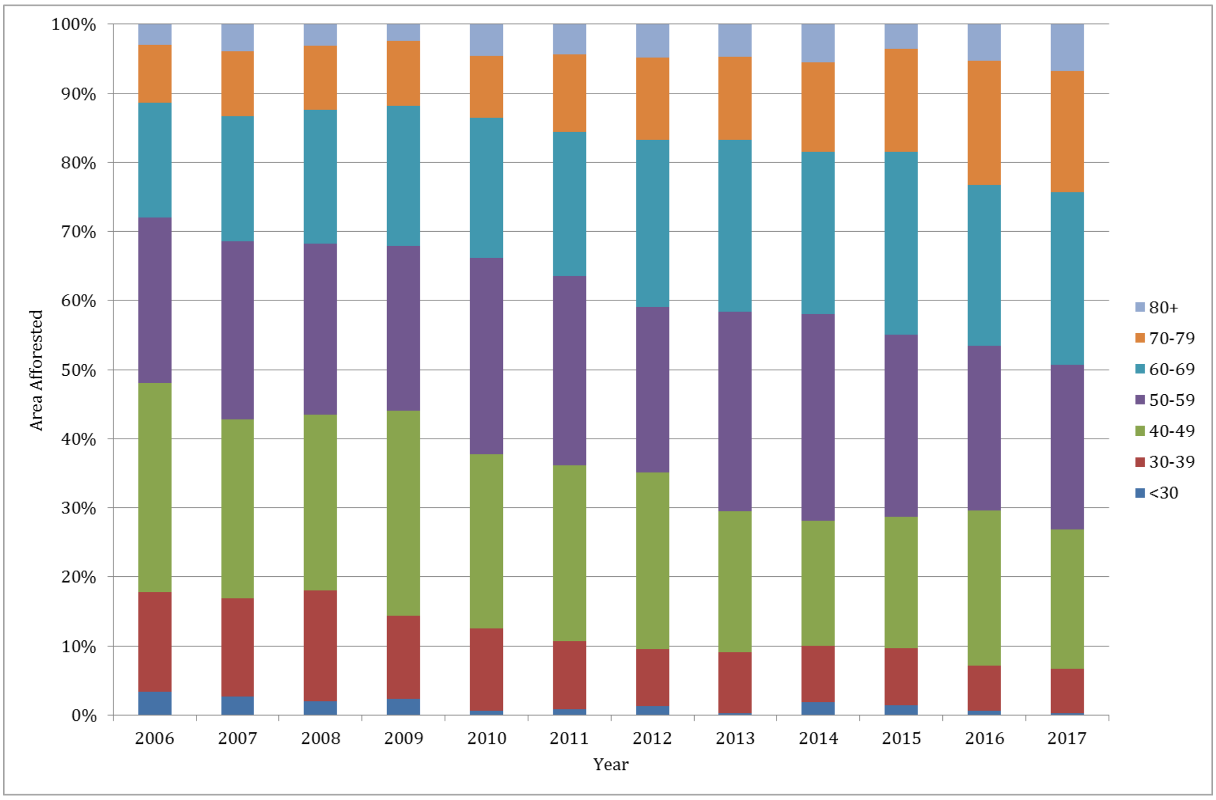

Figure 15. Age profile of forest owners at the time of when their land was afforested (2006-2017).

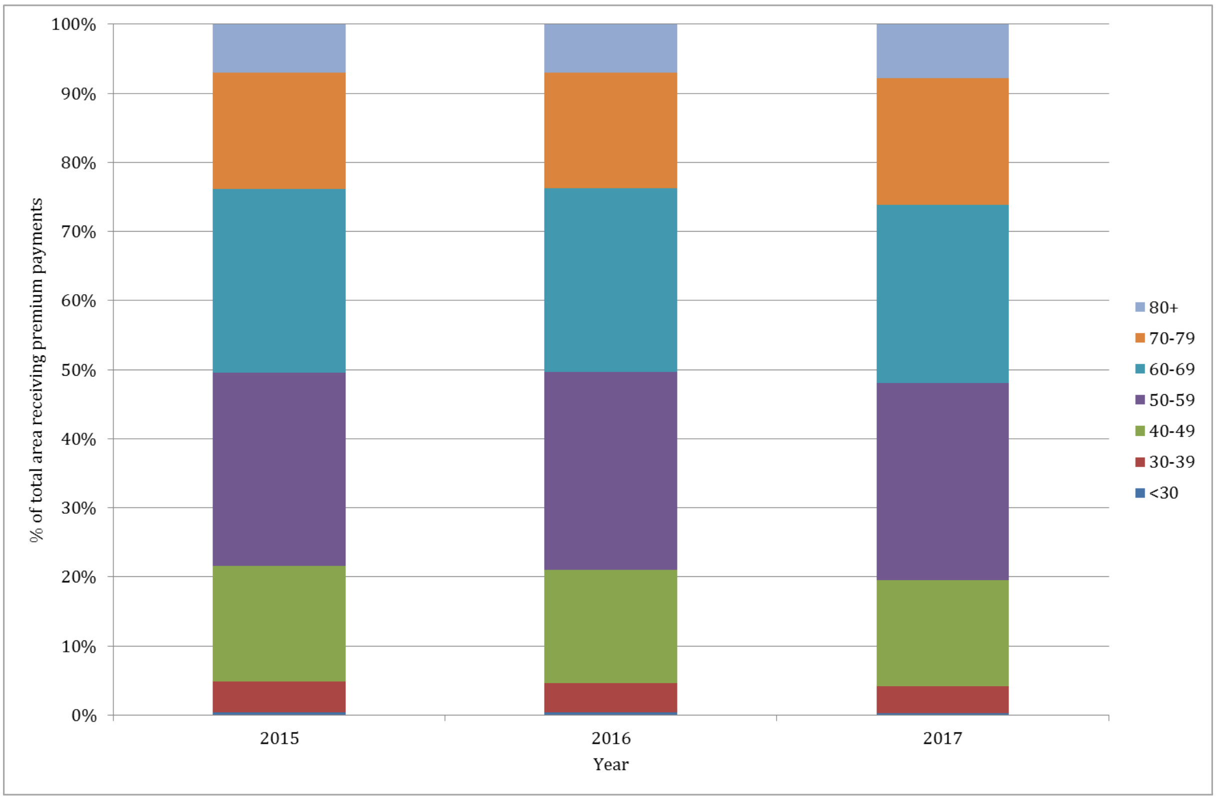

Figure 16. Age profile of forest premium recipients, 2015-2017.

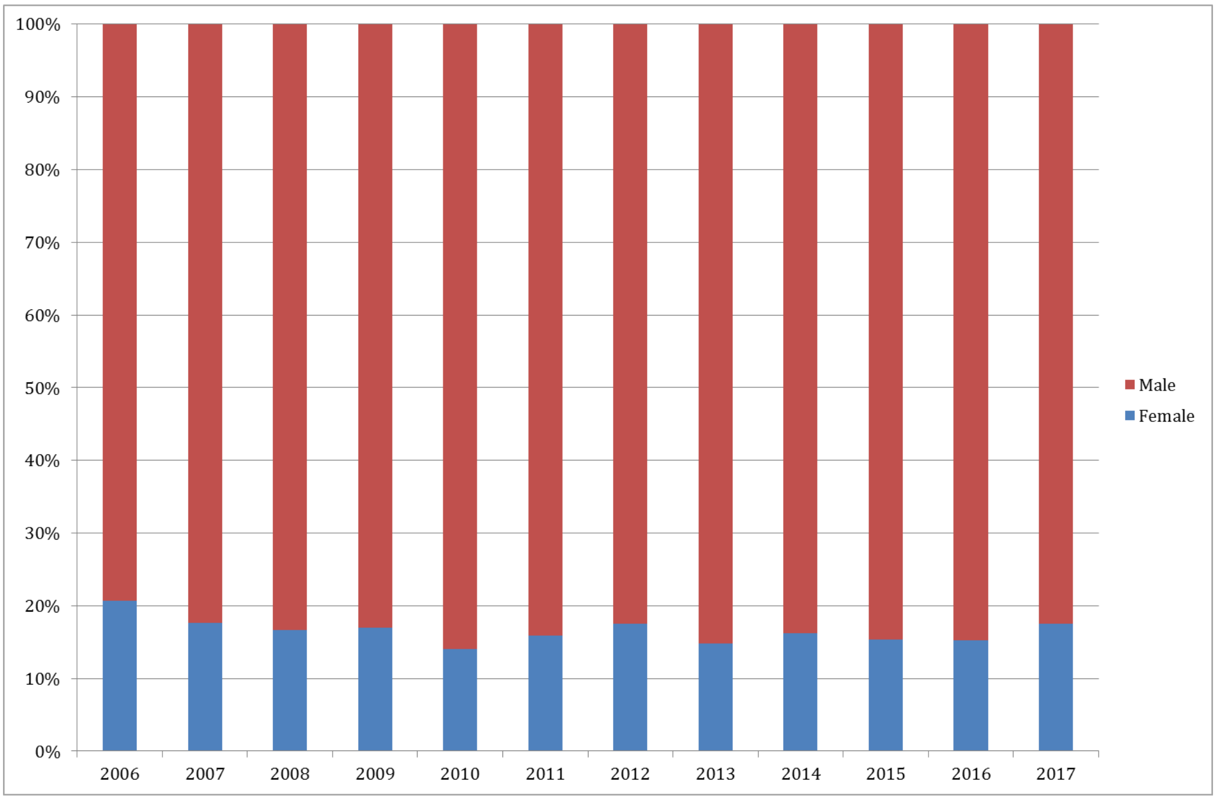

Figure 17. Gender of forest owners at the time of when land was afforested (2006-2017).

3.4.7 Private (non grant-aided) ownership details

Previous sub-sections in this chapter have outlined ownership profiles of the private grant-aided estate. Information on ownership in the Private (non grant-aided) component of the forest estate is not available, which comprised 110,563 ha in 2017 (NFI, 2017). The 1973 *Inventory of Private Woodlands*[18] provided inventory information for forest areas of 40 ha or more (17,481 ha) or 21% of the total of 81,958 ha of private forests estimated at the time. At the time, areas 40 ha or more and under single ownership represented the more commercially viable forest stands in private ownership. The remaining Private (non grant-aided) forest is comprised of primarily juvenile, short-living, naturally regenerated broadleaf species such as birch. These forest areas are commonly quite small and frequently of limited use for agriculture due to slope and other restrictions. The number of owners in this category is in the region of 20,000-30,000. In 1973 over 40% of the 81,958 ha was comprised of "scrub" category. The size category of the 151 estates with detailed historical inventory information is shown in Table 11.

Table 11. Inventory of Private Woodlands, 1973 - Forest-size categories.

Estate Forest Area (ha)	Number of estates	Area (%)
40-50	25	7
51-100	67	24
101-500	56	59
501-1,000	3	11

3.5 Grant-aided forest removal

The area of private grant-aided forest taken out of afforestation between 2008 and 2017 is shown in Table 12, and accounts for 1-4% of the annual afforestation rate over the same years.

Table 12. Lands taken out of afforestation 2008-2017.

Year	Number	Area (ha)
2008	101	209
2009	110	147
2010	74	99
2011	68	87
2012	75	91
2013	63	70
2014	52	64
2015	13	36
2016	47	156
2017	40	101

[18] Purcell, T. 1979. *Inventory of Private Woodlands,* 1973, Department of Fisheries and Forestry, Forest and Wildlife Service.

3.6 Change of applicant

A substantial area of private grant-aided forests change ownership each year (Table 13). Most ownership change is within families from one generation to the next.

Table 13. Change of ownership by area of forest 2007-2017.

Year	Number	Area (ha)
2007	345	3,385
2008	348	3,309
2009	374	3,850
2010	393	3,612
2011	335	2,970
2012	402	3,999
2013	379	3,440
2014	366	3,911
2015	362	3,503
2016	543	5,453
2017	396	3,384

3.7 County level statistics

The total afforestation by county from 1998 to 2017 is detailed in Table 14. In 2017, Leitrim had the highest afforestation area at 536 ha followed by Mayo at 532 ha. County level statistics detailing private and public afforestation are detailed in Tables 15 and 16, respectively.

In Table 17, information is presented on the total area afforested in each county by Farmers and Non-farmers from 2012-2017. Broad level county information is presented on the species composition (broadleaf/conifer) of lands afforested between 2008 and 2017 in Table 18.

Table 14. Total Afforestation (ha) by County, 1998-2017.

County	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Carlow	96	91	57	71	81	79	54	88	60	43	49	47	100	21	73	44	15	82	46	62
Cavan	419	225	402	555	716	220	436	303	217	300	197	260	243	204	171	210	241	277	425	317
Clare	881	932	1,467	1,504	1,012	590	833	749	698	669	695	564	521	484	480	347	420	568	552	518
Cork	1,397	1,306	1,636	1,709	2,094	978	1,434	1,734	1,441	1,024	1,006	799	1,157	1,035	1,041	672	690	663	608	420
Donegal	1,192	877	955	1,016	900	388	309	345	239	321	197	172	147	59	96	40	28	72	36	54
Dublin	63	5	17	4	5	19	11	0	0	18	11	0	0	1	20	0	12	8	3	11
Galway	768	446	640	454	660	452	527	499	372	403	263	318	561	300	336	419	387	432	331	400
Kerry	1,055	1,126	1,828	2,018	1,825	930	893	770	664	549	478	556	736	641	366	490	574	430	405	378
Kildare	250	156	234	136	154	134	84	129	84	79	17	111	86	141	220	48	90	29	13	33
Kilkenny	363	503	422	530	529	456	297	545	322	229	199	203	523	292	294	218	231	264	181	90
Laois	285	287	584	441	476	148	183	203	71	144	178	100	178	95	193	112	168	198	163	99
Leitrim	591	478	688	464	467	325	394	411	227	191	167	179	176	325	278	356	272	513	434	536
Limerick	489	584	964	1,183	1,175	807	767	684	521	373	441	329	411	381	281	243	122	177	329	99
Longford	250	216	280	175	416	212	255	208	255	124	86	87	243	174	178	255	225	286	272	201
Louth	99	2	10	2	63	8	18	2	20	55	65	65	46	19	51	26	0	22	40	22
Mayo	1,094	841	914	924	929	556	483	359	325	402	344	474	548	289	293	346	453	455	429	532
Meath	185	346	349	250	169	149	150	217	287	42	89	130	252	90	203	192	67	73	105	122
Monaghan	76	23	23	48	47	59	74	59	107	70	56	88	140	70	107	93	137	38	89	61
Offaly	296	654	585	509	309	386	316	262	218	135	242	324	279	268	263	174	128	156	136	166
Roscommon	360	517	557	577	503	462	575	287	322	309	352	398	360	311	252	431	449	343	435	431
Sligo	406	176	446	524	315	242	237	254	172	205	132	233	82	87	180	354	382	268	302	190
Tipperary	898	1,154	1,252	1,195	893	710	633	1,087	663	546	465	455	532	494	486	410	330	341	305	162
Waterford	333	442	381	129	482	231	220	239	308	310	156	245	264	204	128	138	122	125	240	163
Westmeath	448	336	182	332	276	209	320	351	155	141	145	200	203	251	271	241	236	204	281	207
Wexford	251	516	344	289	158	225	187	247	216	178	102	182	426	308	201	229	160	128	89	114
Wicklow	385	428	478	426	402	122	48	65	71	89	115	128	100	109	188	164	219	139	251	148
Total	**12,928**	**12,667**	**15,696**	**15,464**	**15,054**	**9,098**	**9,739**	**10,096**	**8,037**	**6,947**	**6,249**	**6,648**	**8,314**	**6,653**	**6,652**	**6,252**	**6,156**	**6,293**	**6,500**	**5,535**

Table 15. Private Afforestation (ha) by County, 1998-2017.

County	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Carlow	53	64	57	71	81	79	54	88	60	43	49	47	100	21	73	44	15	82	46	62
Cavan	228	225	353	555	700	220	436	303	217	300	197	260	243	204	171	210	241	277	425	317
Clare	677	878	1,377	1,457	1,009	588	800	736	698	669	695	564	521	484	480	347	420	568	552	518
Cork	1,039	1,286	1,531	1,615	2,026	963	1,432	1,734	1,441	1,024	1,006	799	1,157	1,035	1,041	672	690	663	608	420
Donegal	841	825	767	931	861	388	292	330	230	321	197	172	147	59	96	40	28	72	36	54
Dublin	63	5	11	4	5	19	11	0	0	18	11	0	0	1	20	0	12	8	3	11
Galway	458	407	434	446	634	382	494	477	356	403	235	318	561	300	336	419	387	432	331	400
Kerry	843	1,106	1,767	2,018	1,825	914	893	770	664	549	478	556	736	641	366	490	574	430	405	378
Kildare	250	156	234	136	154	134	84	129	84	79	17	111	86	101	186	48	90	29	13	33
Kilkenny	227	488	359	530	529	456	297	545	322	229	197	203	523	292	294	218	231	264	181	90
Laois	224	268	553	437	464	148	183	203	71	144	178	93	178	95	193	112	168	198	163	99
Leitrim	490	411	598	447	452	319	388	411	227	191	167	179	176	325	278	356	272	513	434	536
Limerick	289	505	882	1,183	1,175	807	763	684	521	373	441	329	411	381	281	243	122	177	329	99
Longford	144	195	231	168	405	212	255	208	255	124	86	87	243	174	178	255	225	286	272	201
Louth	78	2	10	2	63	8	18	2	20	55	65	65	46	19	51	26	0	22	40	22
Mayo	962	653	768	905	904	554	483	359	325	402	344	474	544	289	293	343	453	455	429	532
Meath	172	340	349	242	169	149	150	217	287	42	89	130	252	90	203	192	67	73	105	122
Monaghan	44	23	23	48	47	59	74	59	107	70	56	88	140	70	107	93	137	38	89	61
Offaly	296	654	579	509	309	386	316	262	218	135	242	324	279	268	263	174	128	156	136	166
Roscommon	264	435	402	550	437	451	559	272	322	309	315	370	360	288	252	431	449	334	435	431
Sligo	304	149	417	524	305	242	226	254	172	205	132	233	82	87	180	354	382	268	302	190
Tipperary	788	1,140	1,195	1,195	868	710	633	1,087	663	546	465	455	532	494	460	410	330	341	305	162
Waterford	309	387	358	127	482	231	220	239	308	310	156	245	264	204	128	138	122	125	240	163
Westmeath	370	336	177	332	276	209	320	351	155	141	145	200	203	251	271	241	236	204	281	207
Wexford	251	472	344	289	158	225	187	247	216	178	102	182	426	308	201	229	160	128	89	114
Wicklow	341	366	456	426	398	116	48	65	71	89	115	128	100	109	188	164	219	139	251	148
Total	**10,002**	**11,776**	**14,231**	**15,147**	**14,735**	**8,969**	**9,617**	**10,032**	**8,011**	**6,947**	**6,182**	**6,613**	**8,310**	**6,591**	**6,592**	**6,249**	**6,156**	**6,284**	**6,500**	**5,535**

Table 16. Public Afforestation (ha) by County, 1998-2017.

COUNTY	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Carlow	43	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cavan	191	-	49	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Clare	204	54	90	46	3	2	34	13	-	-	-	-	-	-	-	-	-	-	-	-
Cork	359	21	105	93	68	15	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Donegal	352	52	188	85	40	-	17	14	9	-	-	-	-	-	-	-	-	-	-	-
Dublin	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Galway	310	39	206	8	26	69	33	22	16	-	28	-	-	-	-	-	-	-	-	-
Kerry	212	21	62	-	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kildare	-	-	-	-	-	-	-	-	-	-	-	-	-	39	34	-	-	-	-	-
Kilkenny	136	15	63	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
Laois	61	19	31	5	11	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-
Leitrim	101	67	90	17	15	6	6	-	-	-	-	-	-	-	-	-	-	-	-	-
Limerick	199	79	82	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Longford	106	21	49	7	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Louth	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mayo	133	189	146	19	24	3	-	-	-	-	-	-	4	-	-	3	-	-	-	-
Meath	13	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Monaghan	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Offaly	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Roscommon	96	82	155	27	66	11	16	15	-	-	37	28	-	23	-	-	-	9	-	-
Sligo	103	27	30	-	10	-	10	-	-	-	-	-	-	-	-	-	-	-	-	-
Tipperary	110	14	57	-	25	-	-	-	-	-	-	-	-	-	26	-	-	-	-	-
Waterford	24	55	23	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Westmeath	77	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wexford	-	44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wicklow	44	62	22	-	4	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	**2,926**	**891**	**1,465**	**316**	**319**	**128**	**122**	**64**	**25**	**-**	**67**	**35**	**4**	**62**	**60**	**3**	**-**	**9**	**-**	**-**

Table 17. Total Afforestation (ha) by County and Farmer/Non-farmer, 2012-2017.

