All Ireland
Forest Reproductive Material
Demand Forecast
for the period 2025-2035

Methodology

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COFOR●

Forest Genetic Resources Working Group

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Acknowledgements

Disclaimer

While every effort has been made to ensure the information provided is accurate, the Department of Agriculture, Food and the Marine does not accept any responsibility or liability for errors of fact, omission, interpretation or opinion that may be present, nor for the consequences of any decisions based on this information.

Interpretation advice

Readers who intend using the forecast for planning or investment purposes are urged to thoroughly review the information provided. It may be advisable in certain cases to engage professional advice.

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Introduction

The Forestry Programme 2023-2027, approved by the Irish Government, represents a significant investment to support Ireland's forestry sector which will deepen and broaden the ecosystem services offered by Irish forests, with an emphasis on increasing the diversity of tree species, particularly broadleaf and native trees. Forest nurseries in Ireland require accurate demand forecasts due to the lead-in time to produce planting stock, which can range from 2 to 4 years depending on species. This is compounded by Ireland's oceanic climate, which affects seed production, especially for broadleaf trees like oak, which may only produce major crops every 5-10 years. Additionally, some large-seeded species cannot be stored for long periods, making forecasting even more critical. The EU Nature Restoration Law is a landmark regulation that establishes binding targets for restoring degraded ecosystems across the European Union. The Republic of Ireland must contribute to the overarching EU targets, which include restoring at least 20% of the country's land and sea areas by 2030 and all ecosystems in need of restoration by 2050. This is particularly relevant for Ireland, where over 85% of protected habitats are considered to be in poor condition, and forest habitats are prominent in the National Restoration Plan currently under development.

In light of this, and to ensure adequate forest sector investment and readiness to supply high-quality planting material for the country's afforestation and reforestation goals, the Department of Agriculture, Food and the Marine (DAFM) commissioned Silvalytics Limited and Henry Phillips to develop a Forest Reproductive Material (FRM) Demand Forecast for the period 2025-2035. This report describes the methodology that was followed to develop the forecast, including the data collection phase. Following review and acceptance of this document by the COFORD Forest Genetic Resource Working Group (FGRWG) the forecast results document itself will be compiled and published and will contain a summary of the methodology followed.

Northern Ireland (NI) and the Republic of Ireland (ROI) have ambitious and interconnected forestry and agri-environment policies aimed at increasing forest and tree cover to address climate change and enhance biodiversity. The island has a common climate, similar soil types, and a history of shared forest management challenges, such as dealing with pests and diseases and in many senses operates as a single, integrated market for forest reproductive materials. As such, information sharing on demand is necessary to effectively meet these shared environmental targets and manage the resources needed to achieve them.

Forest Reproductive Material

The term forest reproductive material, or FRM, encompasses seeds, plant parts (e.g. cuttings and scions) and plants raised by means of seeds or parts of plants including plants propagated in vitro, for forestry purposes. Knowledge of FRM – such as genetic and morphologic variation, reproductive biology, seed biology and storage, and plant propagation (by seed or vegetative means) – is essential for sustainable forest management in both natural and planted forests. In planted forests, for example, an adequate knowledge of these aspects will help ensure the use of appropriate techniques in seed source selection; seed collection, testing and storage; plant production; and matching FRM with the environmental conditions of a planting site[1].

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[1] FAO Forest Reproductive Material downloadable from ://www.fao.org/sustainable-forest-management/toolbox/modules/forest-reproductive-material/basic-knowledge/en/?type=111

Terms of Reference

Objective:

To provide a forecast of potential demand of Forest Reproductive Material (FRM) for forestry purposes on the island of Ireland over the period 2025 to 2035, ensuring that the information provided reflects the best information available, using an appropriate methodology, to support the forestry sector.

Scope:

To include forest tree species approved for use in the Republic of Ireland, Northern Ireland forest and agri-environmental schemes, with a base-case and additional scenarios reflecting different levels of policy and environmental influences, as appropriate.

Task 1 – Forest Data Collection (DAFM)

Task 1 involves collecting essential data on afforestation and reforestation trends from sources like the COFORD Roundwood Production Forecast and other relevant datasets and gathering information about the demand for FRM under various agri-environment schemes (e.g., DAFM and DAERA-NI schemes).

Task 2: Methodology Development

Develop a methodology for estimating potential FRM demand in consultation with the FRM Demand Forecast Steering Group. Document the methodology, ensuring that it takes into account variables such as afforestation/reforestation area, species preferences and germination rates. The methodology should also integrate insights from existing data (e.g., COFORD publications, industry surveys) and current policies.

Task 3: Generate Forecast Model and Results

Apply the developed methodology to build a forecast model that relies on inputs such as afforestation rates, reforestation trends, and expected demand from government schemes.