County	2012				2013				2014				2015				2016				2017			
	Farmer		**Non Farmer**		**Farmer**		**Non Farmer**		**Farmer**		**Non Farmer**		**Farmer**		**Non Farmer**		**Farmer**		**Non Farmer**		**Farmer**		**Non Farmer**	
	No.	**ha**	**No.**	**ha**	**No.**	**ha**	**No.**	**ha**	**No.**	**ha**	**No.**	**ha**	**No.**	**ha**	**No.**	**ha**	**No.**	**ha**	**No.**	**ha**	**No.**	**ha**	**No.**	**ha**
Carlow	9	73	-	-	10	43	1	1	5	15	-	-	9	82	-	-	5	17	4	28	8	46	2	16
Cavan	27	161	4	10	29	198	3	12	39	239	2	1	42	218	11	59	33	213	26	212	27	188	21	129
Clare	70	459	4	21	54	346	1	1	62	394	3	25	85	498	8	70	60	314	33	238	38	259	40	259
Cork	138	1,010	15	31	87	660	7	12	97	679	5	11	95	589	11	74	49	354	34	254	38	206	28	214
Donegal	10	92	1	5	8	40	-	-	5	24	1	4	10	47	5	25	6	28	2	8	4	28	4	26
Dublin	3	16	1	4	-	-	-	-	1	6	2	6	1	5	1	3	1	3	-	-	1	3	2	7
Galway	58	332	2	5	56	388	4	31	57	384	1	3	62	387	7	45	49	242	17	89	35	235	24	165
Kerry	61	358	4	9	59	489	1	1	82	571	2	3	48	359	10	72	51	285	20	120	29	164	31	214
Kildare	20	175	3	45	12	48	-	-	18	85	2	5	3	20	2	9	2	8	3	6	5	22	3	11
Kilkenny	39	270	4	25	35	216	2	1	42	229	1	2	38	208	4	56	19	132	7	49	16	89	1	1
Laois	21	186	1	7	18	100	1	12	26	168	-	-	11	173	2	26	15	111	11	52	7	62	7	36
Leitrim	30	269	2	9	42	338	4	18	32	260	4	12	58	416	10	97	34	239	28	195	37	271	33	266
Limerick	42	253	5	29	35	239	1	4	24	119	3	3	26	163	4	14	35	219	14	110	14	64	7	36
Longford	29	171	3	7	34	254	2	1	39	216	4	9	37	215	6	71	26	144	15	128	30	150	10	50
Louth	6	51	-	-	5	21	2	5	-	-	-	-	2	4	2	19	2	12	4	28	4	22	0	0
Mayo	46	251	9	42	57	299	11	47	84	422	6	31	72	424	8	31	53	316	22	113	51	252	33	280
Meath	26	191	3	12	24	182	2	9	10	67	-	-	12	60	2	13	11	64	9	41	9	60	12	62
Monaghan	19	107	-	-	16	82	3	11	13	121	1	16	8	24	2	14	9	46	6	43	4	39	5	23
Offaly	34	250	1	13	32	174	-	-	25	128	-	-	18	130	5	26	14	106	9	30	18	130	10	36
Roscommon	30	225	3	27	55	431	-	-	68	427	4	22	49	285	7	58	50	305	29	130	52	293	20	138
Sligo	25	165	6	15	45	333	5	21	58	367	4	15	31	233	6	35	43	200	15	102	23	116	13	74
Tipperary	49	429	8	57	68	394	4	16	55	328	1	2	49	301	8	40	19	186	13	120	10	67	17	94
Waterford	21	123	1	5	20	134	1	4	21	118	1	3	23	119	2	7	17	221	4	19	18	132	5	32
Westmeath	29	262	5	9	29	235	5	7	30	236	-	-	27	204	-	-	21	173	18	108	23	146	10	61
Wexford	25	179	8	23	44	219	5	10	31	157	1	3	23	109	4	20	14	67	5	22	20	90	8	24
Wicklow	16	182	1	6	16	144	3	20	26	216	1	3	13	118	3	21	14	151	9	99	15	108	7	40
Total	**883**	**6,237**	**94**	**415**	**890**	**6,009**	**68**	**243**	**950**	**5,978**	**49**	**178**	**852**	**5,389**	**130**	**904**	**652**	**4,156**	**357**	**2,344**	**536**	**3242**	**353**	**2294**

Table 18. Total Afforestation (ha) by County and Broadleaf/Conifer, 2008-2017.

County	2008		2009		2010		2011		2012		2013		2014		2015		2016		2017	
	B'leaf	**Conifer**	**B'leaf**	**Conifer**	**B'leaf**	**Conifer**	**B'leaf**	**Conifer**	**B'leaf**	**Conifer**	**B'leaf**	**Conifer**	**B'leaf**	**Conifer**	**B'leaf**	**Conifer**	**B'leaf**	**Conifer**	**B'leaf**	**Conifer**
Carlow	10	39	22	25	55	46	4	17	23	50	14	31	3	12	19	63	14	32	13	50
Cavan	72	125	84	176	107	136	75	129	49	123	58	152	50	191	57	220	89	336	69	248
Clare	273	422	226	338	190	332	154	331	91	390	58	289	65	354	106	461	73	479	64	455
Cork	367	639	311	487	524	633	469	566	345	696	185	487	182	508	148	515	111	497	82	338
Donegal	26	171	53	119	42	106	23	37	17	79	10	30	4	24	10	62	7	29	15	40
Dublin	10	1	-	-	-	-	1	-	9	11	-	-	2	10	2	7	1	1	4	7
Galway	59	204	111	207	204	357	128	172	109	228	93	326	103	283	115	317	56	275	92	308
Kerry	223	255	191	365	276	459	224	417	95	271	115	375	105	470	104	327	114	291	131	247
Kildare	10	7	42	70	28	59	54	87	91	129	27	21	49	41	5	24	4	9	23	10
Kilkenny	91	107	81	123	180	343	118	174	131	163	62	156	51	180	73	192	66	115	24	65
Laois	55	123	34	67	57	121	44	51	70	123	27	85	35	133	22	176	32	132	15	83
Leitrim	48	120	50	129	63	113	115	210	79	198	71	285	41	231	71	442	73	361	82	455
Limerick	176	264	126	204	111	300	122	259	78	203	51	192	26	96	24	152	65	263	11	89
Longford	38	48	29	58	80	162	61	113	37	141	54	201	50	175	88	198	45	227	29	172
Louth	28	38	27	38	29	18	7	13	16	35	20	7	-	-	18	5	5	35	20	2
Mayo	99	245	112	362	129	419	46	243	37	257	59	288	76	378	62	393	59	369	78	453
Meath	43	46	90	40	178	74	50	40	116	87	61	131	33	33	25	48	31	74	61	61
Monaghan	18	38	38	50	61	79	30	40	37	69	32	61	33	104	8	29	16	73	14	47
Offaly	89	153	186	138	129	150	95	173	96	167	32	142	28	100	29	127	30	106	50	115
Roscommon	99	253	103	295	84	276	59	252	56	195	67	364	69	380	60	283	82	353	75	356
Sligo	38	94	80	152	16	65	21	66	36	145	69	285	49	333	28	240	42	260	29	161
Tipperary	173	292	175	280	203	329	204	290	167	319	78	332	64	266	73	268	39	266	28	134
Waterford	63	93	94	151	97	168	89	115	39	90	25	113	36	85	26	99	36	205	25	138
Westmeath	43	103	85	115	84	119	98	152	104	167	106	136	81	155	44	160	102	179	55	152
Wexford	41	62	80	102	188	239	116	192	69	132	66	163	59	101	29	100	42	47	40	75
Wicklow	35	80	43	85	36	63	40	69	48	140	54	111	53	166	17	122	37	213	34	115
Total	**2,227**	**4,022**	**2,473**	**4,175**	**3,149**	**5,165**	**2,447**	**4,206**	**2,045**	**4,607**	**1,492**	**4,760**	**1,348**	**4,808**	**1,263**	**5,030**	**1,270**	**5,230**	**1,161**	**4,375**
Percentages	**36%**	**64%**	**37%**	**63%**	**38%**	**62%**	**37%**	**63%**	**31%**	**69%**	**24%**	**76%**	**22%**	**78%**	**20%**	**80%**	**20%**	**80%**	**21%**	**79%**

4. Forest Management Operations

4.1 Introduction

This chapter provides information on forest roads, felling activity, reforestation and forest certification as follows:

- Public forest road construction from 1944 to 2017;
- Private forest road construction from 2007 to 2017;
- Felling licenses issued annually between 2010 and 2017;
- Clearfell levels in State forests between 1933 and 2017;
- Private sector broadleaf tending and thinning between 2009 and 2017;
- The level of annual State reforestation between 1933 and 2017;
- The certified forest area.

Key findings

- Since 1944 an average of 130 km of forest roads have been built annually in public forests;
- Between 2007 and 2017 an average of 90 km of private grant-aided forest roads were built annually;
- Over 7,950 ha were reforested on public lands in 2017;
- Public forest clearfelling activities peaked between 2001 and 2007, coinciding with a peak in domestic construction activity;

4.2 Forest Roads

Forest roads enhance the economic viability of forests primarily by improving access for harvesting. In addition, forest roads also provide roundwood stacking, drying and chipping areas. Apart from economic enhancement, forest roads also improve the environmental and biodiversity value of forests by increasing edge effects, improve access to deal with fire and allow for better health and safety by providing access for emergency vehicles.

4.2.1 Public forest roading

Since 1944, 9,621 km of forest roads have been built in the public forest estate or on average 130 km annually (Figure 18).

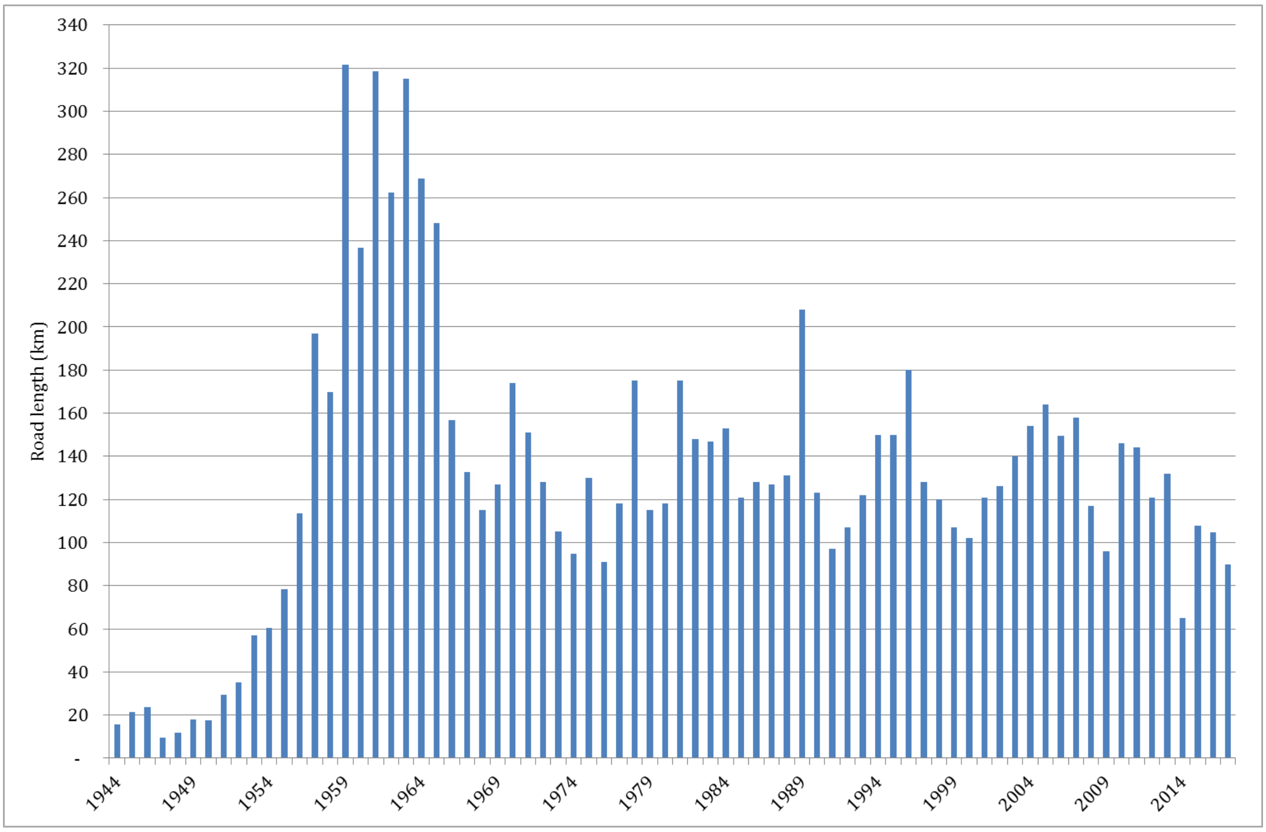

Figure 18. Forest road construction in public forests 1944–2017.

4.2.2 Private forest grant-aided roading

Due to the age profile of forests, forest roads were built primarily in public forests; however with the maturation of private sector forests, roads are increasingly required in private forests (Figure 19).

Since 2006, IFORIS[19] has been used to record the number and length of forest roads grant aided. As the private estate reaches harvesting stage there has been an increase in the length of forest road built. Between 2006 and 2017, an average of 90 km of private grant-aided forest roads were built annually. Table 19 shows the private grant-aided forest road construction from 2008 to 2017 on a county level.

[19] IFORIS is an Integrated Forest Information System which was developed for the processing of forestry pre-approval, grant and premium applications.

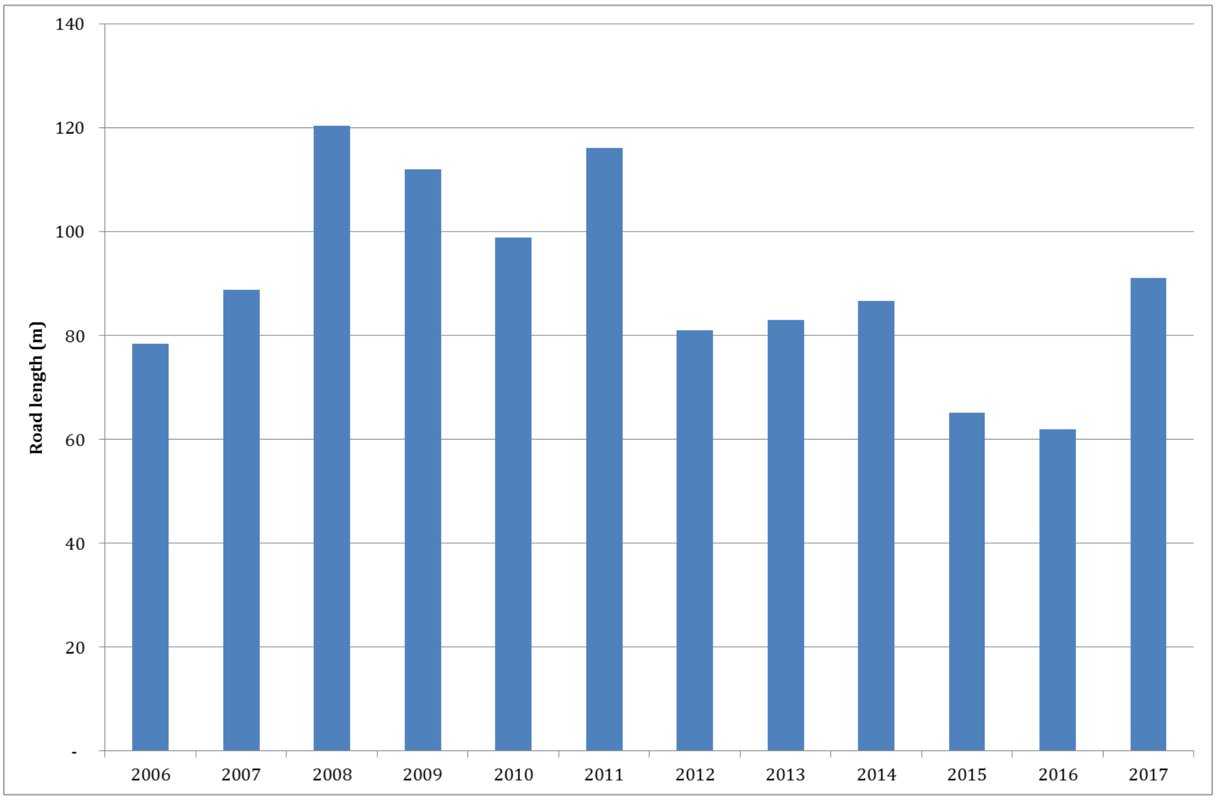

Figure 19. Private grant-aided forest road building 2006-2017.

Table 19. Private grant-aided forest road building (metres) by county from 2008-2017.

County	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Carlow	479	1,152	618	807	494	60	883	0	0	798
Cavan	5,542	3,079	6,957	2,477	1,777	2,478	3,187	3,197	1,702	2,815
Clare	21,740	10,566	5,564	5,783	3,418	4,238	2,768	5,225	4,191	5,755
Cork	17,844	7,265	7,399	13,028	11,614	6,534	8,969	8,708	5,724	8,183
Donegal	11,168	17,958	4,329	460	80	0	1,376	402	395	2,969
Dublin	0	190	900	200	0	480	800	0	0	484
Galway	16,571	7,348	6,898	7,554	3,123	2,360	4,329	895	1,047	3,365
Kerry	12,676	8,403	8,665	10,666	6,037	10,937	11,755	7,833	4,084	12,261
Kildare	2,841	313	2,796	2,790	1,158	1,324	80	2,667	430	735
Kilkenny	5,306	7,217	3,785	3,764	6,894	8,984	5,664	3,630	2,226	2,842
Laois	4,260	8,287	9,737	7,889	6,412	3,812	739	2,206	3,153	3,668
Leitrim	7,758	8,281	4,166	6,441	2,750	5,049	6,426	2,173	1,460	1,624
Limerick	7,234	5,349	5,745	5,042	3,137	6,134	4,927	1,254	3,585	4,885
Longford	865	1,605	475	652	2,606	552	3,116	1,845	2,080	1,228
Louth	500	670	0	1,427	787	0	0	0	435	0
Mayo	10,181	9,616	2,005	3,339	3,355	2,000	3,480	942	266	1,105
Meath	1,230	0	220	1,815	1,105	2,791	384	2,593	1,514	1,734
Monaghan	1,403	530	1,080	470	200	170	0	50	899	1,372
Offaly	3,761	3,666	1,333	10,460	1,919	1,468	2,839	1,950	1,606	4,716
Roscommon	17,657	4,659	4,734	10,094	5,968	2,856	4,422	1,005	917	1,573
Sligo	5,403	3,203	4,926	1,305	2,286	2,805	5,354	2,693	1,813	1,134
Tipperary	19,793	9,505	8,342	7,970	5,243	7,847	6,051	7,331	10,253	8,898
Waterford	11,812	2,620	1,635	4,522	1,099	2,266	2,649	2,362	2,636	5,139
Westmeath	2,953	1,099	2,655	1,703	3,234	2,602	3,218	2,723	6,492	5,961
Wexford	1,200	2,667	990	2,036	1,692	882	1,121	1,292	2,759	4,083
Wicklow	1,928	4,127	2,964	3,400	4,723	4,455	2,148	2,140	2,278	3,730
Total	**192,105**	**129,375**	**98,918**	**116,094**	**81,111**	**83,084**	**86,685**	**65,116**	**61,945**	**91,057**

4.3 Private forest estate felling activity

A felling licence granted by the Minister for Agriculture, Food & the Marine provides authority under the Forestry Act 2014 to fell or otherwise remove a tree or trees and to thin a forest for silvicultural reasons.

Table 20 shows the area of lands granted felling licences for both thinning and clearfelling in privately-owned forests between 2010 and 2017. The area issued with felling licences for thinning was on an upward trend between 2010 and 2014, and declined by approximately 4,544 ha in 2015. However in 2016 the area licenced for thinning increased by 5,351 ha. A large increase in the area licensed for clearfell was evident in 2014 due to Storm Darwin. The clearfell area licenced in 2016 declined to 1,384 ha, which is still high when compared to pre-Storm Darwin clearfell areas. 2,133 ha were licenced for clearfell in 2017, reflecting plantations that were established during the late 1980's and early 1990's reaching maturity. It should be noted that not all areas licensed for thinning and clearfell are actually thinned or clearfelled on the ground.

Table 20. Area of felling licences issued for private forests, 2010-2017.

Year	Thinning area (ha)	Clearfell area (ha)
2010	10,382	439
2011	12,275	590
2012	13,037	467
2013	15,150	395
2014	15,742	3,447
2015	11,198	2,012
2016	16,549	1,384
2017	16,697	2,133

4.4 *Public forest thinning and clearfelling*

The area of public forest clearfelled peaked in 2003, coinciding with a peak in domestic construction activity (Figure 20). Clearfell areas from 1986-2000 were estimated by averaging the reforestation areas for the two years following clearfell. Thinning activity in the public estate is shown in Figure 21. Thinning data for 1986-1996 are not available

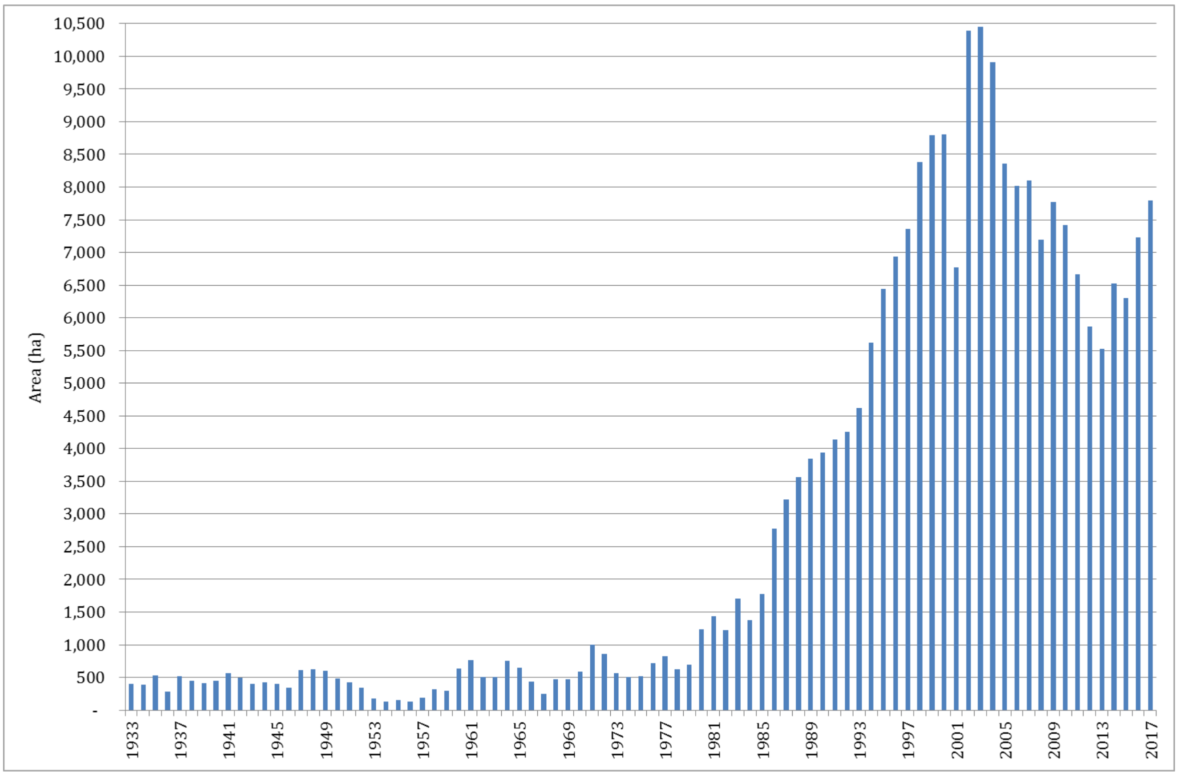

Figure 20. Public estate clearfelling 1933-2017.

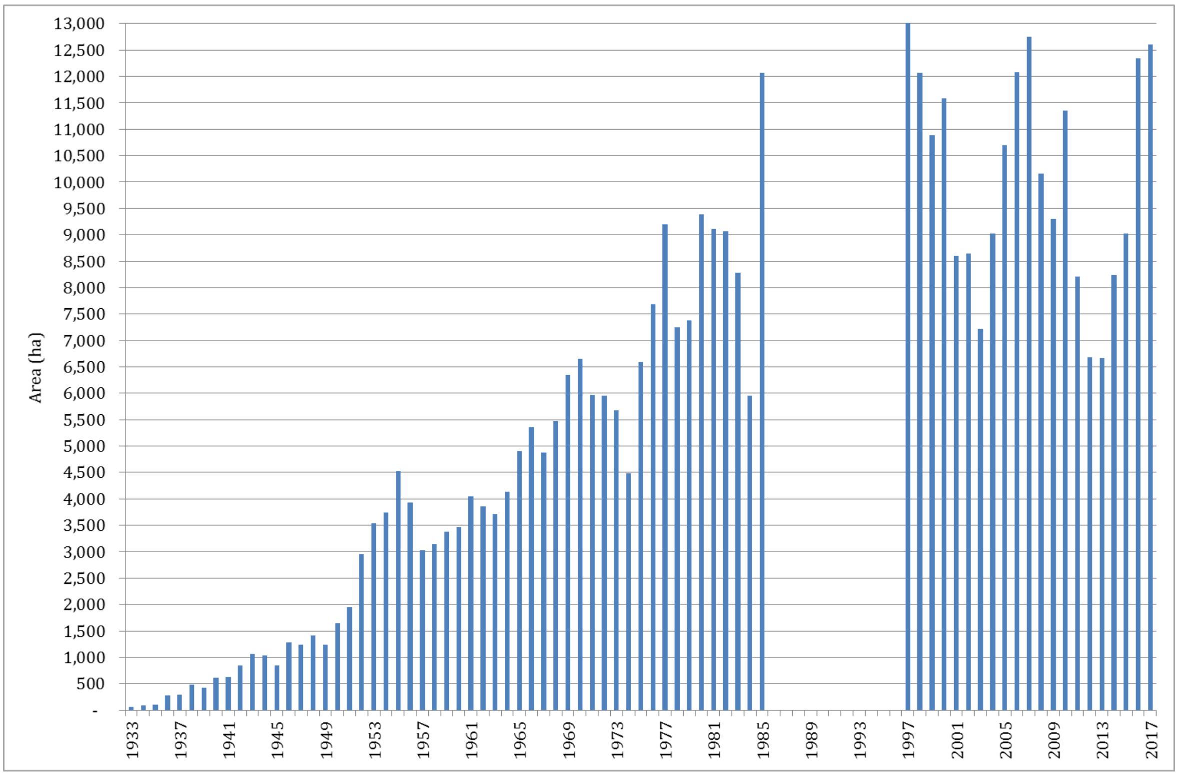

Figure 21. Public estate thinning 1933-2017.

4.5 Public forest reforestation

Reforestation is the regeneration of existing areas of forests that have been felled, and it is a condition of most felling licences that the felled forest is reforested. Annual reforestation rates are mainly driven by harvesting levels (with a time lag, usually of around 2 years, between harvesting and reforestation).

Public forest reforestation rates from 1933 to 2017 are shown in Figure 22. Up until the early 1980's reforestation rates were low due to relatively low afforestation up to 1950. In the 1950's and 1960's afforestation greatly expanded, which in turn was reflected in the increasing reforestation of the 1980's and 1990's. The area of public reforestation has fallen by about a third, since a peak of 10,000 ha in 2003. The years 2008 and 2009 show a significant decrease in reforestation as a result of a sharp decrease in harvesting for the same period, as a result of a downturn in the domestic construction sector.

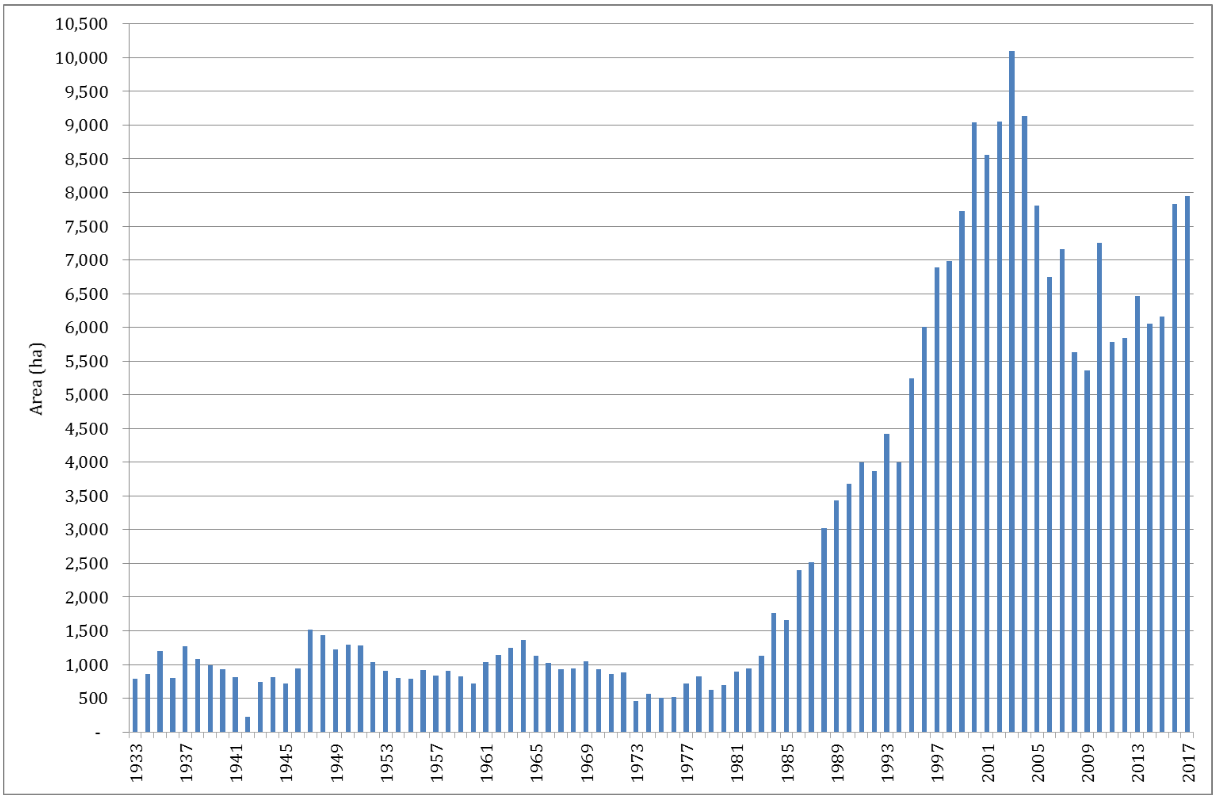

Figure 22. Public sector reforestation 1933-2017.

4.7 *Broadleaf Thinning and Tending*

As part of the Woodland Improvement Scheme (WIS), grants have been available for the tending and thinning of broadleaves. The objectives of the scheme are:

- Improvement felling of malformed or over-mature trees;
- Felling of additional trees to release potential final crop trees;
- Pruning to improve stem quality;
- Thinning or re-spacing to promote growth;
- Management and re-spacing of natural regeneration.

Grant aid for the treated area is available for either tending or thinning operations, depending on which are the most appropriate to the site (i.e. it is not necessary to carry out both sets of operations for grant aid). The tending and thinning element of the WIS was introduced in 2009. In total 6,073 ha have been tended or thinned between 2010 and 2017 (Figure 23). Ash has been the main species grant aided. Figure 24 shows the species areas grant aided.

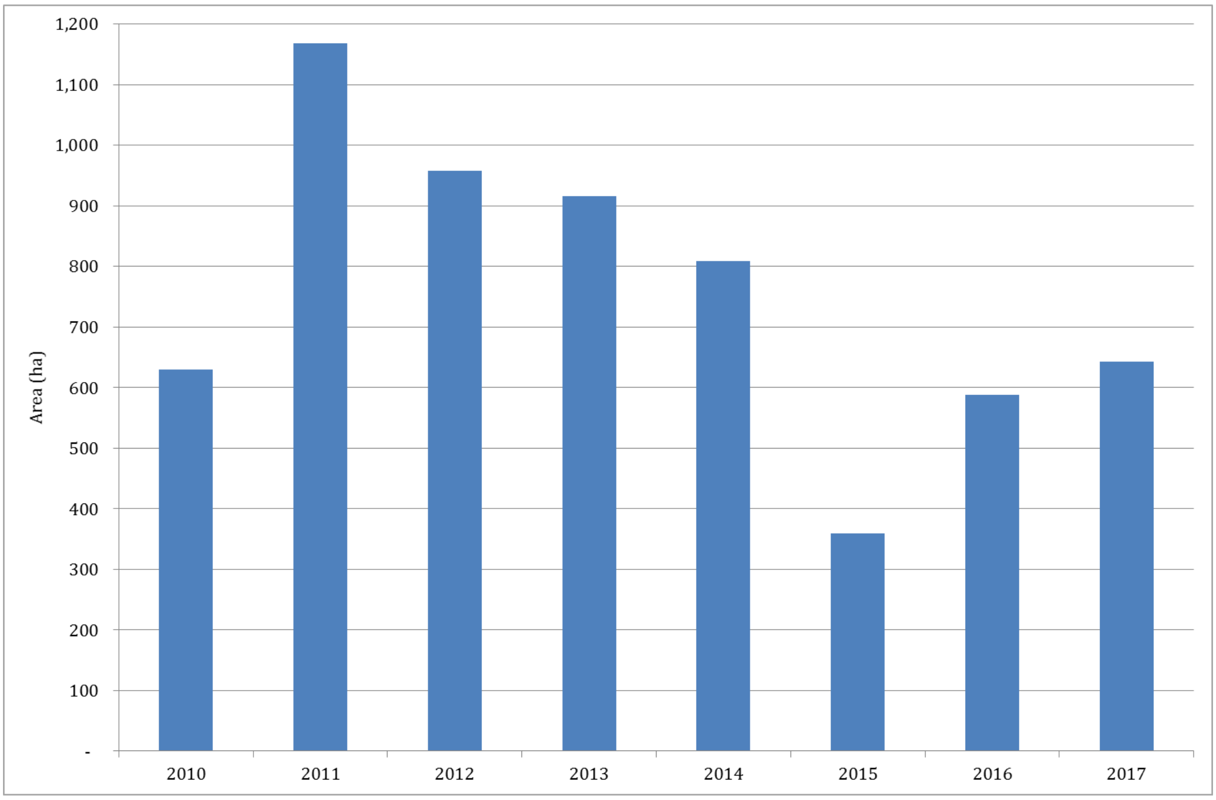

Figure 23. Areas tended and thinned between 2010 and 2017 under the Woodland Improvement Scheme.

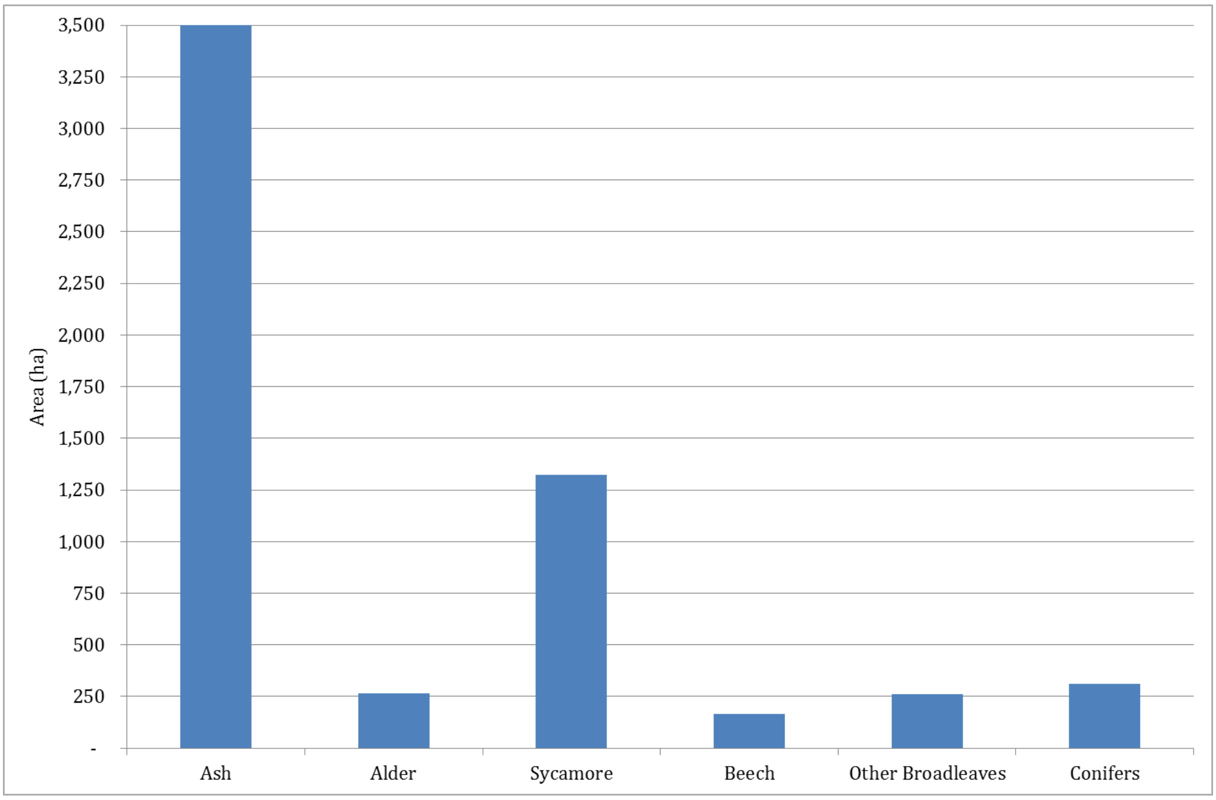

Figure 24. Species tended and thinned under the Woodland Improvement Scheme 2010-2017.

4.8 Certification

Voluntary forest certification schemes are run by international non-governmental organisations to promote good forest practice. In Ireland, there are currently two certifying bodies: the Programme for the Endorsement of Forest Certification (PEFC) and the Forest Stewardship Council (FSC). Voluntary forest certification links the demand for forest products to environmental and social standards to producers who to show that wood or wood products come from certified forests. All major Irish sawmills are certified.

The Forest Stewardship Council has certified the management of the Coillte estate which comprises 54% of the national forest estate. Certification has mainly been an issue for public forests up to now. However as harvesting in the private sector increases, certification is likely to be an issue for private forest owners in the near future. Currently approximately 6,500 ha of private forest is certified.

5. Forest Production and Carbon

5.1 Introduction

This chapter provides information on:

- The annual roundwood harvest between 1955 and 2017;
- The roundwood available for processing between 2006 and 2017;
- The roundwood forecast for 2016 to 2035;
- Roundwood timber prices for both Coillte and the private sector;
- Timber and paper products trade;
- Firewood production;
- Forest based biomass usage;
- The role of forests in climate change mitigation;
- Ireland's Kyoto obligation and its fulfilment;
- Irish forest carbon stocks.

Key statistics

- The total roundwood harvest in 2017 (including firewood) was 3.54 million m^3, the highest level since records began;
- Softwood available for processing in 2017 was 3.22 million m^3;
- 81% of the roundwood available for processing came from Coillte in 2017, with the balance coming from the private sector;
- The share of private sector roundwood available for processing has increased from 7.6% in 2006 to 19% in 2017, reflecting the maturing private forest estate;
- The total forecast of net realisable volume production for the Republic of Ireland over the forecast period 2016-2035 is estimated as being 107.8 million m^3 overbark with an additional 4.5 million m^3 potentially available in the tip - 7cm category;
- The average Coillte timber price in 2017 was up 1.3% from 2016;
- In value terms Ireland was exporting 151% more sawn timber in 2017 than in 2010, mainly to the UK;
- In 2017 42% of the roundwood harvested in the Republic of Ireland was used for energy generation, mainly within the forest products sector;
- The national forest estate is an important carbon reservoir, amounting to 311.7 million tonnes of carbon in 2017;

5.2 Roundwood

5.2.1 Roundwood Harvest 1955-2017

The national roundwood harvest (excluding firewood & hardwood) from Irish forests between 1955 and 2017 is shown in Figure 25. No data are available for the private roundwood harvest prior to 2006, however it was estimated that 100,000 m^3 was harvested from the private forest estate in 2000[22].

Up until the early 1980's, roundwood harvest was low due to relatively low afforestation rates up to 1950. The early 1980's saw the opening of the Finsa and Medite board mills which increased demand for roundwood and sawmilling residues. In 2017, 3.54 million m^3 of roundwood was harvested in the Republic of Ireland, the highest level since records began.

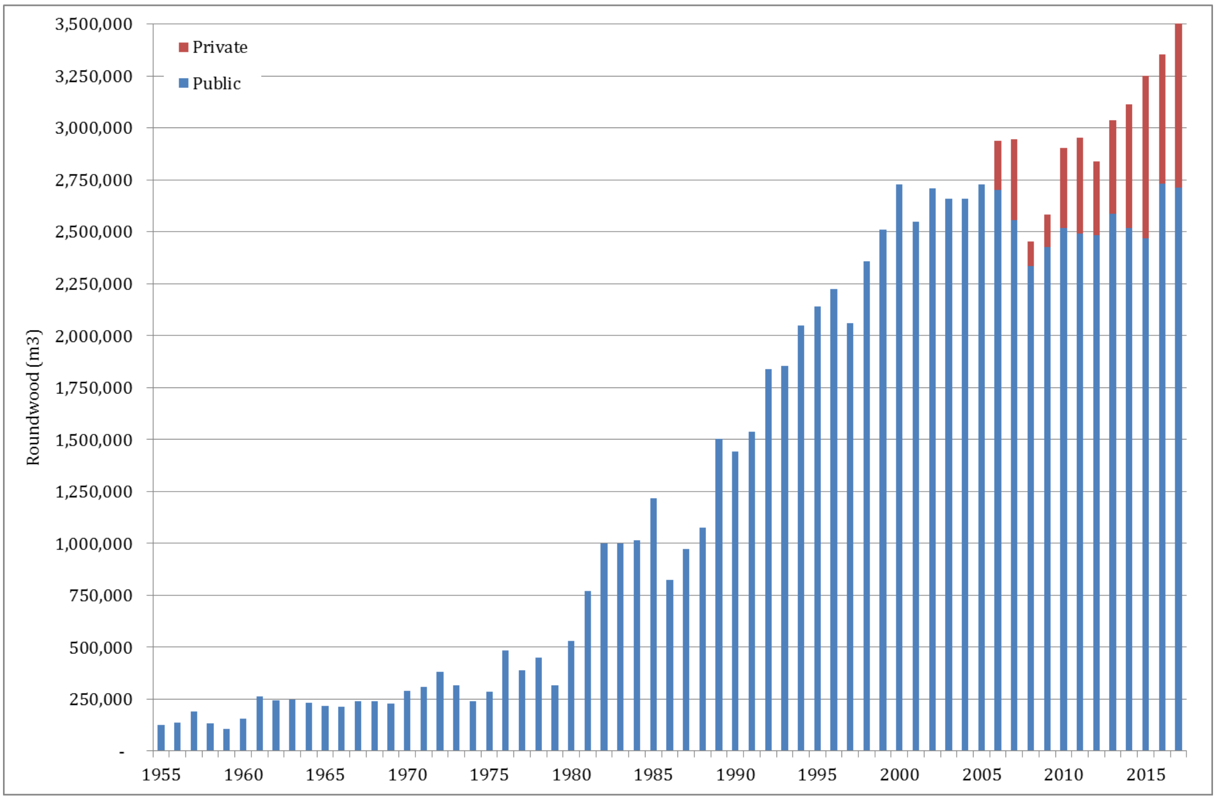

Figure 25. Roundwood harvest 1955-2017.