Task 4: Outputs

Liaise with stakeholders such as the Forest Genetic Resource Working Group (FGRWG) to ensure that the forecast document is comprehensive and meets the needs of the sector. Prepare a final forecast report for the 2025-2035 period, delivering relevant information and insights into future demand for policy makers, forest nurseries, and other relevant entities.

Approach and Data Collection

FRM Demand Overview

The dynamics of FRM demand is set out in Figure 1. The drivers of the scale and nature of tree planting flow from policy, practice, scientific advice and landowner preferences. This is then expressed in the reforestation of lands recently cleared of forest and in efforts to establish new forest cover in agricultural land as forest or what may be described as "Trees Outside Forests", such as hedges and small-scale planting, which may or may not be grant aided. The five key mechanisms of demand highlighted in yellow form the basis of the FRM forecast described in this document. The following data sources provided information to form a consensus view on the nature and scale of these drivers:

    A. Literature review.

    B. Activity levels, past and planned.

    C. Surveys; and

    D. Afforestation policy and targets.
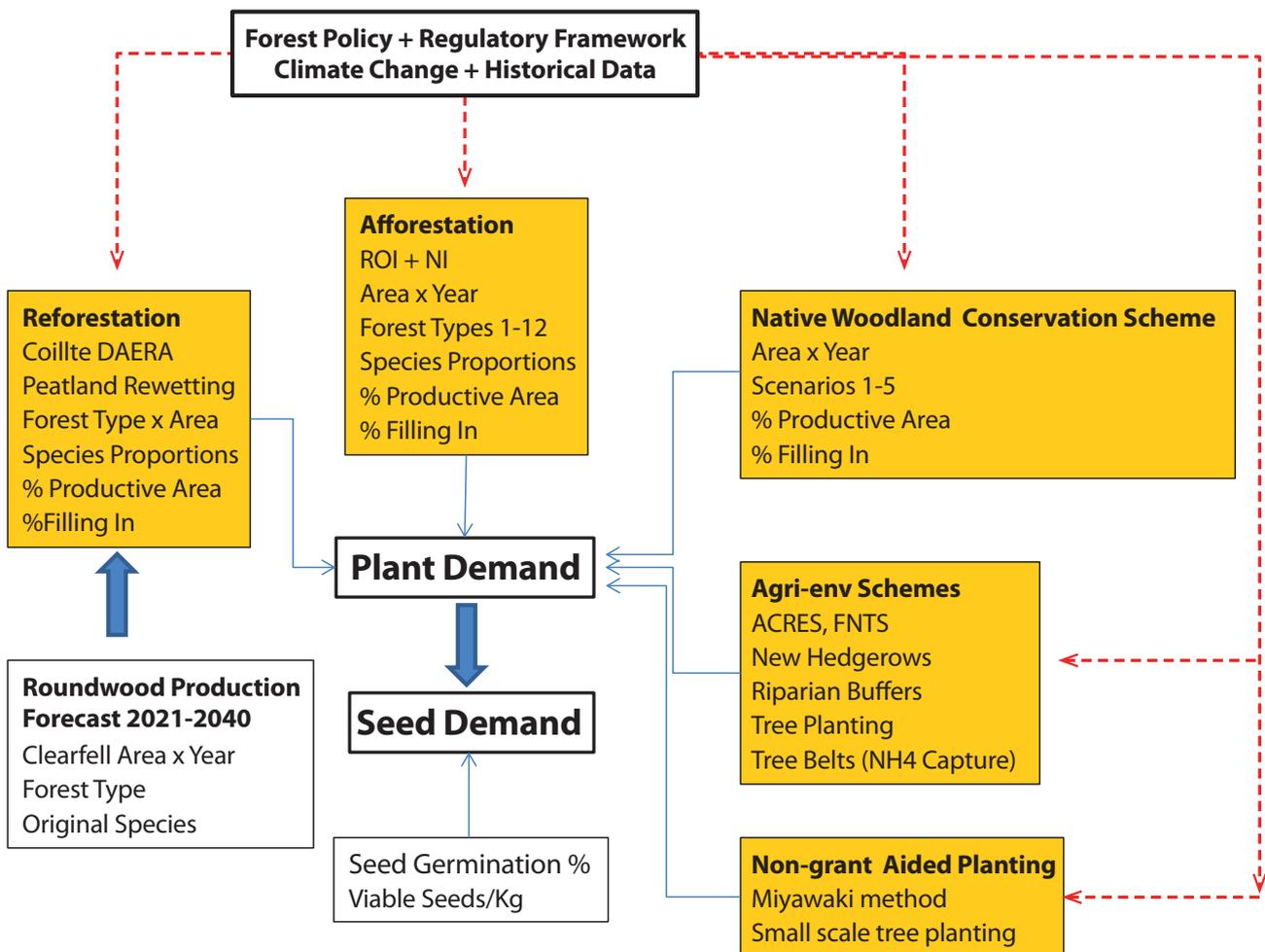
Figure 1: Factors Impacting on FRM Demand

See Table 1 for a list of species abbreviations used throughout the report.