5.2.2 Roundwood available for processing in Ireland

The annual national roundwood available for wood processing, excluding firewood and hardwood, is shown in Table 21. The sharp downturn in roundwood available for processing in 2008 and 2009 reflected the downturn in the domestic construction sector. At this time domestic sawmills were also seeking to increase their share in export markets. In 2017, 3.22 million m^3 of roundwood was available for processing (excluding firewood) in the Republic of Ireland, a 3.9% increase on 2016 production. Between 2006 and 2017, roundwood production

[22] *Forecast of Roundwood Production from the Forests of Ireland 2001-2015*, (2001). COFORD, Dublin.

from privately owned forests averaged 390,417 m^3. In 2017, 676,000m^3 of roundwood came from privately owned forests, a 30.5% increase over the 2016 output. This is reflective of the maturing private forest estate.

Table 21. Roundwood available (commercial softwood) for processing (2006-2017).

Year	Log imports less exports	Coillte Output	Private output	Total Roundwood	Sawlog	Pulp	Stake
2006	214,000	2,700,000	240,000	3,154,000	2,176,000	820,000	158,000
2007	57,000	2,556,000	390,000	3,003,000	1,934,000	889,000	180,000
2008	106,000	2,279,000	118,000	2,503,000	1,619,000	804,000	80,000
2009	-63,000	2,354,000	130,000	2,421,000	1,602,000	731,000	88,000
2010	28,000	2,217,000	463,000	2,708,000	1,603,000	987,000	118,000
2011	55,000	2,299,000	386,000	2,740,000	1,580,000	1,044,000	116,000
2012	-18,000	2,269,000	343,000	2,594,000	1,622,000	841,000	131,000
2013	49,000	2,474,000	328,000	2,851,000	1,710,000	1,024,000	117,000
2014	68,000	2,434,000	447,000	2,949,000	1,815,000	987,000	147,000
2015	40,000	2,377,000	646,000	3,063,000	1,867,000	1,027,000	169,000
2016	-16,000	2,600,000	518,000	3,102,000	1,977,000	961,000	164,000
2017	-65,000	2,613,000	676,000	3,224,000	2,178,000	898,000	148,000

In recent years the private sector has begun to make a substantial contribution to the annual harvest. This reflects the greater area of private forests reaching first thinning stage - much of which was planted in the early 1990's, and the increased export market share gained by sawmills.

In 2017, 42% of the roundwood harvested in the Republic of Ireland was used for energy generation, mainly within the forest products sector. Intake of sawmill roundwood was 2.18 million m^3 in 2017, which was converted to 1.05 million m^3 of sawn timber[23]

Whilst commercial hardwoods are still a minor element of the annual roundwood available for processing, the figure has increased substantially between 2016 and 2017, from 6,000 m^3 to 18,000 m^3. This is primarily due to the increased planting of broadleaves during the 1990's which have entered the market (Table 22).

Table 22. Roundwood available (commercial hardwood 000 m^3 overbark) for processing in the Republic of Ireland 2011-2017.

	2011	2012	2013	2014	2015	2016	2017
Imports less exports	0	0	-1	0	0	0	0
Coillte	1	1	2	6	3	5	7
Private Sector	1	1	1	0	0	1	11

[23] *Woodflow and forest-based biomass energy use on the island of Ireland*, 2017. COFORD, Department of Agriculture, Food and the Marine, Dublin.

5.2.3 Roundwood Forecast

The total forecast of net realisable volume production for the Republic of Ireland over the forecast period 2016-2035 is estimated as being 107.8 million m^3 overbark which includes 4.5 million m^3 potentially available in the tip–7 cm category.

The annual forecast of net realisable volume will increase from 3.6 million m^3 in 2016 to 7.6 million m^3 by 2035. Table 23 displays the future sustainable harvest levels between 2016 and 2035 by assortment and ownership type. Privately owned forests will steadily increase their share of the total harvest of roundwood from 27% in 2016 to 63% in 2035[24].

Table 23. Forecast of potential conifer net realisable volume production by assortment category and ownership type 2016-2035 (000 m^3 overbark).

Year	Private					Coillte					Overall Total
	Tip - 7cm	7- 13cm	14- 19cm	20+cm	Total	Tip - 7cm	7 - 13cm	14- 19cm	20+ cm	Total	
2016	60	368	219	328	976	150	548	695	1,262	2,655	**3,630**
2017	55	356	174	329	914	126	499	669	1,399	2,694	**3,608**
2018	59	375	212	281	926	149	493	757	1,362	2,762	**3,688**
2019	76	451	334	298	1,158	150	510	783	1,401	2,844	**4,003**
2020	78	473	372	401	1,324	148	481	754	1,438	2,821	**4,145**
2021	80	501	446	412	1,439	145	538	924	1,294	2,902	**4,341**
2022	91	547	560	564	1,762	145	538	924	1,294	2,902	**4,663**
2023	106	595	766	842	2,309	145	538	924	1,294	2,902	**5,211**
2024	103	595	782	1,194	2,674	145	538	924	1,294	2,902	**5,576**
2025	109	632	969	1,260	2,970	145	538	924	1,294	2,902	**5,872**
2026	117	656	1,048	1,508	3,329	124	449	764	1,347	2,684	**6,013**
2027	120	683	1,049	1,523	3,375	124	449	764	1,347	2,684	**6,059**
2028	99	560	863	1,461	2,982	124	449	764	1,347	2,684	**5,667**
2029	99	609	905	1,455	3,068	124	449	764	1,347	2,684	**5,752**
2030	110	650	1,084	1,479	3,323	124	449	764	1,347	2,684	**6,007**
2031	94	528	890	1,837	3,350	110	390	724	1,603	2,828	**6,177**
2032	99	578	1,062	1,853	3,592	110	390	724	1,603	2,828	**6,419**
2033	95	563	1,018	2,033	3,709	110	390	724	1,603	2,828	**6,536**
2034	103	609	1,104	2,151	3,967	110	390	724	1,603	2,828	**6,794**
2035	123	753	1,376	2,595	4,847	110	390	724	1,603	2,828	**7,674**
Total	**1,876**	**11,083**	**15,232**	**23,803**	**51,994**	**2,621**	**9,418**	**15,721**	**28,082**	**55,842**	**107,837**

5.2.4 Actual Harvest Vs. Forecasted

Actual and forecast harvest (net realisable volume (NRV)) for the Republic of Ireland has been compared for the period 2011 to 2015. NRV forecast data is taken from the *All-Ireland Roundwood Production Forecast (2016 - 2035)*[24]. Actual harvest is from the COFORD Connects *Woodflow* Series[25].

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[24] *All Ireland Roundwood Production Forecast 2016-2035*, 2016. COFORD, Department of Agriculture, Food and the Marine, Dublin.

[25] Available from: http://www.coford.ie/publications/cofordconnects/

Over the period 2011 to 2015, private sector harvest was 129% of NRV forecast, while Coillte harvest was 88% of NRV forecast. Over the same period, the combined harvest (i.e. Coillte and private) was 93% of NRV forecast (Table 24).

Table 24. Actual and forecast roundwood harvest (000 m³ overbark) in the Republic of Ireland (2011-2015).

Year	2011			2012			2013		
Harvest type[1]	A	F	%	A	F	%	A	F	%
Private	460	371	124	354	384	92	448	369	121
Coillte	2,492	2,979	84	2,485	2,737	91	2,588	2,798	92
Total	2,952	3,350	88	2,839	3,121	91	3,036	3,167	96

Year	2014			2015			Total (2011-2015)			
Harvest type	A	F	%	A	F	%	A	F	D	%
Private	597	425	140	780	504	155	2,639	2,053	586	129
Coillte	2,517	2,906	87	2,470	2,844	87	12,552	14,264	1,712	88
Total	3,114	3,331	93	3,250	3,348	97	15,191	16,317	1,126	93

[1] A: Actual harvest: F: Forecast harvest. D: Difference % = actual harvest expressed as a % of NRV forecast

Actual and forecast harvest (net realisable volume (NRV)) for the Republic of Ireland has also been compared for 2017. NRV forecast data is taken from the *All-Ireland Roundwood Production Forecast (2016-2035)*. Actual harvest is from the COFORD Connects *Woodflow* Series.

For 2017 the private sector actual harvest was 90.5% of NRV forecast, while Coillte harvest was 100.7% of NRV forecast. The combined harvest (i.e. Coillte and private) was 98.2% of NRV forecast (Table 25).

Table 25. Actual and forecast roundwood harvest (000 m³ overbark) (2017).

Ownership	Actual Harvest	Forecast Harvest	Actual harvest expressed as a % of NRV forecast
Private	828	914	90.5
Coillte	2,714	2,694	100.7
Total	3,542	3,608	98.2

5.2.5 Roundwood prices - Coillte

Coillte is the dominant supplier of logs to the processing sector in Ireland. The standing timber price is the price paid per cubic metre of timber by the purchaser, where the purchaser is responsible for harvesting. The figures quoted in Table 26 below are for sales to the sawmill sector only and include all species and harvest types. As the mix of species and harvest types can vary from quarter to quarter, this can impact on contracted prices in addition to the impact of other market factors. The majority of prices quoted are for standing sales with retained pulpwood, i.e. there is no value for pulp included in these prices. Coillte retain the pulpwood to supply their boardmills, i.e. Smartply and Medite. Average timber prices in 2017 were up 1.3% since 2016.

Table 26. Coillte Contracted Standing Sales (€/m^3) by average tree size and per year[26].

Category (m^3)	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
0.001 - 0.074	10	-	-	-	-	10.5	-	-	-	-	39.4
0.075 - 0.124	9.37	-	3.96	-	-	-	-	-	41.2	-	
0.125 - 0.174	8.64	19.4	4	-	8.5	9.5	-	-	-	-	40.1
0.175 - 0.224	19.4	24.1	15	38.6	32.8	-	-	-	-	-	56.6
0.225 - 0.274	34.4	21.4	19	47.6	39.5	40.9	48.7	49.1	50	43.5	44.2
0.275 - 0.324	38	28.9	19.9	43.8	42.3	43.2	47.1	51.1	49.9	45.8	46
0.325 - 0.374	43.4	30.4	23.2	44.1	43.7	44.5	51.3	56.5	53.9	44.7	51.8
0.375 - 0.424	41.2	33.8	24.5	58.2	44.4	46.8	48.6	57.9	56.5	48.1	51.1
0.425 - 0.474	43.7	31.5	24	55.5	47.2	45.6	52	59.1	58.4	50.5	50.6
0.475 - 0.499	47.9	35.7	25.1	55.1	46	48.5	54.5	62.1	62.9	54.4	52.1
0.500-0.599	50.5	37.8	26.8	59.9	48.3	50.5	51.6	64.8	63.3	54.5	55.2
0.600-0.699	52	38.4	27.1	63.7	49	52.9	55.4	70.2	66	57.2	57.1
0.700-0.799	52.1	39	27	58.8	49.9	54.1	55.6	66.3	59.6	57	57.6
0.800-0.899	50.6	42.1	27.3	57.1	50.7	52.8	57.4	74.5	67.9	58.7	56.8
0.900-0.999	53.6	41.4	28.9	56	51.3	54	60.7	67	67	58.4	57.4
> 1.000	55.6	39.6	29.4	59.6	51.3	53.8	54	75.8	71.1	60.8	60.3
Average (€/m^3)	**47.2**	**35.3**	**25.7**	**56.7**	**47.8**	**50**	**53.6**	**65.1**	**60.8**	**53.7**	**54.2**

26 Available from: https://www.teagasc.ie/crops/forestry/advice/markets/timber-prices/

5.2.6 Roundwood Prices - Private Sector

The UCD Forestry Section and the Irish Timber Growers Association (ITGA) collate timber price information from private sources, publishing it in the *Forestry and Timber Yearbook* annually. The prices are averages derived from small sales data received from a range of growers and therefore prices presented in Table 27 below are for guidance purposes only. Private timber prices followed a nominal upwards trend in prices since 2006, although this trend estimation is less reliable due to the small sample size. The prices presented in Table 27 include pulpwood prices from the private sector.

Table 27. Annual private standing roundwood prices (€/m^3) 2009-2017. (* denotes small number of sales)[27].

Category (m^3)	2007	2009	2010	2011	2012	2013	2014	2015	2016	Jan - Sep 2017
0.001 - 0.074	6	8.28	10.5	10.6	10.2	9.44	14.04	13.2	7.7	9.08
0.075 - 0.124	10.51	7.15	14.4	14.3	14.3	12.8	13.53	16.3	11.4	11.46
0.125 - 0.174	12.76	7.26	17.4	13.5	19.2	18.96	18.4	19.6	14.9	11.91
0.175 - 0.224	17.8	11.59	22.9	15.8	17.8	20.44	28.72	20.8	17.9	19.7
0.225 - 0.274	37.82	11.29	35.3	23.1	25.1	18.62	33.14	30.8	17.1	18.68
0.275 - 0.324	27.47	11.64	47.1	36.9	32.9	21.84	34.06	33.6	28	27.51
0.325 - 0.374	49.65	14.5	64.1	57.5	38.6	47.42*	39.64	34.3	26.7	36.77
0.375 - 0.424	33.06	16	56.7	52.3	28.4	44.48	49.03	43.3	39.3	36.77
0.425 - 0.474	43.8	50	54.2	53.3	48.3	32.00*	65.93	39.2	49.4	
0.475 - 0.499	52	-	53	35	-					48
0.500 - 0.599	53.09	-	57.1	50.3	49.2	45.05	61.85	47.6	44	51.31
0.600 - 0.699	41.68	-	54.3	51.7	51.8	45.99	56.82	59	58.8	49.4
0.700 - 0.799	52.57	-	54.3	52.6	54.7	53.79	64.21	59.5	49.4	52.74
0.800 - 0.899	57.2	-	53.7	50.4	54.9	53.35	67.72	59.5	49.8	50.71
0.900 - 0.999	50.51	-	52.9	53.4	54.8	51.26	65.16	64.7	57.5	53.75
1.000 and over	56.32	-	56.9	45	54.2	52.97	60.38	61.5	60.9	53.61

An additional source of information on the range of prices paid for privately owned timber during 2017 is the IFA Timber Price Survey (Table 28). The prices paid for timber varied significantly, for example the pulp prices quoted ranged from €18 to €30/tonne, depending on distance to market, access to the site and the size of the sale. The prices for sawlog varied from €60 to €84/tonne throughout the year, which represents a slight increase compared to the 2016 survey.

[27] *Forestry & Timber Yearbook 2018*. Irish Timber Growers Association, Dublin.

Table 28. IFA Timber Price Survey 2017 (Price € /tonne roadside excl. vat)[28].

Product Type	Length (m)	Diameter (cm)	Jan-Feb	Mar-Apr	May-June	Aug-Sept	Nov - Dec
Pulp	3 m	< 7cm	18 - 30	18 - 30	18 - 28	18 – 30	26 - 30
Stakewood	1.6 m	> 8cm < 15 cm	38 - 44	38 - 44	40 - 42	40 - 44	36 - 40
Palletwood	2.5 m	> 14 cm	34 - 46	34 - 43	34 - 42	34 - 45	34 - 45
	3.1 m		40 - 48	40 - 45	44 - 48	44 - 48	43 - 46
	3.4 m		44 - 46	46	46	45 - 48	45 - 48
	3.7 m		45 - 50	47 - 48	46 - 50	48 - 52	48 - 55
Sawlog	4.9m	> 20cm	60 - 70	60 - 70	65 - 75	70 - 77	68 - 78
	5.5 m		70			80	80 - 84

5.2.7 Forest-based biomass

Forests also provide a source of renewable raw materials for fuel and wood products which help mitigate rises in greenhouse gases. Usage of wood fuels is increasing due to renewable energy policies and as young plantations enter the production stage.

In 2017, 42% of roundwood harvested was used for energy generation, mainly within the forest products sector (Table 29). The usage of forest based biomass for the energy sector abated 0.99 million tonnes of CO_2 emissions in 2017, up almost 30% on the 2016 level.

Table 29. Use of forest-based biomass and as a proportion of total roundwood harvest (2010-2017) (000 m³ overbark)[29].

	2010	2011	2012	2013	2014	2015	2016	2017
Wood-biomass use by the energy[30] and forest products industry	554	572	611	660	760	796	1,049	1,296
Roundwood chipped for primary energy use	39	41	30	100	100	114	117	49
Domestic firewood use	199	214	225	230	235	237	237	239
Short rotation coppice	1	5	5	5	5	5	20	20
Wood pellets and briquettes	121	129	144	161	150	154	160	175
Charcoal	2	5	2	1	1	1	1	1
Total	916	966	1,017	1,157	1,251	1,307	1,584	1,780
Roundwood harvest								
Roundwood available for processing	2,708	2,740	2,594	2,852	2,975	3,016	3,108	3,242
Firewood harvest	199	214	225	230	235	237	237	235
Total	2,907	2,954	2,819	3,082	3,210	3,253	3,345	3,477
Forest-based biomass as a % of total roundwood harvest	31.5	32.6	36.0	33.5	36.3	34.8	34.1	42.1

[28] Available from: https://www.ifa.ie/market-reports/market-reports-4/
[29] *Woodflow and forest-based biomass energy use on the island of Ireland*, 2017. COFORD, Department of Agriculture, Food and the Marine.
[30] This includes co-firing of wood-biomass at Edenderry Power Station, Co. Offaly.

5.3 Firewood production

Statistics on the sale of firewood from public forests between 1937 and 1987 are shown in Figure 26. Firewood consumption peaked during the Second World War due to restricted coal imports. There was also increasing firewood demand during the 1980's, reflected in increased sales during this period. Official estimates of firewood use are unavailable between the years 1988 and 2005.

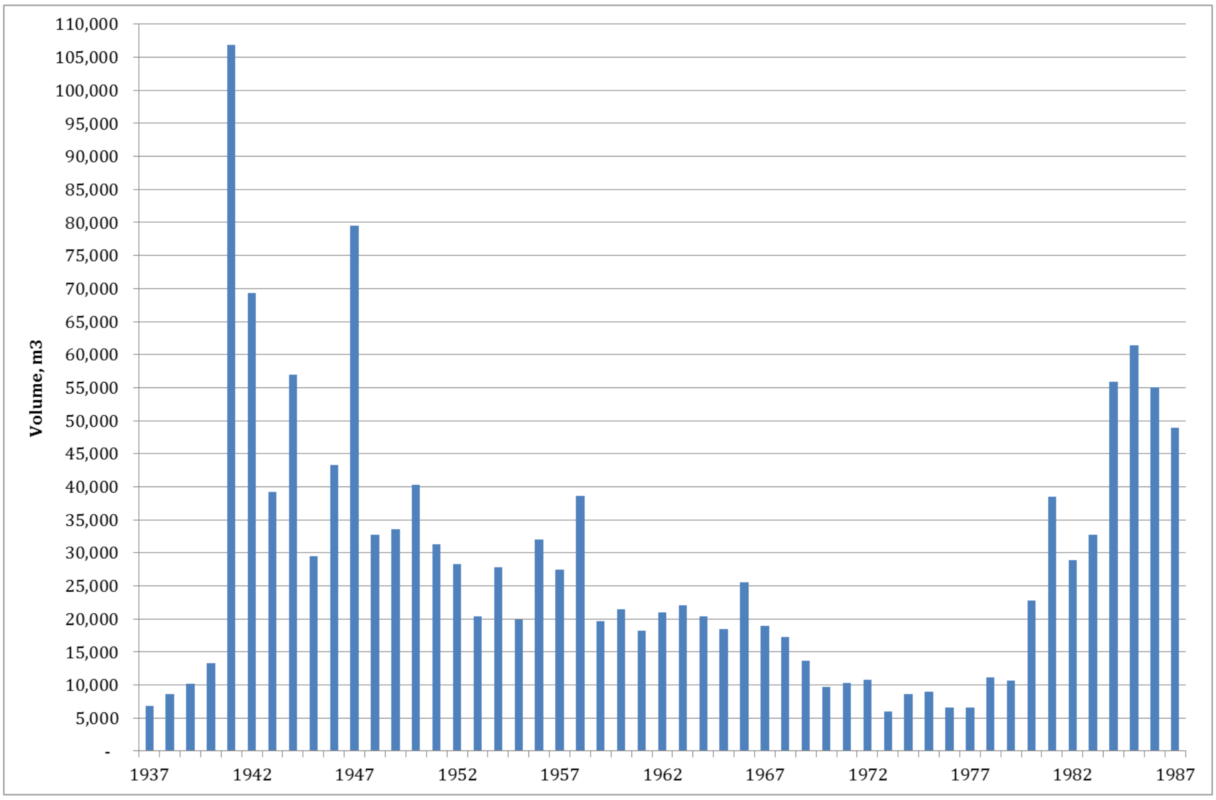

Figure 26. Firewood production volume from public forests 1937-1987.