Table 1: Key to species abbreviations used throughout the report

Common Name	Proper Name	Classification	Common Name	Proper Name	Classification
Beech	*Fagus sylvatica*	BE	Austrian pine	*Pinus nigra (var. maritima)*	OC
Common alder	*Alnus glutinosa*	ALD	Coast redwood	*Sequoia sempervirens*	OC
Common dogwood	*Cornus sanguinea*	OB	Corsican pine	*Pinus nigra (var. laricio)*	OC
Common hornbeam	*Carpinus betulus*	OB	Douglas fir	*Pseudotsuga menziesii*	DFIR
Common whitebeam	*Sorbus aria*	OB	European larch	*Larix decidua*	OC
Crab apple	*Malus sylvestris*	OB	Grand fir	*Abies grandis*	OC
Downy birch	*Betula pubescens*	BI	Lawson cypress	*Chamaecyparis lawsoniana*	OC
Field maple	*Acer campestre*	OB	Lodgepole pine	*Pinus contorta*	OC
Grey alder	*Alnus incana*	ALD	Monterey cypress	*Cupressus macrocarpa*	OC
Grey Willow	*Salix cinerea*	OB	Monterey pine	*Pinus radiata*	OC
Hazel	*Corylus avellana*	OB	Norway spruce	*Picea abies*	NS
Holly	*Ilex aquifolium*	OB	Scots pine	*Pinus sylvestris*	SP
Italian alder	*Alnus cordata*	OB	Serbian spruce	*Picea ormorika*	OC
Lime	*Tilia cordata*	OB	Sitka spruce	*Picea sitchensis*	SS
Norway maple	*Acer platanoides*	OB	Western hemlock	*Tsuga heterophylla*	OC
Pedunculate oak	*Quercus robur*	OAK	Western red cedar	*Thuja plicata*	OC
Red alder	*Alnus rubra*	ALD			
Red oak	*Quercus rubra*	OAK			

ACRES Hedging Plant Species		
Common Name	**Proper Name**	**Classification**
Blackthorn	*Prunus spinosa*	Blackthorn
Dog rose	*Rosa canina*	Dog rose
Guelder rose	*Viburnum opulus*	Guelder rose
Hawthorn/Whitethorn	*Crataegus monogyna*	Hawthorn/Whitethorn
Hazel	*Corylus avellana*	Hazel
Holly	*Ilex aquifolium*	Holly
Spindle	*Euonymous europaeus*	Spindle
Alder buckthorn	*Frangula alnus*	Alder buckthorn

Remaining left-table rows:

Common Name	Proper Name	Classification
Rowan	*Sorbus aucuparia*	OB
Sessile oak	*Quercus petraea*	OAK
Silver birch	*Betula pendula*	BI
Southern beech	*Nothofagus procera/Nothofagus obliqua*	OB
Spanish chestnut	*Castanea sativa*	OB
Sycamore	*Acer pseudoplatanus*	OB
Wild cherry	*Prunus avium*	OB
Wild service tree	*Sorbus torminalis*	OB
Yew	*Taxus baccata*	OB

Literature Review

Forest reproductive material (FRM) is continually traded between EU countries. Despite the volume of trade there are few references in the literature dealing specifically with estimating and/or forecasting the demand for FRM or analysing the trade in FRM. A study in 2018[2] showed that on average, 30 million plants and 400,000 kg seeds were annually traded. About 85% of traded plants were Norway spruce. Coniferous FRM trade is dominated by Scandinavian and Baltic countries, while broad-leaved species are extensively traded in Central Europe. FRM trade and production are interconnected on a multinational level, and besides domestic FRM, most countries are also trading with foreign material. The results of a gravity model indicated that among other significant factors the bilateral trade is driven by geographical distance, currency, and forestry contribution to the domestic gross product. As no detailed data on seed transfer were made available by most countries, the total FRM transfer is biased and probably underestimated.

A survey[3] in the UK of the main forest nurseries show that 152 million trees were produced for the 2022-2023 planting season with the top four species being the main conifers used in timber production. At almost half (48.3%) of the total number of trees produced Sitka spruce (*Picea sitchensis*) is by far the predominant tree species, with the second-most grown species (Scots pine) at five times less. Hawthorn (*Crataegus monogyna*) and birch (*Betula pubescens*) are also very high on the list both with 6.4 million plants, emphasising the importance of native hedge planting and native species in the UK landscape.