Residential energy use grew by 18.3% (0.4% per annum) over the period 1990–2015. Corrected for weather, the growth was 10%. During this time the number of households in the State increased by 74%, from approximately 1.0 million to 1.75 million. Since 1990, there has also been a decrease in the use of firewood in open fires, in line with the general decline of solid-fuel open fires, with a concurrent rise in the use of oil, gas and electricity for residential energy consumption. As a result, the share of firewood used for domestic heating has decreased since 1990[31].

Despite this, due to the significant increase in the number of households and energy usage per household there has been a concurrent increase in firewood sales since the 1980's. Between 2006 and 2017 the firewood market in Ireland has grown by 63%, from 147,000 m^3 in 2006 to 239,000 m^3 in 2017, and the market is now estimated to be worth €34.6 million[32]. Figure 27 shows firewood use in Ireland between 2006 and 2017 from State and private forests, including wood sourced from non-forest areas. The introduction of grant aid in 2009 for first thinning of broadleaf forests has resulted in substantial mobilisation of firewood from first thinnings, principally for domestic use. In addition, firewood is also harvested by forest owners for their own use and this is not accounted for in current figures.

[31] *Energy in Ireland 1990–2015, 2016 Report*, 2016. Sustainable Energy Authority of Ireland.
[32] *Woodflow and forest-based biomass energy use on the island of Ireland*, 2017. COFORD, Department of Agriculture, Food and the Marine.

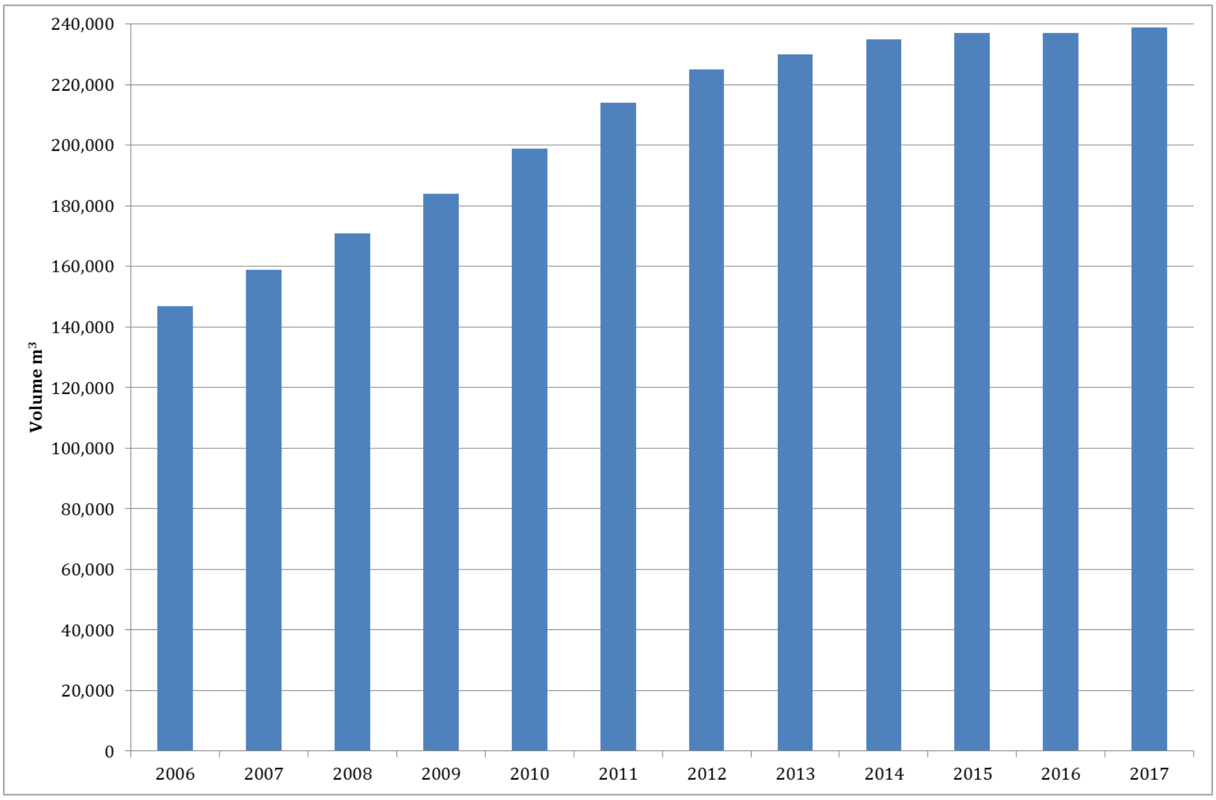

Figure 27. The domestic firewood market 2006-2017.

5.4 *Timber and paper products trade*

In 2017, exports of forest products from the Republic of Ireland were valued at €423 million, an 11.3% increase on 2016. Wood-based panels accounted for nearly 53% of the value of forest products exports, the balance compromising paper and sawn timber exports (Table 30). In value terms Ireland became a net exporter of sawn timber in 2010, the first time since 1961, when forest products statistics began to be compiled by the FAO. This came about due to the closing of the gap between the value of exports and imports from 2008 onwards due to the collapse of the domestic construction market and greatly increased exports of sawn timber. In value terms Ireland exported €129 million of sawn timber in 2017, mainly to the UK, representing an increase of 151%.

Table 30. Timber and paper products trade, volume and value (2010-2017)[33]

	Imports															
	2010	2011	2012	2013	2014	2015	2016	2017	2010	2011	2012	2013	2014	2015	2016	2017
	000 m^3								**€ million**							
Sawn timber	242	201	145	134	205	227	250	266	74	64	54	51	74	88	92	99
Wood-based panels	166	195	204	194	235	240	266	260	65	68	75	78	98	112	112	129
	000 tonnes								**€ million**							
Pulp products	41	54	47	50	46	51	46	45	31	45	45	41	42	53	45	45
Paper & particle-board products	370	383	415	428	404	427	417	407	313	333	339	340	340	359	337	335
TOTAL									483	510	513	510	554	612	586	608
	Exports															
	2010	2011	2012	2013	2014	2015	2016	2017	2010	2011	2012	2013	2014	2015	2016	2017
	000 m^3								**€ million**							
Sawn timber	658	619	534	601	718	701	806	875	85	83	73	81	122	121	122	129
Wood-based panels	660	616	630	665	610	610	628	660	179	173	179	199	198	190	206	224
	000 tonnes								**€ million**							
Pulp products	1						3								1	1
Paper and particle-board products	33	59	68	81	67	86	137	40	44	52	51	59	50	44	51	69
TOTAL									308	308	303	339	370	355	380	423

[33] Roundwood, sawmill residues and secondary processed timber products are not included. Data sourced from COFORD Connects *Woodflow* Series, available from: http://www.coford.ie/publications/cofordconnects/

5.5 *Carbon stocks*

Forests and forest sector policies play an important role in mitigating climate change by:

- afforestation and reforestation;
- forest management;
- controlling deforestation (land use change from forest to non-forest);
- the use of wood products to store carbon and displace emissions from energy intensive materials;
- Use of forest products for bioenergy to replace fossil fuel use.

In 1997, Ireland committed to maintain national greenhouse gases emissions at 13% above 1990 levels, as part of a legally-binding commitment under the Kyoto Protocol. Over the five years of the first commitment period of the Kyoto Period (i.e. 2008 to 2012), Ireland met its Kyoto obligations when forest carbon stock changes associated with afforestation and deforestation activities since 1990 were taken into account.

The national forest estate is an important carbon reservoir, amounting to 311.7 million tonnes of carbon in 2017 as estimated from the 3rd cycle NFI (Table 31). Carbon in biomass and litter pools have increased from 2012 to 2017. Since 2012, changes have arisen in the NFI methodology and biomass estimation techniques. More accurate biomass equations, new classification systems and associated C stock values were introduced for soil and deadwood, <u>therefore the 2017 data are not comparable with the C stock estimates from 2006 and 2012.</u>

The carbon stock in forest soils is the dominant component, accounting for 79.1% of the carbon in the forest estate in 2017. Total living tree biomass amounted to 17.9% of the total carbon stock, while deadwood, including logs, stumps and standing dead trees along with litter constituted the remaining 3%.

Table 31. Forest carbon stocks 2006, 2012 and 2017.

	2006		2012		2017	
Carbon stock	Million t	% Total	Million t	% Total	Million t	% Total
Above-ground biomass*	30.6	8.9	39.7	10.4	45.6	14.6
Below-ground biomass**	6.7	1.9	8.8	2.3	10.3	3.3
Deadwood***	1.2	0.4	2.5	0.6	2.1	0.7
Litter	2.3	0.7	6.3	1.6	7.1	2.3
Soil	304.9	88.1	323.7	85.1	246.6	79.1
Total	348.4	100.0	381.0	100.0	311.7	100.0

** Above-ground biomass includes all living stems, branches and needles/leaves based on a stump height at 1% of total tree height.*
*** Below-ground biomass includes all roots to a minimum diameter of 5 mm.*
**** Deadwood includes all logs, stumps and branches with a minimum diameter of 7 cm.*

6. The Socio-Economic Contribution of the Forest Sector

6.1 Introduction

This Chapter provides information on the socio-economic contribution of forestry in Ireland in the following areas:

- The value of direct economic activity in the growing and harvesting subsectors (excluding wood processing and related activities) and employment for the years 2003 and 2012;
- The value of total (Direct, Indirect and Induced) economic activity in the growing and harvesting subsector and employment for the years 2003 and 2012.

Key statistics

- An approximation of the full economic value of the forest sector in 2012 was €2.3 billion, when both indirect and induced effects were taken into account;
- The total GVA of the forest sector was €1,096.5 million in 2012;
- The total value of economic activity in the growing and harvesting sector in 2012 was €387 million;
- For every €1 of economic activity generated in the growing and harvesting subsector a further €0.78 was generated in the wider economy in 2012;
- The total value of economic activity in the wood processing sector in 2012 was €1389.1 million;
- For every €1 of economic activity in wood processing an extra €0.66 was generated in the wider economy in 2012;
- The number of people employed directly in the forestry and logging sector averaged 2,800 between 1998 and 2017;
- In 2010 direct and induced employment supported by the forest sector was estimated to be 5,531 persons, while in the wood processing sector direct and induced employment was estimated to be 6,408 persons.
- Between 2003 and 2012 the overall value of both the growing and harvesting subsector and wood processing subsector grew by 46% and 39% respectively;
- The number of people employed directly in the wood processing subsector has decreased since the economic downturn in 2008;
- Over 18,000,000 forest visits took place in 2005;
- In 2017, €101.5 million was spent on planting grants, maintenance grants, annual premium payments and grant aid for forest roads.

6.2 *Value of the forest Sector*

The total value of economic activity in the forest sector, both directly of itself and to the wider Irish economy, is shown in Table 32. The total direct value of economic activity in the growing and harvesting subsector in 2012 was €387 million. Value to overall Gross Domestic Product or Gross Value Added (GVA) was €136.6 million. In terms of the multiplier effect of this economic activity, for every €1 generated in the growing and harvesting subsector a further €0.78 was generated in the wider economy in 2012. This resulted in the growing and harvesting subsector contributing an overall value of €688.7 million to the wider Irish economy, an increase of €216 million since 2003.

The total value of economic activity in the wood processing subsector in 2012 was €1389.1 million, adding €391.6 million in terms of GVA to the economy. For every €1 of economic activity in wood processing an extra €0.66 was generated in the wider economy, an increase of €79.3m over the 2003 figure. Total extra activity in the wider economy in 2012 was €910.3 million (€2,299.4 – €1,389.1 million), an increase of €235 million since 2003.

The total GVA of the forest sector was €1,096.5 million in 2012, and an approximation of the full economic value of the forest sector in 2012 was €2.3 billion, when both indirect and induced effects were taken into account.[34]

Table 32. Value of economic activity in the forest sector.

Growing and harvesting subsector		
	2003[35]	2012[36]
	million, €	
Direct Economic Activity Value	255.4	386.9
Gross Value Added	134.5	136.6
Overall Value to Wider Irish Economy	472.4	688.7
Type 2 Multiplier	1.9	1.78
Wood processing subsector		
Direct Economic Activity Value	975.0	1389.1
Gross Value Added	312.3	391.6
Overall Value to Wider Irish Economy	1650.0	2299.4
Type 2 Multiplier		1.66

[34] *Annual Review and Outlook for Agriculture, Food and the Marine 2013/14*, 2014. Department of Agriculture, Food and the Marine.
[35] *The Socioeconomic Contribution of Forestry in Ireland – an Interdisciplinary Approach*, 2006. COFORD, Department of Agriculture, Food and the Marine, Dublin.
[36] Personal Communication. Dr. Richard Moloney, 2014.

6.3 *Employment in the forest sector*

In 2010 direct and induced employment supported by the forest sector was estimated to be 5,531, while in the wood processing sector direct and induced employment was estimated to be 6,408[37].

In 2012 COFORD estimated that the total employment generated by activities in the forest and wood products sector was 12,000 full time equivalents[38].

6.3.1 Categorisation of employment statistics

There is an EU wide nomenclature for the classification of economic activity, which is referred to as NACE[39]. The class *Forestry and Logging* is most relevant for the purpose of this publication and includes the following four components:

- Silviculture and other forestry activities;
- Logging;
- Gathering of wild growing non-wood products;
- Support services to forestry.

It is important to note that the *Forestry and Logging* class is concerned only with what occurs within the forest. Activities outside of the forest, such as the transport of logs to sawmills are not included.

There is one other class which is relevant for this publication: *Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials*. This class can be broken into the following sub-categories:

- Sawmilling and planing of wood;
- Manufacture of products of wood, cork, straw and plaiting materials:
    - Manufacture of veneer sheets and wood-based panels;
    - Manufacture of assembled parquet floors;
    - Manufacture of other builders' carpentry and joinery;
    - Manufacture of wooden containers;
    - Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials.

6.3.2 Quarterly National Household Survey

The Quarterly National Household Survey (QNHS) is a large-scale, nationwide survey of households in Ireland, which began in September 1997. It is designed to produce quarterly labour force estimates that include the official measure of employment and unemployment in the State. Each quarter, field interviewers visit 39,000 households. In figure 28 below, average annual estimates are displayed.

The number of people employed directly in the forestry and logging sector has averaged 2,800 between 1998 and 2017 while the average number employed directly in sawmilling and planing of wood has averaged 7,200 for the same period. A downward trend in employment in the wood processing sector has been a feature since 1998, particularly since the economic recession in 2008 (Figure 28). Estimates were not produced for 2015 as the sample size was too small to be

[37] *An Economic Evaluation of the Market and Non-Market Functions of Forestry*, 2013. COFORD, Department of Agriculture, Food and the Marine.

[38] *Irish Forestry and the Economy*, 2014. COFORD. Department of Agriculture, Food and the Marine.

[39] Description of NACE codes available at http://www.cso.ie/px/u/NACECoder/NACEItems/searchnace.asp

considered reliable. Estimates for 2014, 2016 and 2017 are considered to have a wide margin of error and should be treated with caution.

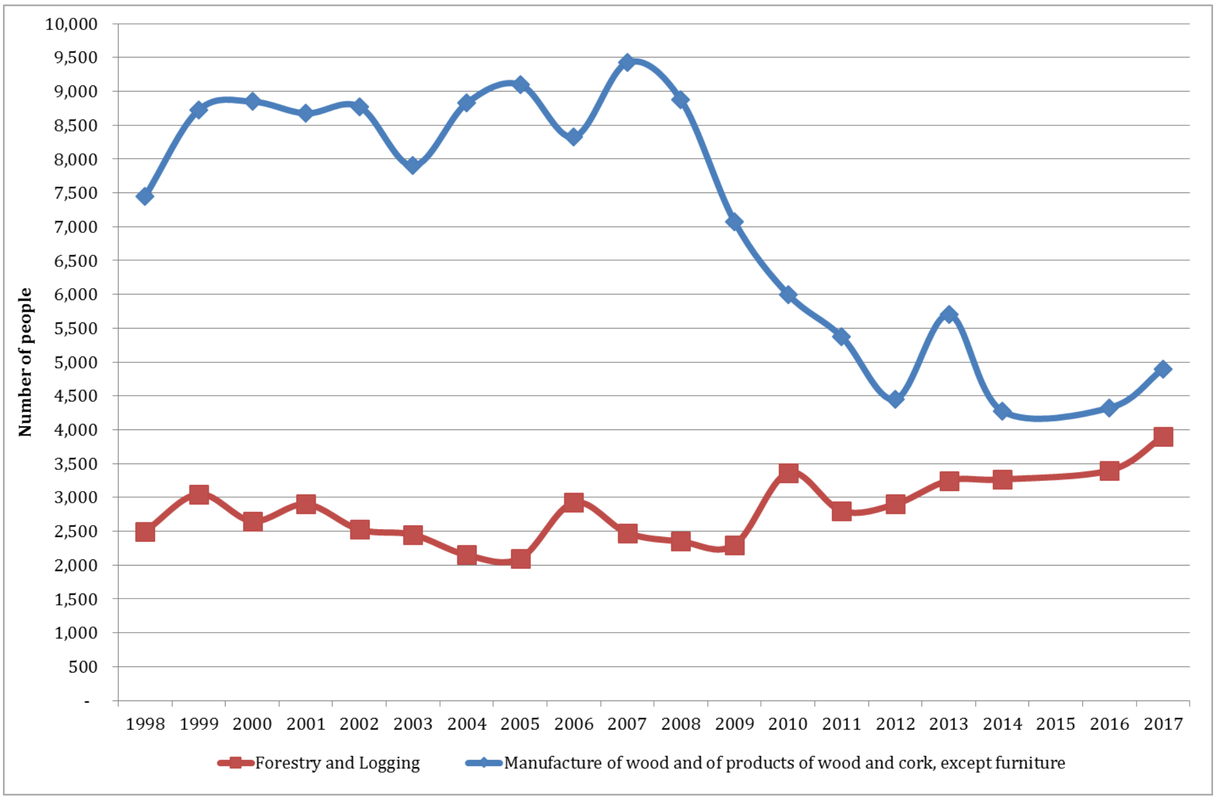

Figure 28. Quarterly National Household Survey labour force estimates (1998-2017).

6.3.3 Census of Ireland 2006, 2011 and 2016

Table 33 outlines persons aged 15 and over, classified by principal economic status and detailed industrial group involved in forestry, logging and related activities[40]. The unemployment rate in the sector has fallen to 5.5% in 2016 in both Forestry and Logging and Manufacture of wood and wood products. The total in the labour force for wood and wood products has also decreased significantly from 5,530 in 2011 to 4,000 in 2016 (Table 33).

The statistical classification of economic activities in the European Community, abbreviated as NACE, is used to categorise the census data in Table 33. The NACE Rev.1 classification was used in 2006, whereas the NACE Rev.2 classification data is used for the 2011 and 2016 census.

Table 33. Persons 15 years and over involved in forestry by principal economic status.

NACE 02 - Forestry and Logging						
Census Year	Total in labour force	At Work			Unemployed (incl. looking for first regular job	Unemployment rate (%)
		Male	Female	Total		
2006	2,548	2,142	282	2,424	124	4.9
2011	2,169	1,676	237	1,913	256	9.5
2016	2,468	1,978	290	2,268	200	5.5
NACE 16 - Manufacture of wood and of products of wood and cork, except furniture						
Census Year	Total in labour force	At Work			Unemployed (incl. looking for first regular job	Unemployment rate (%)
		Male	Female	Total		
2006	6,188	5,168	752	5,920	268	4.3
2011	5,530	3,767	647	4,414	1116	20.6
2016	4,000	3,182	429	3,611	389	5.5

[40] Available from : https://www.cso.ie/en/csolatestnews/presspages/2017/census2016profile11employmentoccupationsandindustry

6.4 Forests & Recreation

There has been a long-standing policy in place of encouraging the use of forests for outdoor recreation. Table 34 shows an upward trend in visitor number to Irish forests between 1999 and 2005.

Table 34. Number of visits to Irish forests 1999, 2004 & 2005.

Year	Number of forest visits
1999[41]	8,500,000
2004[42]	11,000,000
2005[43]	18,000,000

Since the early 1970's there has been an active programme of providing recreational facilities in State forests. At the present time there are 260 recreational sites and 13 forest parks in forests throughout the country[44]. In addition to providing recreational sites such as picnic areas and trails, Coillte has an open forest policy that allows free public access to its 440,000 ha estate. The National Parks and Wildlife Service (NPWS) provide access to national parks and nature reserves, and arboreta managed by the Office of Public Works are open to the public. Also urban forests (public forests established and managed for recreation) owned by County Councils or local communities are quite intensively used being close to population centres.

For the private forest estate the decision to allow public access rests with the forest owner, and is provided on a goodwill basis[45]. Private forest owners who have availed of a roading grant in recent years must allow public access to the forest road.

[41] Clinch, P. (1999), *The Economics of Irish Forestry*, COFORD, Department of Agriculture, Food and the Marine.
[42] Bacon, P. and Associates (2004). *A Review and Appraisal of Ireland's Forestry Development Strategy*, Final Report. Stationery Office, Dublin
[43] Fitzpatrick and Associates (2005). *Economic Value of Trails and Forest Recreation in the Republic of Ireland*. Coillte and the National Trails Strategy Working Group of the Irish Sports Council. Final Report, Dublin
[44] http://www.coillte.ie
[45] *Forest Recreation in Ireland A Guide For Owners & Managers*, 2006. Forest Service, Department of Agriculture, Food and the Marine.

6.5 Expenditure, 1993-2017

Since 1993, nearly €2.2 billion has been expended by the State and European Union on afforestation and other support measures for the forest sector. In 2017, €101.5 million was spent on forest activities including afforestation grants, maintenance grants, annual premium payments and grants for forest roading infrastructure (Figure 29). Expenditure in 2017 decreased by €2.3 million on the previous year. A detailed breakdown of expenditure by activity since 2007 is provided in Table 35.

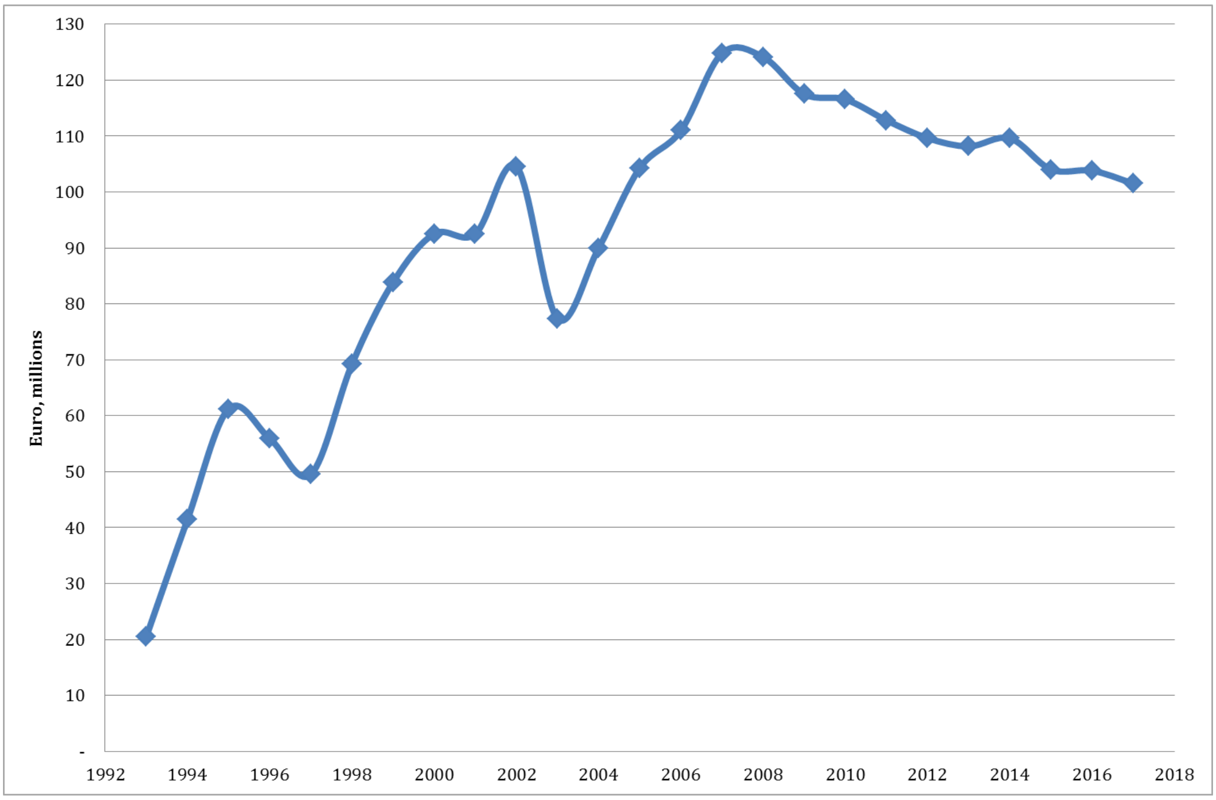

Figure 29. Total state expenditure 1993-2017.

Table 35. Department of Agriculture, Food and the Marine expenditure, 2007-2017.

Expenditure (1000's Euro)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Main Afforestation Programme											
Grant - 1st Instalment	21,262	19,852	22,080	27,557	20,482	19,215	17,033	16,759	17,480	18,420	15,819
Grant - 2nd Instalment	10,515	9,470	8,675	7,441	7,697	6,334	7,291	7,630	7,357	6,881	6,192
Premium	70,306	74,264	70,496	72,285	75,005	75,685	76,013	77,501	73,609	72,418	71,511
Sundry (e.g. EU Debt Recoveries)	1,088	1,192	1,075	505	647	379	523	620	259	79	108
Afforestation Programme Total	**103,171**	**104,778**	**102,326**	**107,789**	**103,831**	**101,614**	**100,860**	**102,511**	**98,705**	**97,798**	**93,630**
Forest Roads-Harvesting	7,517	7,129	5,400	3,694	4,204	3,077	2,709	2,794	2,381	2,561	3,889
Reconstitution of Woodlands	1,579	2,108	790	966	827	567	257	253	222	248	130
Ash Dieback (RCW)	0.0	0.0	0.0	0.0	0.0	0.0	693	1,274	688	446	811
Woodland Improvement Scheme	390	233	374	248	164	70	65	76	28	22	29
Thinning & Tending - WIS	0.0	0.0	0.0	610	750	971	864	666	470	593	603
Shaping of Broadleaves	52	57	83	10	0.0	0.0	0.5	0.0	0.0	0.0	0.0
Pruning of Conifers	130	189	454	56	0.0	233	94	0.0	0.0	0.0	0.0
NeighbourWood	76	578	670	180	351	435	146	6	0.0	167	130
Native Woodland Conservation	3,763	1,724	851	819	829	1,221	845	514	211	194	289
NDP Other Measures	412	170	52	3	11	-2	0.0	0.0	0.0	0.0	0
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31
Support Schemes Total	**13,919**	**12,187**	**8,674**	**6,587**	**7,136**	**6,573**	**5,673**	**5,582**	**3,999**	**4,356**	**5,912**
Reforestation	4	8	4	13	11	0.0	5	0.0	0.0	11	0.4
Forest Inventory	106	69	15	7	69	41	30	18	68	34	42
Other Capital Total	**110**	**76**	**19**	**20**	**81**	**41**	**35**	**18**	**68**	**45**	**43**
Total Capital	**117,201**	**117,041**	**111,018**	**114,395**	**111,048**	**108,227**	**106,568**	**108,111**	**102,772**	**102,199**	**99,585**
Promotion	2,047	1,738	487	289	864	799	828	684	693	840	1,060
Training	963	820	1,122	954	226	105	80	103	0	0	0
Technical Support	303	379	752	393	92	85	232	266	278	234	180
Fees International Organisations	37	31	37	39	189	8	16	8	10	10	10
Forest Sector Development (COFORD)	4,169	4,258	4,289	401	408	380	425	304	350	424	606
Miscellaneous (e.g. legal, printing)	99	-123	-195	94	4	41	20	144	-65	119	100
Total Current	7,618	7,103	6,491	2,171	1,782	1,418	1,601	1,510	1,265	1,627	1,956
Overall Total	**124,819**	**124,145**	**117,510**	**116,566**	**112,830**	**109,646**	**108,169**	**109,621**	**104,037**	**103,826**	**101,541**

7. Forest Protection and Health

7.1 Introduction

One of the key objectives of the Forestry Inspectorate of DAFM is to implement the forestry aspects of the EU Plant Health Directive 2000/29/EC which includes monitoring and control programmes for harmful forestry pests and diseases. In this regard with increased levels and new emerging patterns in trade and greater mobility of larger numbers of people, the risk from the introduction of exotic pests and diseases is ever present. Damage may also be caused to forests by abiotic factors, with fire and wind the most common cause.

The majority of forests in Ireland are established using planting stock and ensuring the traceability, suitability and quality of forest seed and plants used is vitally important. The Forestry Inspectorate has responsibility for the implementation of the Council Directive 1999/105/EC on the marketing of forest reproductive material and the associated implementing regulations as well as the being the designated authority in Ireland for the OECD Scheme for the Certification of Forest Reproductive Material Moving in International Trade.

The Forestry Inspectorate also oversees the national implementation of the FAO, IPPC International Standard for Phytosanitary Measures (ISPM) No. 15, Guidelines for Regulating Wood Packaging Material in International Trade. Not only is this important in terms of imports and protecting Ireland's forests but also for companies exporting who require compliant wood packaging, thereby facilitating Irish exports of goods of all kinds.

Key statistics

- No harmful pests or diseases for which Ireland has current EU Protected Zone status have been detected in Irish forests during annual surveys in 2017;
- The first detection of *Hymenoscyphus fraxineus* (previously referred to as *Chalara fraxinea)* in Ireland was in October 2012. The systematic and targeted plant health surveys undertaken by the Department over the summer months of 2017 recorded significant increases in findings of the disease. By the end of 2017 there had been findings in ash in over 600 locations in various settings – forests, nurseries and garden centres, on farm planting, roadside planting, hedgerows and private gardens in all 26 counties. In 2017 in light of the increasing numbers of findings DAFM switched to mapping findings on the basis of whether the disease had been found in 10km grid squares rather than showing individual findings.
- *Phytophthora ramorum* was first detected in Japanese larch in 2010 and at the end of 2017 has been confirmed present at a total of 52 locations in this tree species;
- Fire damage peaked in 2017 at 1700 ha, primarily due to the Cloosh forest fire in Co. Galway;
- 109 Seed Collection Permits and 19 Master Certificates of Provenance were issued in 2017 in relation to home collected forest reproductive material;
- 45 Irish companies are currently registered in Ireland to produce wood packaging material to the FAO IPPC International Standard for the Regulation of Wood Packaging Material in International Trade (ISPM No. 15) thus facilitating the export of goods worldwide from Ireland on compliant pallets and crates.

7.2 Biotic – Pests and Diseases

The Forestry Inspectorate is responsible for implementing the forestry aspects of the EU Plant Health Directive, Council Directive 2000/29/EC on protective measures against the introduction into the Community of organisms harmful to plants or plant products and against their spread within the Community. This Directive has recently been reformed by the European Commission and the Standing Committee on Plant Health in Brussels which is regularly attended by the Forestry Inspectorate at its monthly meetings. Under the EU Plant Health regime, for logistical plant health reasons the island of Ireland is considered as a whole. As a result there is close co-operation with Northern Ireland's Department of Agriculture, Environment and Rural Affairs involving regular meetings of the North South Ministerial Council and the Plant Health Sub-Group.

The Forestry Inspectorate implements the provisions of the Directive relating to timber, wood packaging material (pallets, crates, etc.), forest plants, Christmas trees and other forest products and surveys the national forest estate for quarantine forest pests and diseases.

Council Directive 2000/29/EC is to be replaced by Regulation (EU) 2016/2031 effective from 14th December 2019. DAFM is actively organising policy and operational requirements to meet the articles of Regulation 2016/2031.

7.2.1 Protected Zone Organisms

Ireland has Protected Zone status for 13 harmful organisms present in other EU Member States but not present here (Table 36). In accordance with Commission Regulation EC No 690/2008 to justify Ireland's Protected Zone status, the Forestry Inspectorate conducts annual national forest surveys and submits reports annually to European Commission. No detection of the aforementioned organisms were found in surveys conducted during 2015, 2016 and 2017.

Table 36. List of harmful organisms for which Ireland has Protected Zone status.

Protected Zone Organism
Cephalcia lariciphila (European web-spinning larch sawfly)
Gilpinia hercyniae (European spruce sawfly)
Gremmeniella abietina (Brunchorstia disease)
Dendroctonus micans (great spruce bark beetle)
Ips amitinus (small spruce bark beetle)
Ips cembrae (large larch bark beetle)
Ips duplicatus (northern bark beetle)
Ips sexdentatus (six-toothed bark beetle)
Ips typographus (eight-tooted spruce bark beetle)
Hypoxylon mammatum (hypoxylon canker)
Cryphonectria parasitica (chestnut blight)
Thaumetopoea processionae (oak processionary moth)
Dryocosmus kuriphilus (oriental chestnut gall wasp)

7.2.2 Other Regulated Organisms

Other harmful organisms listed in the EU Plant Health Directive of significance which also require mandatory annual surveys and reporting include *Anoplophora chinensis* (citrus long-horn beetle), *Anoplophora glabripennis* (Asian long-horn beetle), *Bursaphelenchus xylophilus* (pine wood nematode), *Monochamus spp*. (sawyer beetle), *Phytophthora ramorum* and *Gibberella circinata* (pitch canker of pine).

7.2.3 Surveys

In surveys for the above regulated organisms and for general forest health monitoring purposes, a network of observation points, pheromone traps, bait logs and sampling points distributed around the country in public and private forests and forest nurseries is used. The Forestry Inspectorate also deals with queries and reports from the industry and general public in relation to forest and tree health issues. This may involve site visits and taking of samples for laboratory analysis. This diagnostic and advisory service is part of the National Forest Protection Policy.

In September 2016 Dothistroma Needle Blight (DNB) was confirmed in Ireland for the first time. It was identified as being present on Scot's pine trees at two privately owned (grant aided) forests, one in southwest Limerick and one in northwest Cork. Samples taken from Scot's pine trees at the two forests in early August were analysed and laboratory results confirmed the presence of *D. septosporum* in early September. Surveys during 2017 brought the number of findings of DNB to 31. These findings were across 14 counties, affecting Scot's pine, lodgepole pine and Corsican pine. Figure 30 indicates the findings as of 31st December 2017 as illustrated on a 10 x 10km grid square basis.

In the EU, the movement of plants for planting is regulated through the plant passport system. In Ireland therefore there are regular inspections of nurseries each year. The Department will only grant authorisation to issue a plant passport if a place of production and its immediate vicinity is free of the relevant harmful organisms. Further information on the DNB finding can be found on the following link:
https://www.agriculture.gov.ie/forestservice/treediseases/dothistromaneedleblight/

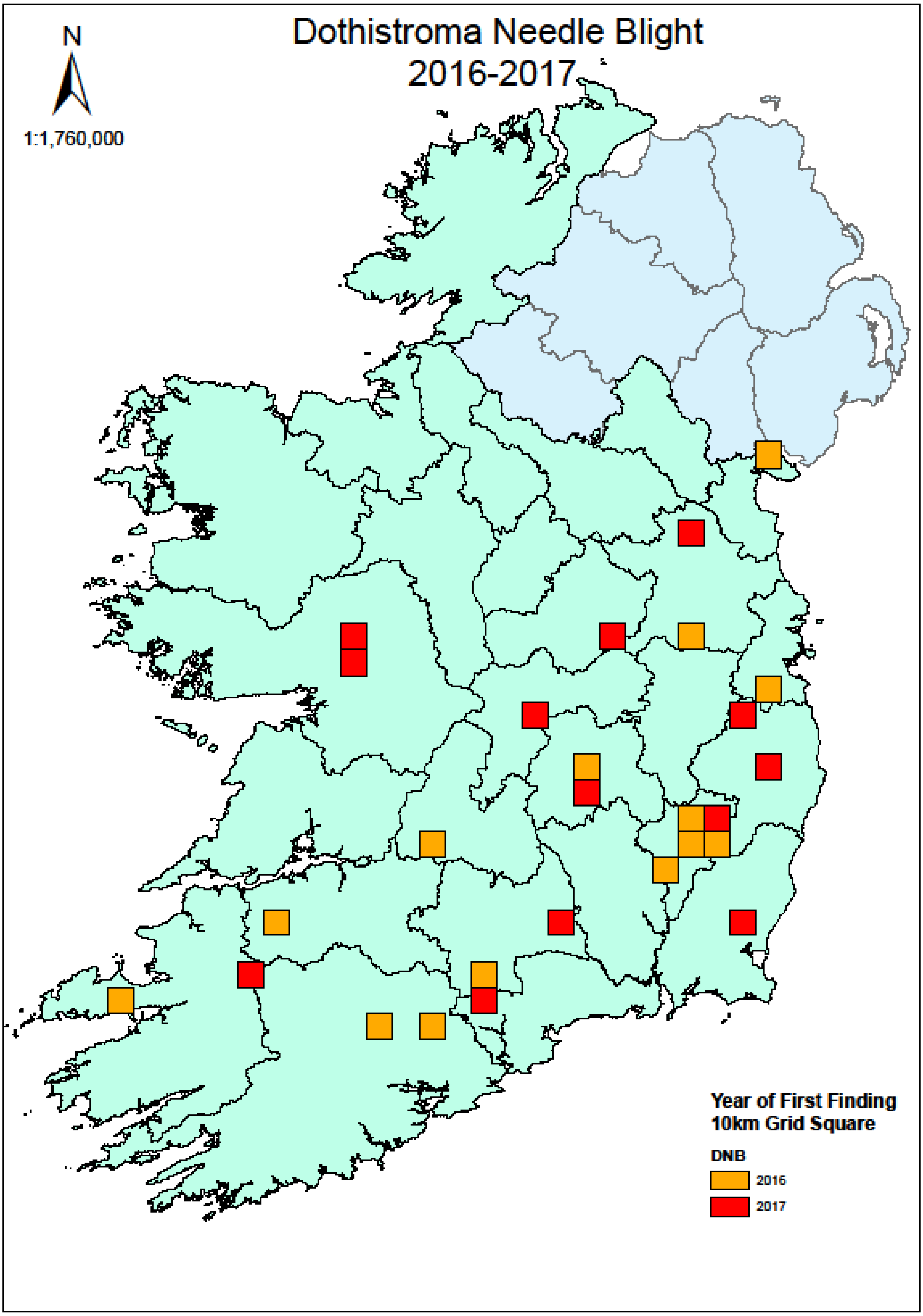

Figure 30. Findings of Dothistroma Needle Blight in Ireland 2016-2017.

7.2.4 Ash Dieback (*Hymenoscyphus fraxineus*)

Following the first confirmed finding of the Ash Dieback disease in October 2012, on imported trees used in forestry plantations, intensive surveys for the disease have been conducted year on year since. In addition to forest surveys, staff in the wider Department conducted surveys in horticultural nurseries, garden centres, private gardens, roadside landscaping and farm agri-environment scheme plantings. The surveys conducted in 2017 included a targeted survey of forestry plantations and a systematic survey of National Forest Inventory points across the country. By the end of 2017 there had been findings in ash in over 600 locations in various settings – forests, nurseries and garden centres, on farm planting, roadside planting, hedgerows and private gardens in all 26 counties. In 2017 in light of the increasing numbers of findings DAFM switched to mapping findings on the basis of whether the disease had been found in 10km grid squares rather than showing individual findings. Figure 31 displays the findings as of 31st December 2017 as illustrated on a 10x10km grid square basis.

While *Hymenoscyphus fraxineus* is not a regulated disease under the EU Plant Health Directive (Council Directive 2000/29/EC) a Ministerial Order to provide for measures to prevent the spread of *Hymenoscyphus fraxineus* in the genus *Fraxinus* L. was introduced on the 6th November 2012 (S.I. 431 of 2012). It restricted the movement of ash plants and seed into Ireland as well as imposing restrictions on ash wood imports. Further to the adoption of the '*All Ireland Chalara Control Strategy*' in July 2013, which was developed jointly with the Department of Agriculture and Rural Development (DARD) in Northern Ireland, the Department continued its co-operation with the UK authorities throughout 2016. The legislation in relation to ash wood imports was updated in 2015 (S.I. No 479 of 2015). The new Order restated the provisions contained in the previous Order as they pertain to plant and plant products but introduced a number of changes in relation to the documentary requirements around the importation of ash wood, the required pre-importation treatments, as well as taking into account the change in the scientific name of the organism in 2014. A revised Reconstitution Scheme was launched in 2017 to offer increased flexibility and assistance to owners in particular in relation to dealing with the disease in older plantations.

For update information on Ash Dieback disease please visit the following webpage:
http://www.agriculture.gov.ie/forestservice/treediseases/ashdiebackchalara/.