2   Jansen S., Konrad H. and, Geburek T (2018) Crossing borders – European forest reproductive material moving in trade. Journal of Environmental Management. 2019 Mar 1:233:308-320.

3   https://assets.publishing.service.gov.uk/media/63ff24e0e90e0740d987d8e8/Tree_supply_report_-_data_analysis_and_appendix.pdf

The report also notes that work on estimating demand is underway but proving to be challenging, especially for assessing restock numbers across the UK. Nurseries expressed their frustration at planting targets repeatedly not being fulfilled and argued that overambitious targets confuse the market rather than boost it. Overall, nurseries still have reasonable capacity to expand their production and will do so as the market grows. While knowledge of the upcoming numbers of trees needed for planting (and ideally species) would be very valuable to nurseries, operators feel this needs to be based on concrete figures rather than abstract targets.

A recent study[4] examined the demand for forest plants across forest lands in the Russian federation and found a close correlation between harvesting activity and plant demand. It did not however attempt to forecast future demand.

Large-scale global reforestation goals have been proposed to help mitigate climate change and provide other ecosystem services. To explore reforestation potential in the United States, researchers used GIS analyses, surveys of nursery managers and foresters, and literature synthesis to assess the opportunities and challenges associated with meeting proposed reforestation goals[5]. The results show that the nation's nurseries are currently producing 1.3 billion plants per year, which are mostly going to replace existing trees harvested by timber companies or lost to wildfires. To expand U.S. forests onto an additional 64 million acres identified by the study as ripe for reforestation—and carbon storage—would take another 1.7 billion plants a year. That brings the total needed from nurseries to three billion a year, more than a 130 percent increase.

A 2019 study[6] analysed historical plant sales data and developed econometric models to project future demand for forest plants in Austria. The research considered various forest adaptation strategies and climatic factors, aiming to predict annual regeneration requirements and plant needs under changing environmental conditions. An econometric model including relevant forestry data (logging activity, deadwood, and lumber prices of wood assortments) as well as data on economic development and forest nurseries was formulated to explain historical plant demand and estimate the future demand for forest plants in Austria.

Activity levels, past and planned

In preparation for this analysis data were assembled form a variety of authoritative sources covering:

Past

   A. Afforestation in NI in both state and private sectors, by species.

   B. Afforestation by area by species per Forest Statistics Ireland 2024 (ROI, private).

   C. Afforestation by area by species and planting grant scheme; per Form 2 grant aid returns following afforestation (ROI, private).

   D. National Forest Inventory (NFI) of forests less than 10 years old (ROI).

   E. DAFM Private Forest Estate 2023 shapefile data (ROI, private).

   F. Reforestation in ROI based on felling licence replanting plans, by species.

   G. Reforestation in Coillte based on company records, by species.

   H. Reforestation in NI based on DAERA records:

   I. Reconstitution planting scheme for Ash dieback and other causes, by species – ROI.

   J. Agri-environmental scheme data (ROI).

   K. Agri-environmental scheme data (NI); and

   L. Imports and exports of FRM (ROI).

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4   V Petrov V., I Filinova I. and Bespal'ko A. (2020) Economical issues and organization of forestry nurseries. *IOP Conf. Ser.: Earth Environ. Sci.* 574 012065

5   Fargione et al 2021 Challenges to the Reforestation Pipeline in the United States Front. For. Glob. Change, 04 February 2021 Sec. Forest Management Volume 4 - 2021 | https://doi.org/10.3389/ffgc.2021.629198

6   Braum M. et al. Modelling Austrian seedling demand under different adaptation management strategies. 21st EGU General Assembly, EGU2019, Proceedings from the conference held 7-12 April, 2019 in Vienna, Austria, id.8764