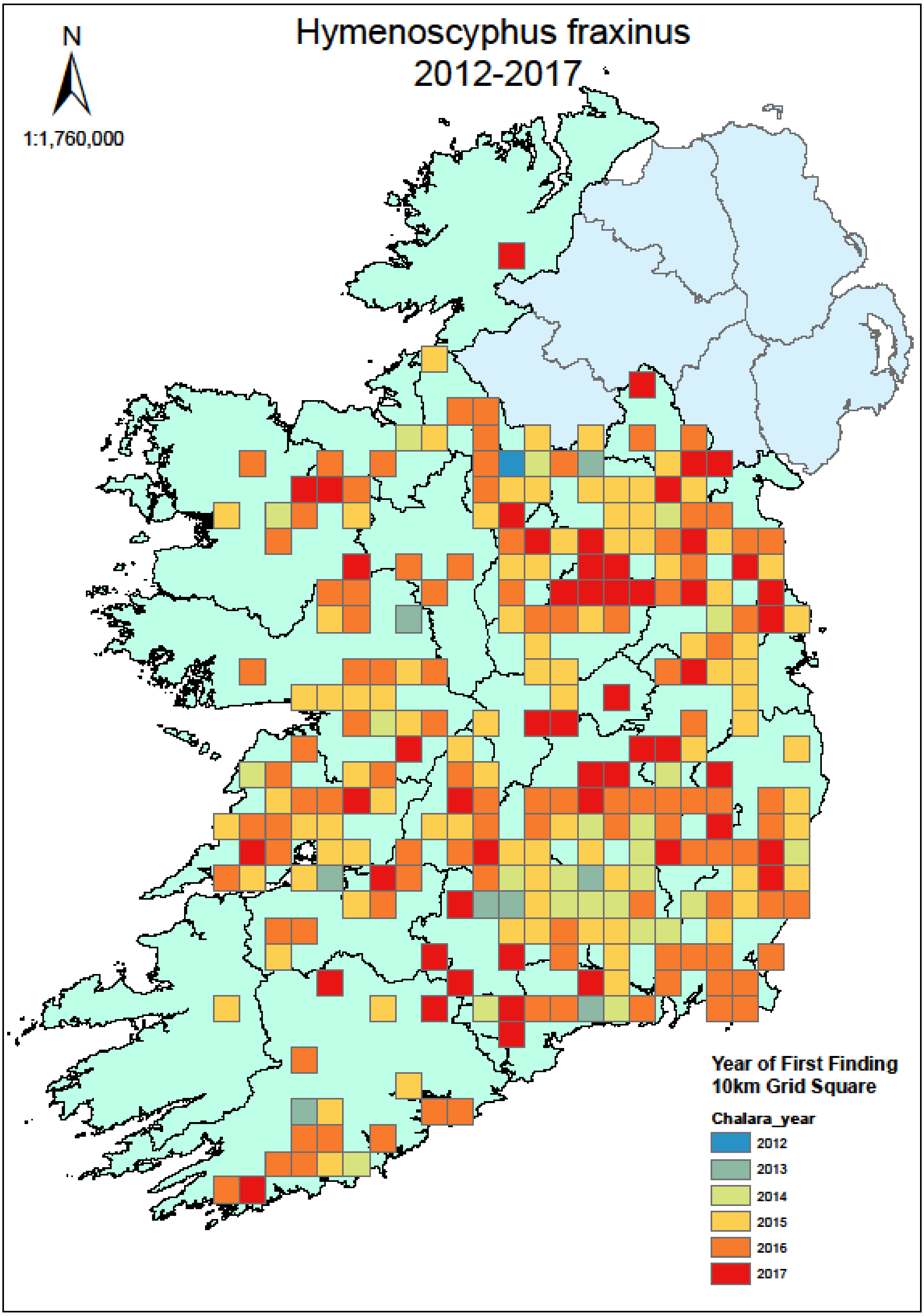

Figure 31. Ash Dieback findings in Ireland 2012 – 2017.

7.2.5 Phytophthora ramorum

Since the first finding in Ireland *of Phytophthora ramorum* in Japanese larch in 2010 the Forestry Inspectorate has continued to conduct annual ground and aerial surveys of larch with the assistance of the Air Corps and Coillte. At the start of 2017 the disease had been confirmed present in Japanese larch at 48 forest locations, up from 47 at the start of the previous year. At the end of 2017 the disease had been confirmed present at four additional locations, bringing the total number of confirmed locations in Ireland to 52, and affecting approximately 322ha of forestry (Table 37). Since 2010 the Forestry Inspectorate has worked with Coillte (as the principle landowner affected) in undertaking sanitation felling of infected larch in an effort to limit spread and continued to do so in 2017. Figure 32 displays the findings as of 31st December 2017 as illustrated on a 10x10km grid square basis.

Table 37. Number of confirmed site findings in Japanese larch.

Year	Number of confirmed new findings
2010	8
2011	4
2012	4
2013	10
2014	18
2015	3
2016	1
2017	4

The disease has also been detected during forest surveys on beech, noble fir, Spanish chestnut, *Vaccinium myrtillus* and *Gaultheria shallon* (first world finding in the wild) growing in close proximity to infected Japanese larch. While previous surveys detected the disease for the first time worldwide on a single Sitka spruce and European silver fir tree, no subsequent findings have been detected here. Also of significance is that since 2003 a number of detections of the disease have been made in wild invasive rhododendron in forest locations. By the end of 2016 the number of such findings was 26. There were no additional findings in 2017.

Phytophthora kernoviae has been detected on wild rhododendron in a number of forest locations. By the end of 2016 there were 8 such findings, 6 of which were in forests which also had Japanese larch infected with *Phytophthora ramorum*. To date all the confirmed findings of the disease have been limited to counties Wicklow, Wexford, Kilkenny, Tipperary, Waterford, Cork and Kerry. There were no additional findings of *P. kernoviae* in 2017.

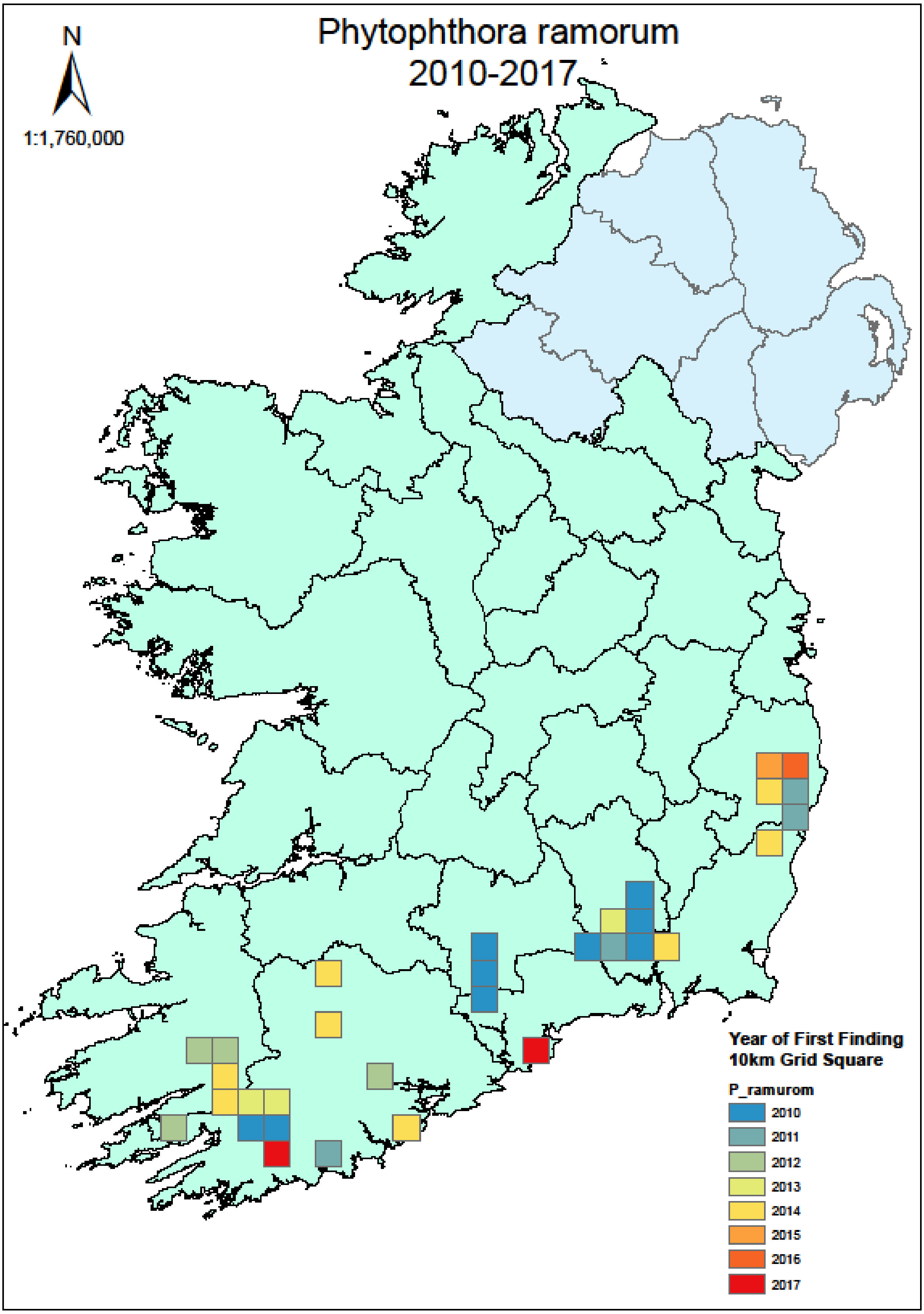

Figure 32. Phytophtora ramorum findings in Ireland 2010-2017.

7.3 EU Plant Health Directive & Protected Zone Monitoring

Import inspections of wood and wood products from Third Countries regulated under the EU Plant Health Directive are routinely conducted to ensure compliance with entry requirements as part of the Customs clearance process (Tables 38 and 39). In 2017, 654 third country consignments received a documentary check and if appropriate to the requirements, were physically inspected (Table 38). Five were found to be non-compliant with the import requirements. Appropriate measures were taken on the non-compliant imports ranging inter alia from requesting correct documentation to entry refusal.

Under the EU internal markets regime goods coming from within the EU are not subject to Customs clearance but monitored to ensure Ireland's Protected Zone requirements are met. DAFM operates two designated Border Inspection Posts in Dublin and Cork ports for import controls from Third countries and has an office in Waterford port. Shipments coming into the other ports and airports are covered from these locations if required.

In 2017 the special measures introduced in 2013 by the European Commission regarding inspections of wood packaging material associated with certain stone commodities imported into the EU from China were extended for another year. In 2017, 123 containerised consignments from China were inspected, with one non-compliance detected where appropriate phytosanitary measures were imposed (Table 39). In addition, the Forestry Inspectorate carries out monitoring of Portuguese wood packaging material in relation to the threat of pine wood nematode nematode (as required under Commission Implementing Decision 2012/535) and wood packaging from other countries.
The Forestry Inspectorate also provides advice and deal with queries regarding import and export requirements related to wood/wood products and forest reproductive material. Phytosanitary Certificates may also be issued to accompany certain consignments leaving the free trade area of the EU.

Table 38. Third Country Timber Import Inspections from January to December 2017.

Country	Number of Inspections	Not Regulated or Compliant	Non Compliant
USA	597	593	4
Canada	23	22	1
Chile	8	8	0
China	6	6	0
Russia	3	3	0
Ukraine	3	3	0
Cameroon	2	2	0
Egypt	2	2	0
Ghana	2	2	0
Indonesia	2	2	0
Namibia	2	2	0
Nicaragua	1	1	0
Belize	1	1	0
Switzerland	2	2	0
Total	654	649	5

Table 39. Wood Packaging Inspections from Jan to Dec 2017.

Country	Number of Inspections	Compliant	Non Compliant
China	123	122	1
Portugal	8	3	5
Other	2	2	0
Total	133	127	6

7.4 Forest Reproductive Material

The Forestry Inspectorate is responsible for implementing Council Directive 1999/105/EC on the marketing of forest reproductive material. Forest reproductive material (FRM) is a collective term to describe seeds, plants and cuttings, which are important for forestry purposes. The aim of the legislation is to ensure that forest reproductive material, which is marketed, is from approved suitable sources and is clearly labelled and identified throughout the entire process from tree seed collection to processing, storage, forest nursery production and delivery to the final forest user. In recent years the Forestry Inspectorate has being participating in the ongoing EU review of seed and propagating material legislation.

DAFM provides the following services in relation to forest reproductive material:

- Registration of suppliers of forest reproductive material - seed collectors, nurseries, seed and plant importers and brokers
- Registration of seed stands Issuing of Certificates of Provenance for seed collections
- Advice on forest seed and plant regulations

In 2017 109 Seed Collection Permits were issued - an increase on the previous year (83 issued in 2016). During 2017, 19 Master Certificates of Provenance were issued (36 issued in 2016). These figures vary from year to year depending on availability of suitable seed and levels of demand.

DAFM is also the National Designated Authority in Ireland for the OECD Scheme for the Certification of Forest Reproductive Material Moving in International Trade. The object of the international OECD Scheme is to encourage the production and use of forest seeds, parts of plants and plants that have been collected, transported, processed, raised and distributed in a manner that ensures their trueness to name.

Forest plants may also be subject to the requirements of the EU Plant Health Directive, Council Directive 2000/29/EC on protective measures against the introduction into the Community of organisms harmful to plants or plant products and against their spread within the Community.

7.5 ISPM No. 15 (IPPC International Standard for Wood Packaging Material)

In relation to exports (in addition to import controls), the Forestry Inspectorate is responsible for the implementation of the FAO, IPPC, International Standard for Phytosanitary Measures (ISPM) No. 15, Guidelines for Regulating Wood Packaging Material in International Trade. ISPM No. 15 describes phytosanitary measures to reduce the risk of introduction and/or spread of quarantine pests associated with wood packaging material made of raw wood, in use in international trade.

Wood packaging material, which is being exported from Ireland to most non-EU countries around the world, is required to comply with ISPM No. 15. ISPM No. 15 thereby facilitates exports by Irish companies of goods of all kinds, which are being transported using wooden pallets, crates, loose wood dunnage etc. In practice wood packaging material made from unprocessed raw wood and used in supporting, protecting or carrying a commodity, must be heat treated or fumigated in a specified manner and each individual unit of the wood packaging material must be stamped on at least two sides with the officially approved ISPM No. 15 mark verifying the treatment and incorporating the country code and the registration number of the producer of the packaging.

ISPM No. 15 currently does not apply to wood packaging material which is being dispatched to other EU Member States. The following services are available in relation to ISPM No. 15:

- Registration of producers of wood packaging material and kiln operators in association with NSAI
- Advice to wood packaging material manufacturers and kiln operators concerning ISPM No. 15
- Advice to importing and exporting companies concerning ISPM No. 15

To the end of 2017, there were 45 companies registered to operate under the scheme in Ireland. Companies in the scheme are inspected to ensure compliance with agreed Standard Operating Procedures and that the wood packaging material is fully compliant with the standard.

7.6 Abiotic

This section details the extent of damage to the forest estate arising from non-living or abiotic sources.

7.6.1 Forest fires

Forest fires normally occur each year in Ireland and reach their peak in spring, particularly in forests established on formerly unenclosed land, with a preponderance of purple moor grass and heather vegetation. Figure 33 shows the area of forests damaged by fire from 1930 to 2017. In the late 1970's and early 1980's, considerable areas of public forest were burnt. Fire damage levels were high in both public and private forests in 2010 and 2011 following protracted dry periods in spring. The high level of forest fire damage in 2017 is primarily attributed to the Cloosh fire in Co. Galway, which impacted approximately 1500 ha of forest.

Estimates of fires in privately-owned forests for the periods 1985-2005 and 2010-2016, were derived by multiplying the proportion of public forest area destroyed by fire each year by the private forest area. In 2017 the private estate was directly estimated due to large single event at Cloosh, which would not be representative of the private estate.

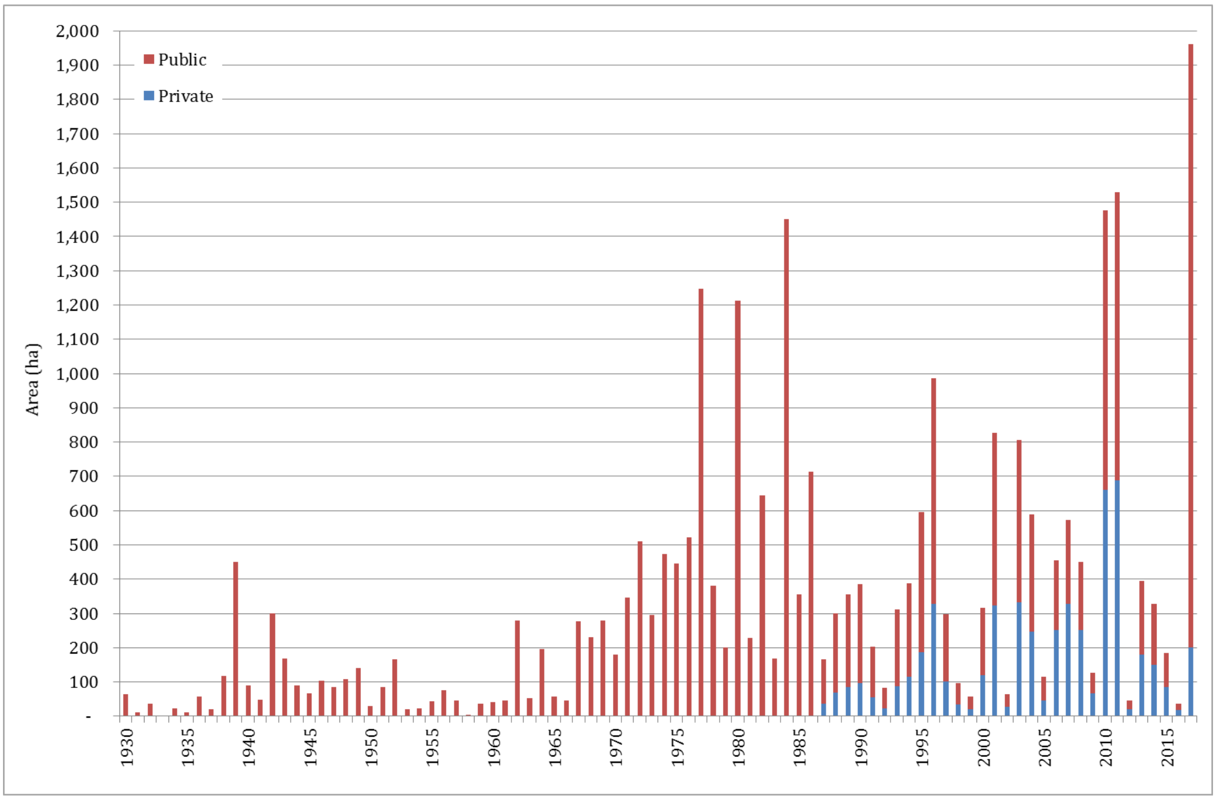

Figure 33. Area of forest damaged by fire 1930-2017

8. International comparators

8.1 Introduction

This chapter compares the status of Irish forests with European and global forests. Comparisons are primarily from 2015 when the FAO *Global Forest Resources Assessment* and the *State of Europe's Forests* were published. Also presented are figures on roundwood harvest, increment and forest expansion in the EU 28.

Key statistics

- At 10.9%, forest cover in Ireland in 2015 was one of the lowest in the EU, where the average forest cover was 33.5%; Worldwide forest cover was 30.6%;
- In 2015, public forest ownership in Ireland was at 54%, close to the EU average of 59%;
- Annual roundwood harvest in 2010 was 2.7 million m^3, compared with an EU average of 18.9 million m^3 in the same year;
- Fellings represented at 47% of annual increment in 2012, which was below the EU average of 59%, reflecting the relatively young age of Ireland's forests in comparison to the rest of Europe;
- Of all the EU Member States, since 1990 Ireland has had the highest rate of increase in forest expansion as a percentage of total forest cover.

8.2 Global & EU 28 Forest Cover

Despite having afforested more than 320,000 ha since 1990, Ireland remains one of the least forested countries in Europe. In 2015, when the FAO *Global Forest Resources Assessment* was published, Ireland had 10.9% forest cover, compared with a total forest cover of 33.5% in the EU 28 and a 30.6% forest cover worldwide. In 2015 total Irish forest cover represented 0.8% of the total European forest cover.

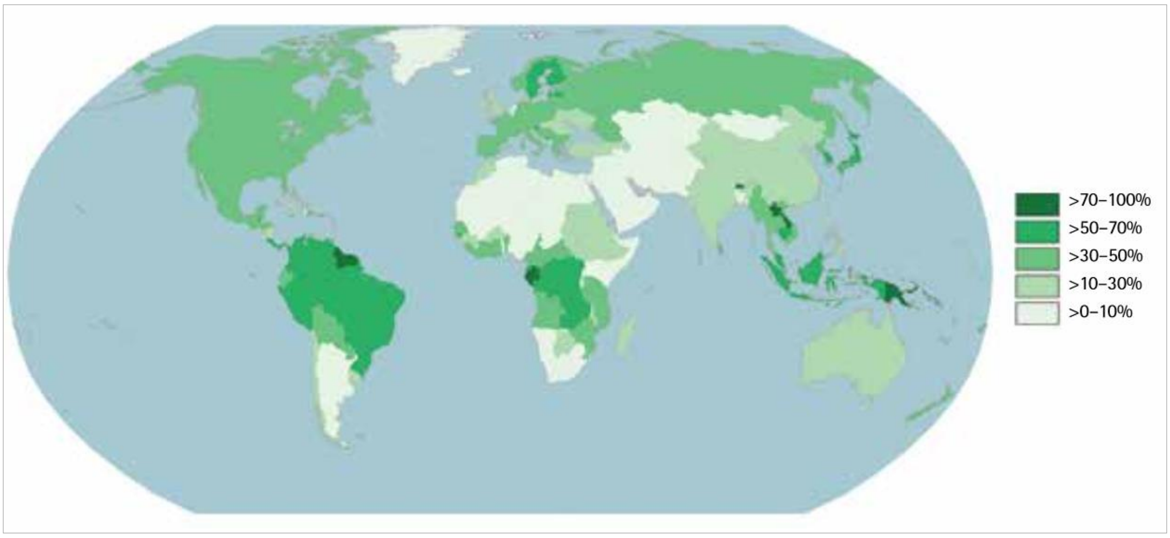

Figure 34. Global forest cover (Source: FAO *Global Forest Resources Assessment* 2015).

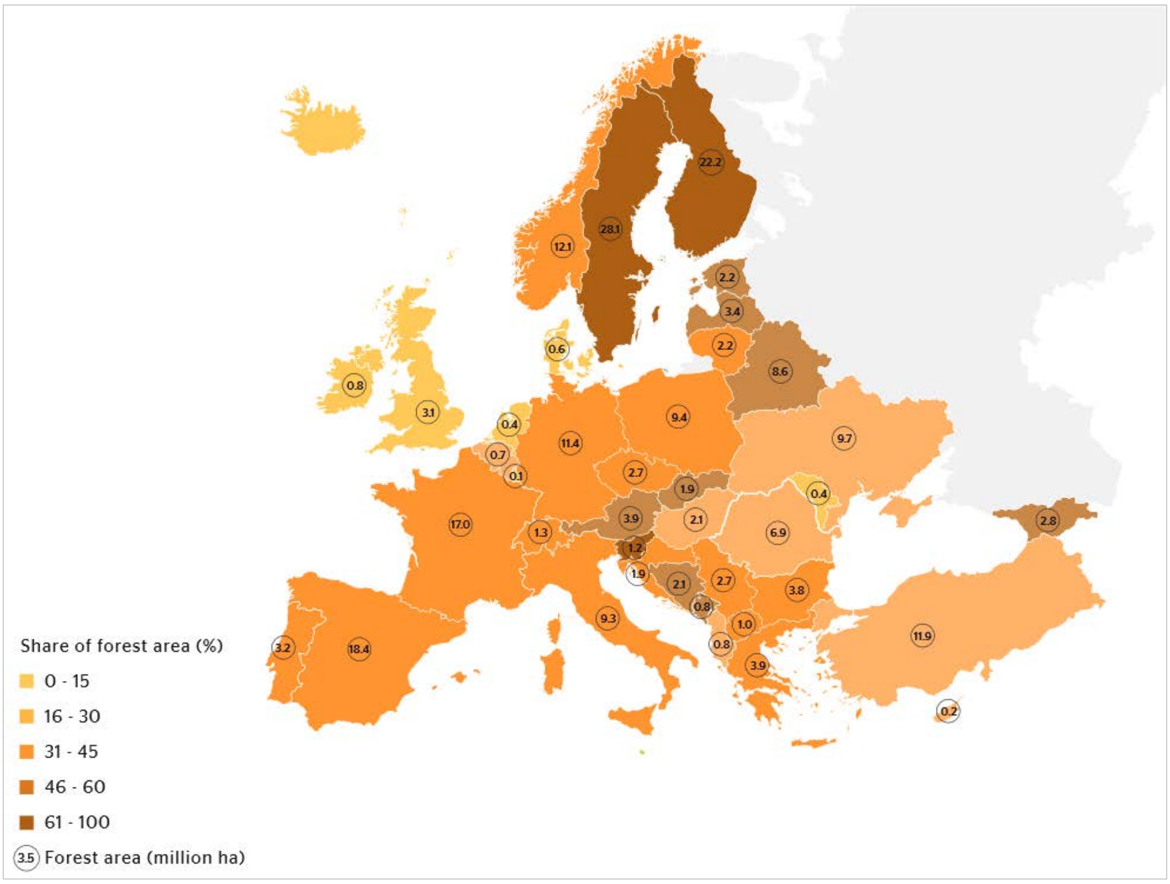

Figure 35. Forest area (million ha) and share (percentage) of land area by country (Source: State of Europe's Forests 2015).

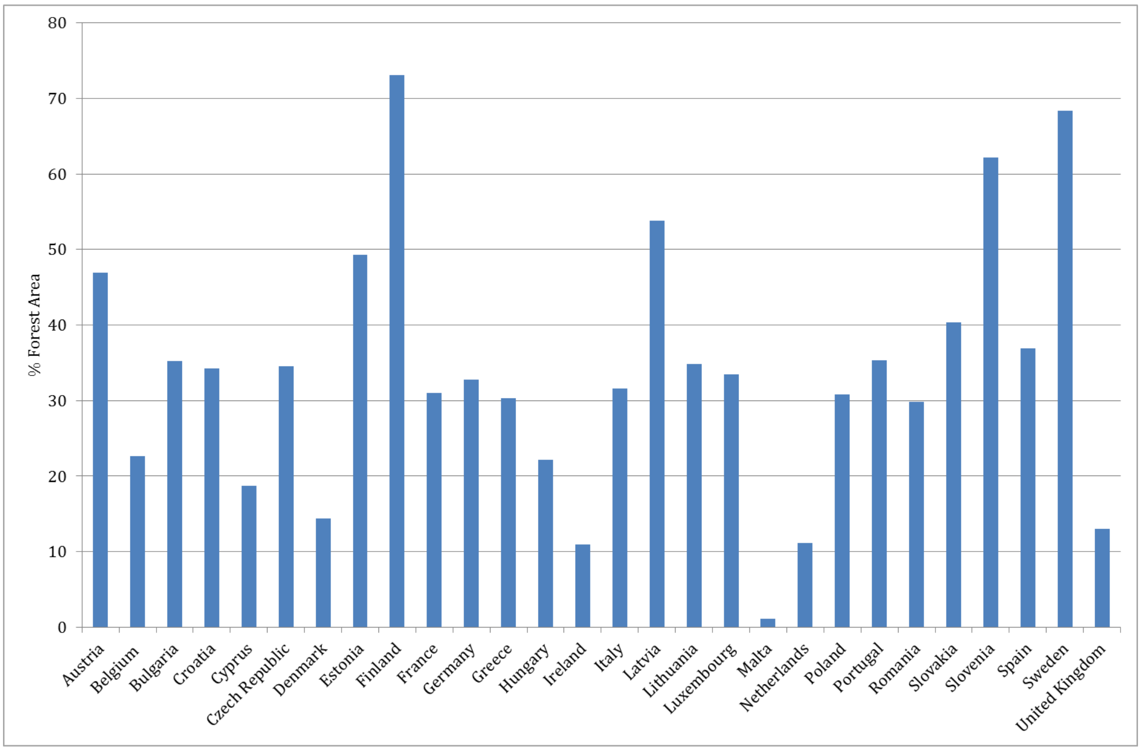

Figure 36. Forest cover in EU 28 (Source: State of Europe's Forests 2015).

8.3 Forest comparison: EU 28

The *State of Europe's Forests* reports on the status and trends in European forests and offers a comparison of Irish forests with European counterparts. In 2015 at the time of the latest report, public forest ownership in Ireland was at 54%, close to the EU average of 59% (Figure 37). Due to afforestation, the proportion of privately owned forest is increasing in Ireland. Germany has the highest total growing stock of the EU 28, at over 3.6 billion m^3 (Figure 38).

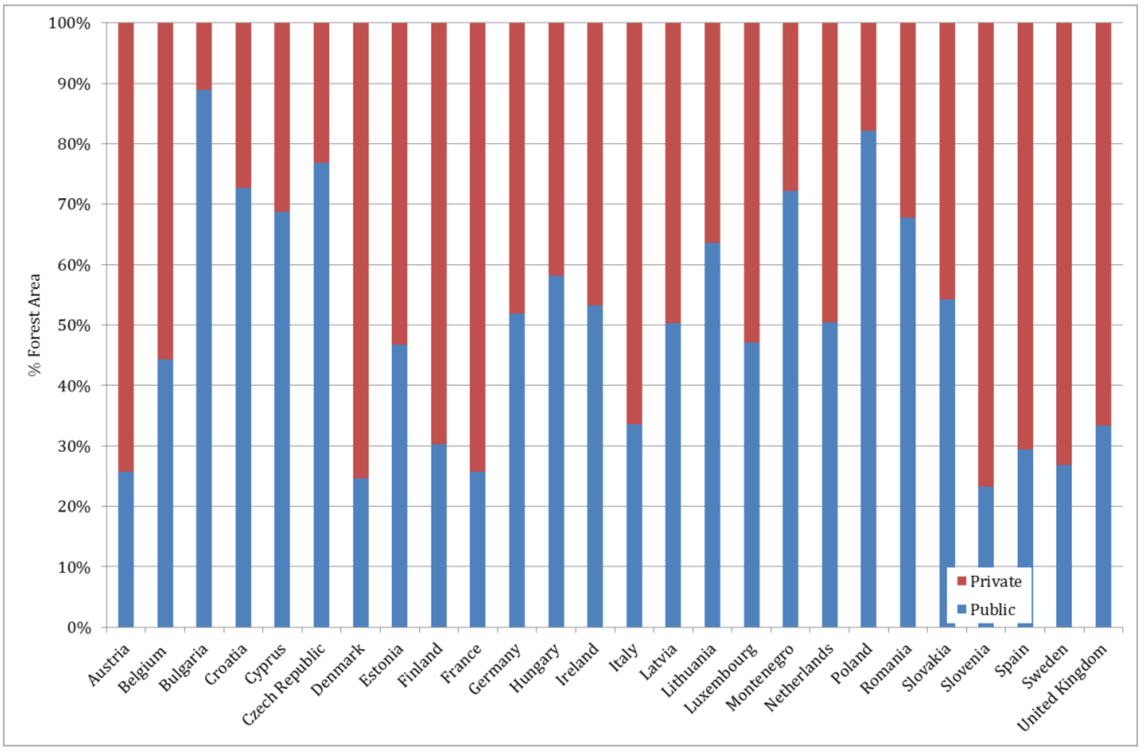

Figure 37. Forest ownership in the EU 28 (*State of Europe's Forests 2015*).

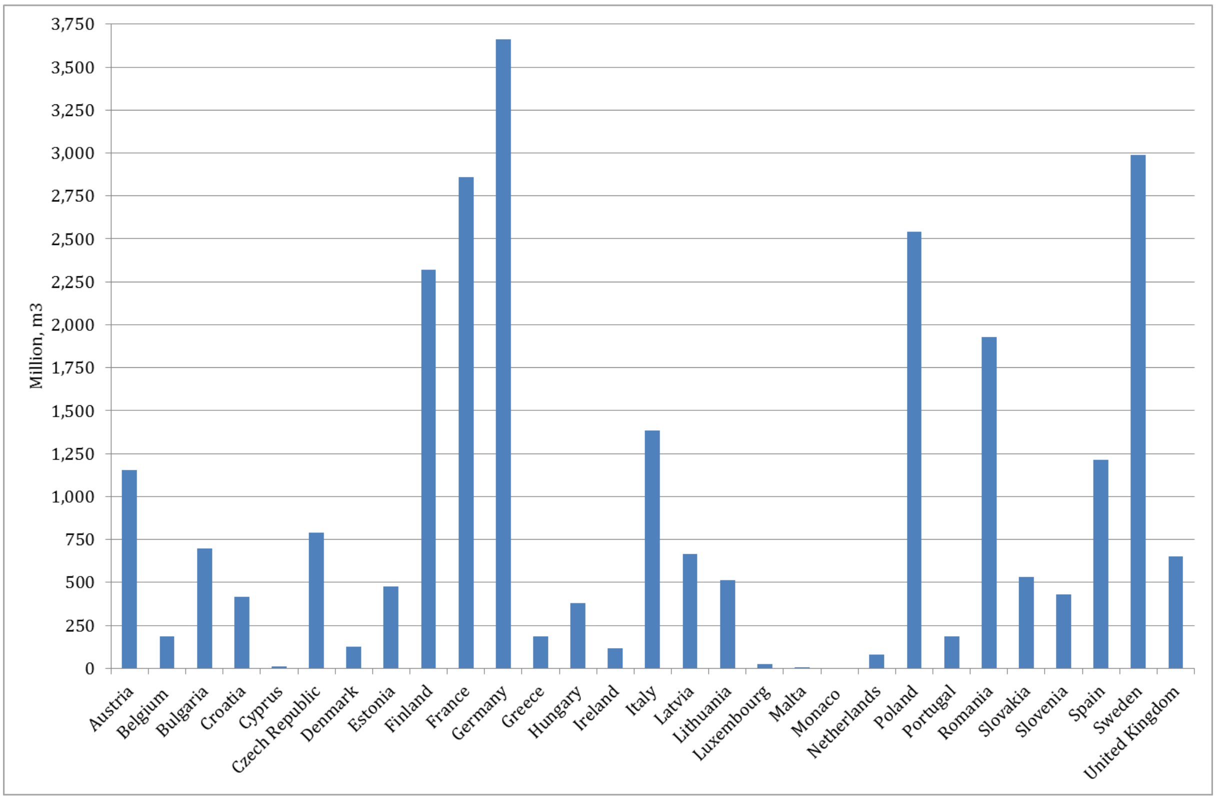

Figure 38. Growing stock in the EU 28 countries (*State of Europe's Forests 2015*).

Annual roundwood harvest at 3.7 million m³ in 2010 compares with an EU average of 18.9 million m³ in the same year (Figure 39). Fellings represented at 47% of annual increment in 2010, which was below the EU average of 59% (Figure 40), which is a reflection of the relatively young age of Ireland's forests in comparison to the rest of the Europe.

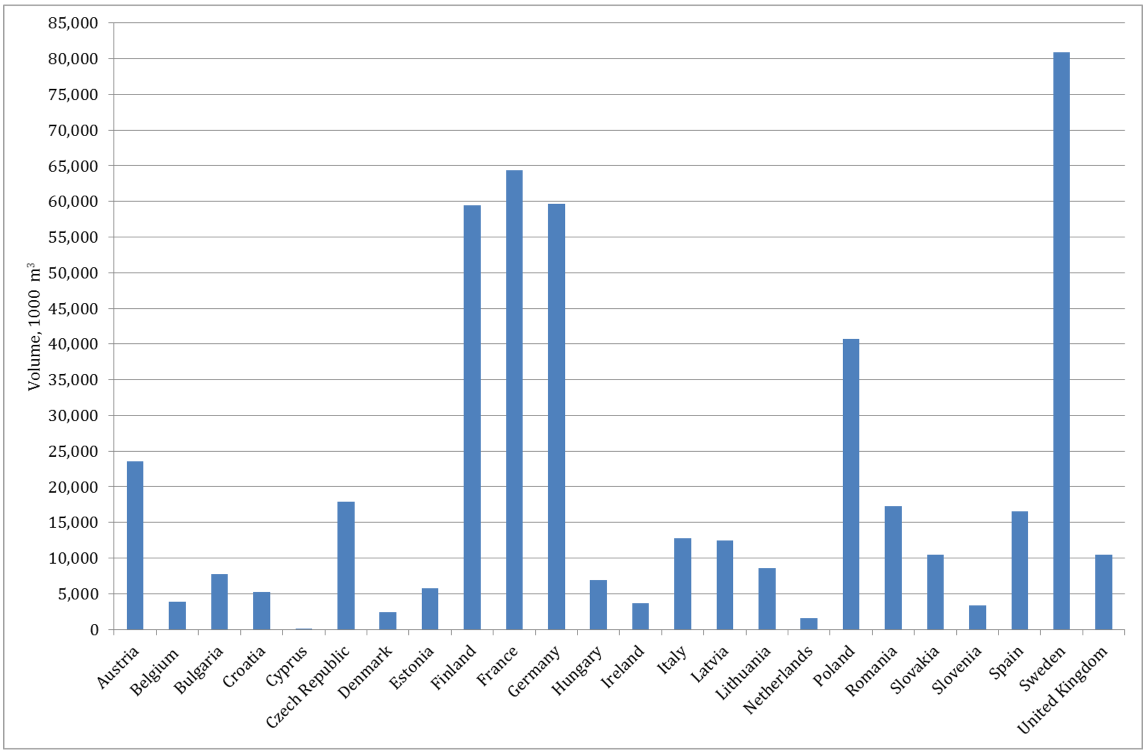

Figure 39. Felling volumes in the EU 28 (*State of Europe's Forests 2015*).

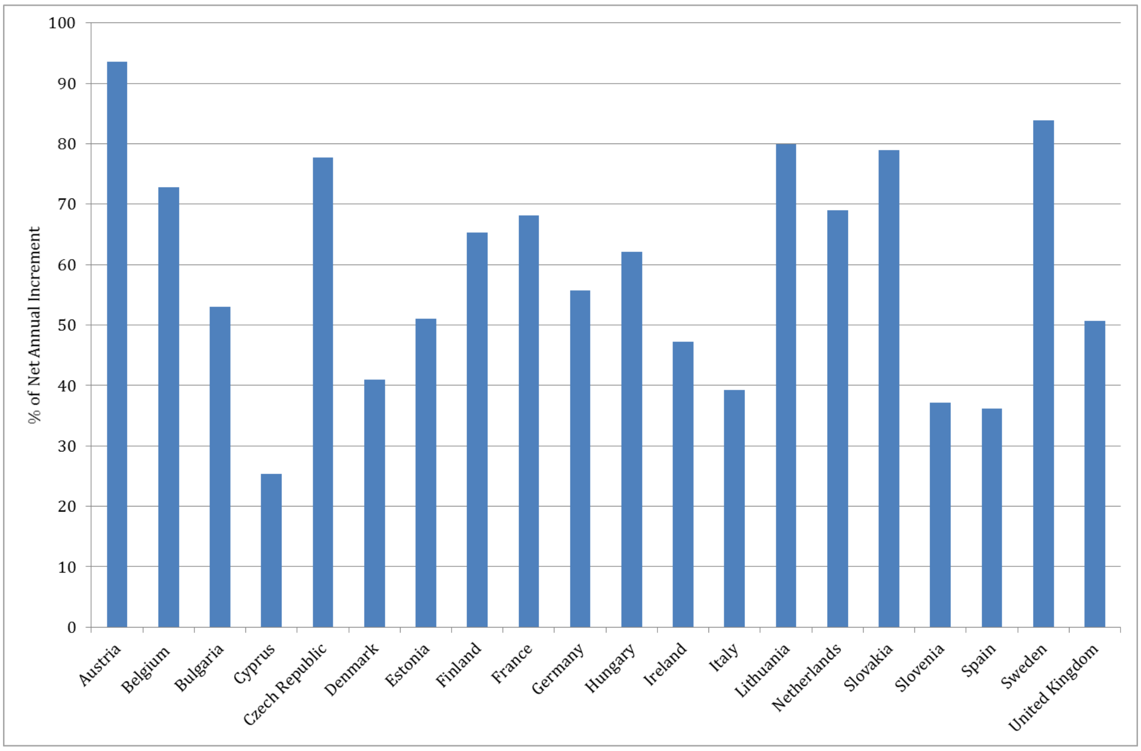

Figure 40. Harvest as a percentage of net annual increment (*State of Europe's Forests 2015*).

8.4 European Forest Expansion Rate

According to the *State of Europe's Forests 2015* report, since 1990 Spain has had the greatest annual expansion of forests at 184,000 ha, France at 102,000 ha and Turkey at 93,000 ha. The annual rate of change, expressed as a percentage of total forest area is highest for Iceland (4.6%), Ireland (2.0%) and Spain (1.2%) for the period 1990-2015 (Figure 41).

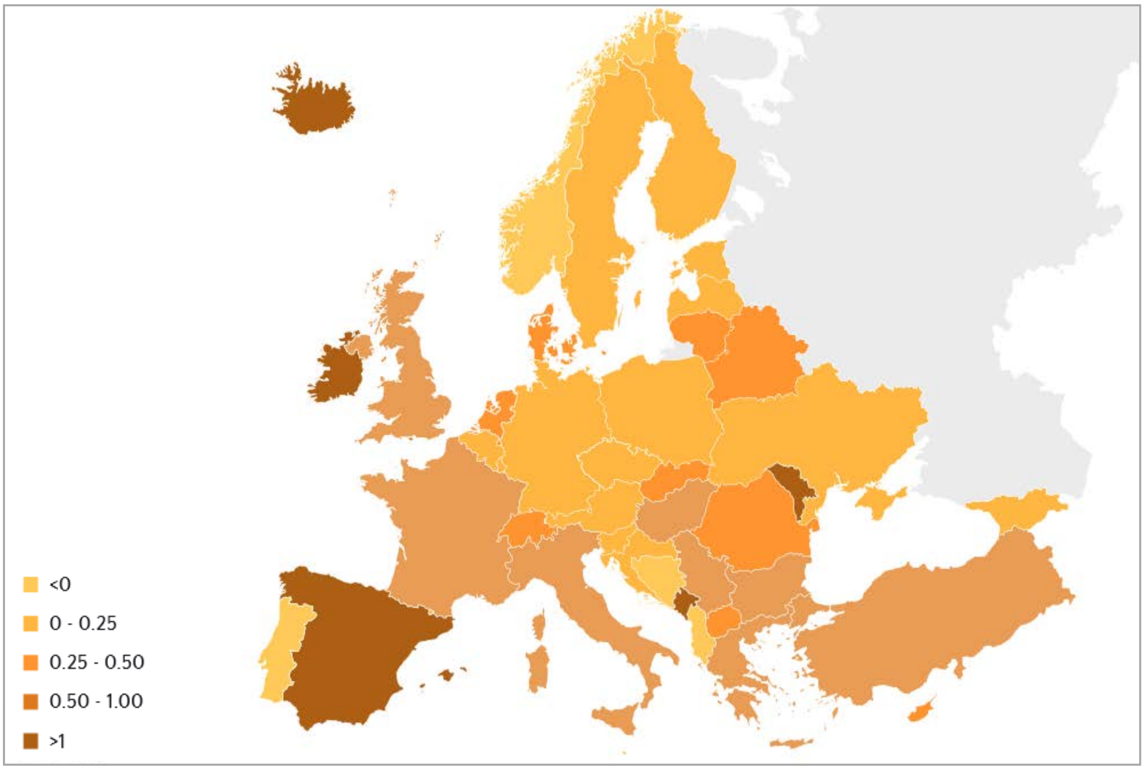

Figure 41. Annual % rate of change in forest area by country 1990-2015 (*State of Europe's Forests 2015*).

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