Future

A. Reforestation plans, by species, for Coillte and DAERA lands.

B. Reforestation plans, by species, submitted as part of ROI private sector felling licence process.

C. Draft Nature Restoration Law targets.

D. COFORD All Ireland Roundwood Production Forecast 2021-2040; and

E. Reforestation plans, by species, for private sector NI from DAERA.

These data were used to place the forecast in the context of actual activity and trends in recent years and ensure no single source was used as reference. To compile historical average annual afforestation data by area and species for ROI a triangulation exercise compared the data held in E) the shapefile maintained by DAFM Forest Service of all private forestry, whether grant aided or not; C) data from Form 2 applications confirming forest established following grant aid; B) the DAFM Forest Statistics Ireland, 2024 and D) 2022 National Forest Inventory (ROI). All these sources are consistent, although IFORIS returns indicate a higher number of hectares planted with "Other Conifers", but this due to a difference in species categorisation (see Figure 2 and Figure 3). The exercise confirmed that the areas and species percentage breakdown for afforestation for ROI based on grant schemes is consistent with other sources and covers the majority of forest being planted. In the NFI records for reforestation we see higher use of more diverse conifers and broadleaves.
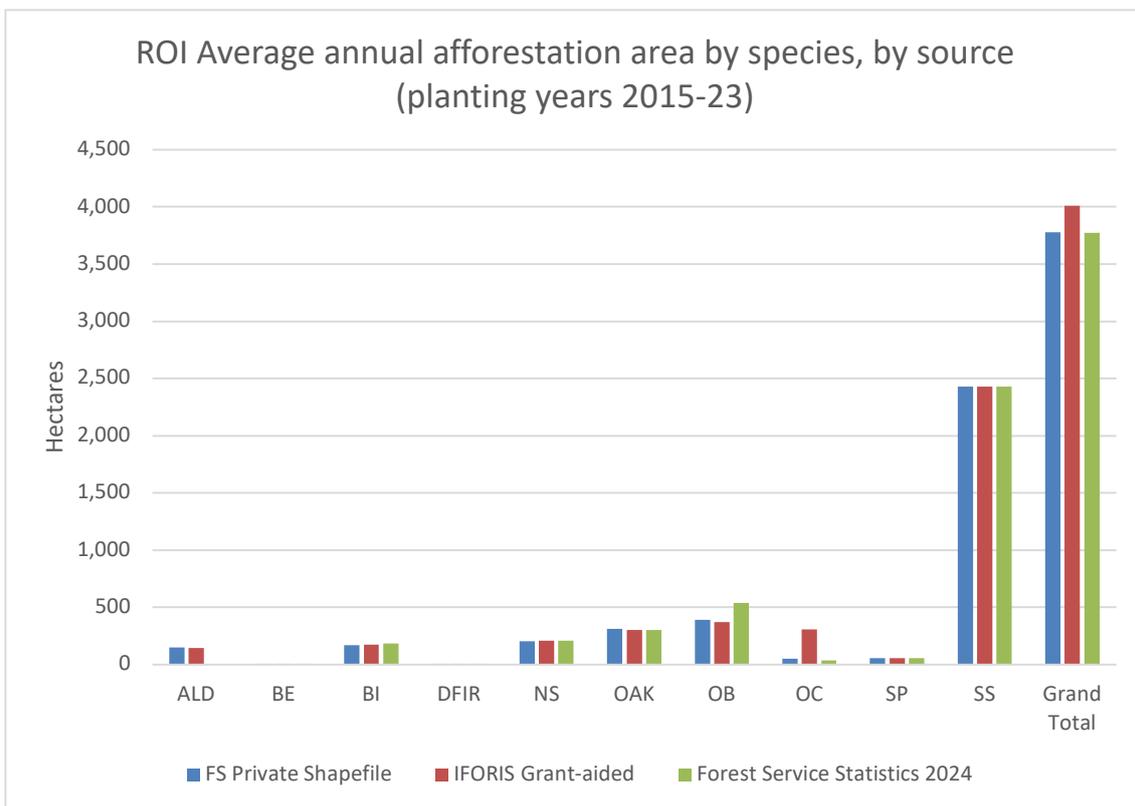
Figure 2: Average annual area of past afforestation ROI, by data source, in hectares (for the period 2015-2023)
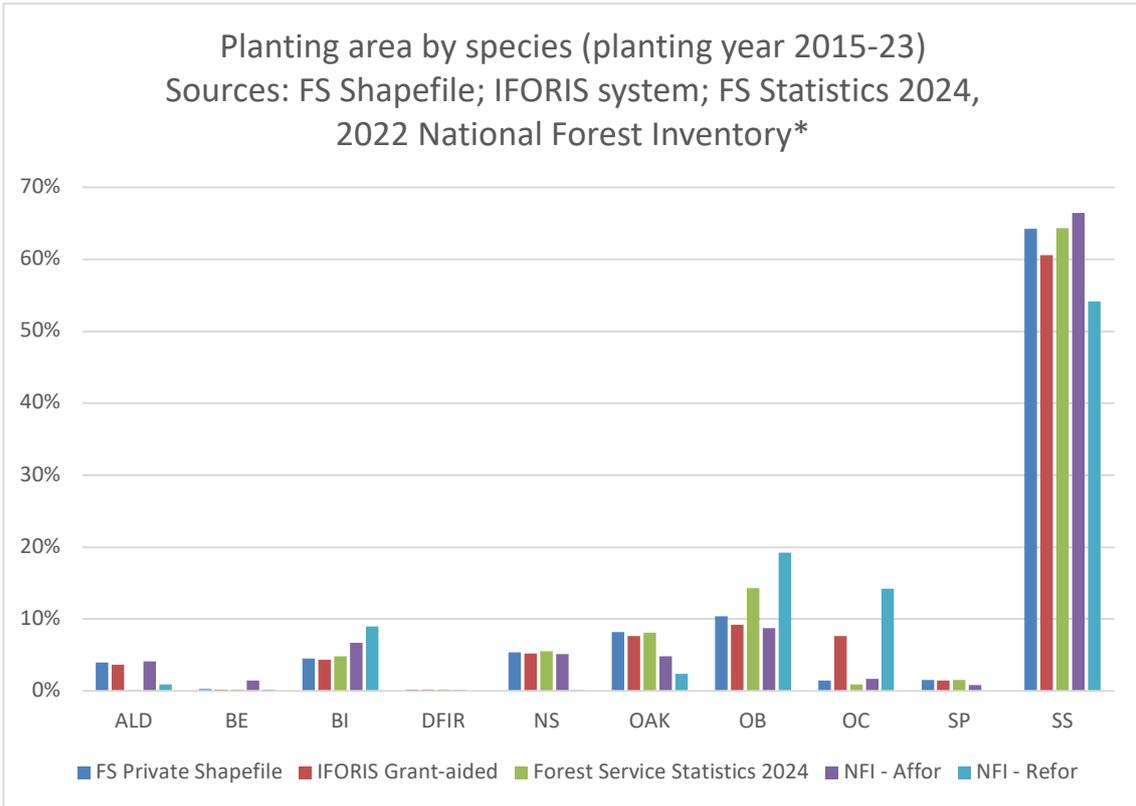
Figure 3: Past afforestation ROI by species, by data source, for the period 2015-2023, as percentage of total hectares.
*NFI data is sourced from 2022 NFI report compiled in 2020-2022 based on stands of age 1-10.
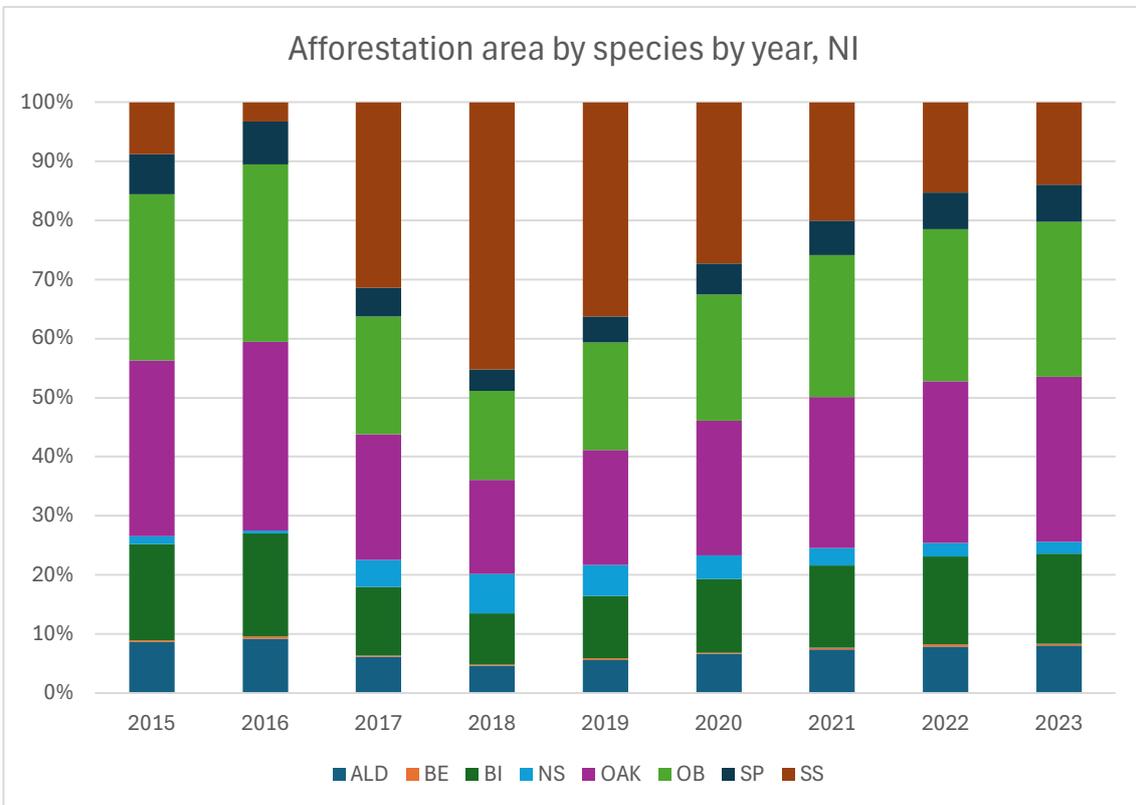
Figure 4: Past afforestation NI by species by percentage area

FRM Demand Surveys

The aim of these surveys was to determine a range of parameters that could serve as a basis for developing a number of scenarios focusing on future demand. Two surveys were developed, one in Survey Monkey[7] which was emailed to the list of approved forestry consultants for DAFM and DAERA and a second in MS Excel emailed to fifteen companies / organisations who account for the majority of afforestation and reforestation activity. The response rate was 80% for the Company survey (12 out of 15 replied) and 18% for the Survey Monkey consultants (27 out of 169 replied). While the 18% response rate is disappointing for the individual survey it is fairly typical, especially given that some approved foresters may not engage in planting works. The higher response rate for the Company survey can be attributed to contacting the targeted respondents directly by telephone in advance and getting assurances for their participation. The results of the Company Survey are provided below and informed the forecast. The results of the Company and individual surveys were combined in the section of this report "Modelling forecast uncertainty with Monte Carlo simulation". Given the predominance of forecast parameters lying outside the scope of the Monte Carlo simulation[8], and the resulting narrow range of variance in the plant forecast, this technique was dropped in favour of following the Company survey results together with policy-based scenarios. The Company survey comprised fourteen questions, eight of which referred to afforestation and six to reforestation (Appendix 1). The noteworthy results from the survey are briefly described below.

Afforestation

The results of the Company survey show that there are contrasting views on the future levels of afforestation in both the Republic of Ireland (ROI) and Northern Ireland (NI). The overall trend in the ROI was for annual afforestation to increase from 2,300 ha in 2025 to 2,700 ha by 2030 and thereafter to an average of 2,850 ha per annum. In NI the view was that annual afforestation would increase from 325 ha in 2025 to 450 ha by 2030 and thereafter averages 500 ha per annum. The open space left unplanted varied from 12% to 30% across respondents and averaged 21%.

Regarding species and forest types in the ROI, there was a significant decrease in mixed high forest (FT12 mainly Sitka spruce) and a small decrease in native forests (FT1) offset by increases in small native forests (NTA1 and NTA2) (Table 2). In contrast, in NI there is a projected increase in the planting of Sitka spruce averaging 65% in the 2031-2035 period with a decrease in oak planting going from 15% in the period 2025-2030 to 5% in the period 2031-2035.

Table 2: Company Survey Results - Afforestation Areas by forest type ROI

Forest Type	Description	Mean 2025-2030	Variance v 2024	Mean 2031-2035	Variance v 2024
FT1	Native forests	35%	-3%	34%	-4%
FT2	Forests for water	1%	0%	1%	0%
FT3	Forests on public lands	2%	1%	3%	2%
FT4	Neighbourwod scheme	1%	1%	1%	1%
FT5	Emergent forests	1%	1%	1%	1%
FT6	Broadleaves - oak and beech	2%	1%	2%	0%
FT7	Diverse broadleaves	2%	1%	2%	1%
FT8	Agroforestry	7%	5%	9%	7%
F10	Continuous cover forestry	4%	2%	6%	4%
FT11	Mixed high forest minor conifers	3%	1%	5%	3%
FT12	Mixed high forest mainly Sitka	39%	-8%	34%	-12%
NTA1	Small native forests	4%	-1%	5%	-1%
NTA2	Small native forests - water protect	1%	0%	3%	1%

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[7] https://www.surveymonkey.com/

[8] Monte Carlo simulation is a computational technique that uses random sampling to model the probability of different outcomes in a process that involves uncertainty. By simulating the combined effect of the variability of multiple input parameters on a complex model allows overall uncertainty to be better understood and quantified using descriptive statistics. This helps in making informed decisions, especially in situations where deterministic calculations are impractical or impossible.

Reforestation

Company survey respondents indicated a gradual decrease in the planting of Sitka spruce on reforestation sites going from 59% to 52.5% for the 2025-2035 period (Table 3). This was matched with a gradual increase in the planting of broadleaves, mainly oak and birch. For reforestation on Coillte land, data was provided directly from Coillte to the project team, both for area and species to be used. For NI DAERA provided reforestation data for the state and private sectors.

Table 3: Survey Results - Species Composition Reforestation (Excluding Coillte)

Year	SS%	NS%	SP%	DFIR%	OC%	OAK%	BI%	ALD%	BE%	OB%	Totals
2025	59.0%	10.1%	2.9%	2.6%	0.9%	6.1%	8.4%	5.8%	0.9%	3.4%	100.0%
2026	59.0%	9.0%	3.1%	2.5%	1.0%	6.8%	9.0%	5.8%	0.6%	3.3%	100.0%
2027	57.3%	8.9%	3.3%	2.5%	1.1%	7.5%	9.6%	6.4%	0.5%	3.0%	100.0%
2028	55.6%	7.5%	3.4%	2.8%	2.0%	8.8%	10.0%	6.4%	0.5%	3.1%	100.0%
2029	56.6%	8.1%	3.4%	2.8%	2.0%	8.1%	9.5%	5.8%	0.5%	3.3%	100.0%
2030	55.1%	8.8%	3.4%	2.8%	2.3%	8.3%	9.6%	5.8%	0.6%	3.4%	99.9%
2031	52.5%	8.3%	3.4%	2.9%	2.3%	9.4%	10.3%	6.6%	0.6%	3.9%	100.0%
2032	52.5%	8.3%	3.4%	2.9%	2.3%	9.4%	10.3%	6.6%	0.6%	3.9%	100.0%
2033	52.5%	8.3%	3.4%	2.9%	2.3%	9.4%	10.3%	6.6%	0.6%	3.9%	100.0%
2034	52.5%	8.3%	3.4%	2.9%	2.3%	9.4%	10.3%	6.6%	0.6%	3.9%	100.0%
2035	52.5%	8.3%	3.4%	2.9%	2.3%	9.4%	10.3%	6.6%	0.6%	3.9%	100.0%

Afforestation policy and targets

ROI

The ROI has an ambitious afforestation policy aimed at significantly increasing its forest cover and leveraging forestry for climate action, biodiversity, and rural development underpinned by the following key policy and strategy elements:

Shared National Vision for Trees, Woods and Forests until 2050: This vision, developed through extensive consultation, emphasises "the right trees in the right places for the right reasons with the right management" to support a sustainable economy, society, and healthy environment. It anticipates forests as a key solution to climate, biodiversity, housing, and health challenges.

Forest Strategy (2023-2030): This strategy provides the overarching framework for forestry development in Ireland. It aligns with broader government and EU policies like the Climate Action Plan and the new Biodiversity Strategy.

Forestry Programme (2023-2027): This is the primary mechanism for implementing the Forest Strategy in the short to medium term. It represents an unprecedented €1.3 billion funding level for Irish forestry. The program aims to increase the national forest estate on both public and private land, delivering benefits for climate change mitigation, biodiversity, wood production, economic development, employment, and quality of life and offers significant financial support to encourage afforestation.

The **Native Tree Area Scheme** also allows for the planting of up to 2 hectares of native woodland without requiring an afforestation license, encouraging small-scale native tree planting.

Overall Forest Cover: The ambition outlined in Ireland's Forest Strategy is to increase forest cover from its current 11% to 18% of the total land area of ROI. This is a significant increase from the roughly 1% cover at the end of the 19th century.

Annual Planting Rates: The Climate Action Plan sets a target of afforesting 8,000 hectares annually to 2030 in ROI.

Species Diversity: ROI's Forest Strategy places an emphasis on increasing species diversity. The forestry programme 2023-2027 includes an annual target of 50% broadleaf species, with a minimum of 20% broadleaved species per application.

Carbon Sequestration: Afforestation is identified as the single largest land-based climate change mitigation measure available to Ireland. The goal is for forests to act as a carbon sink to offset residual emissions, especially from agriculture, and contribute significantly to carbon emissions targets. Coillte aims to grow 100,000 hectares of new forests by 2050, contributing to a carbon sink of 18 million tonnes of CO_2. The Environmental Protection Agency (EPA) has indicated that an afforestation rate of 13,000 to 40,000 hectares per annum may be needed from 2025 to 2050 to offset projected emissions from the agriculture sector.

NI

NI's forest policy, primarily managed by the Forest Service within the Department of Agriculture, Environment and Rural Affairs (DAERA), aims to promote forest expansion and sustainable forestry practices.

The NI Forestry Strategy, "**Northern Ireland Forestry - A strategy for sustainability and growth**", was published in 2006 and aims to achieve a steady expansion of tree cover to 12% of land area by 2050. The current area of woodland in Northern Ireland is 118,482 hectares, which is 8.6% of the land area.

The **Forests for Our Future** afforestation programme was launched in 2020 aiming to plant 18 million trees and create 9,000 hectares of new woodland in Northern Ireland between 2020 and 2030. The Forests for Our Future programme is an important part of the Northern Ireland Executive's multi-decade draft Green Growth Strategy and will be a key driver of the target to achieve 12% woodland cover by 2050. The programme supports woodland creation by providing grant aid to cover associated costs, with funding available through the Small Woodland Grant Scheme and the Forest Expansion Scheme.

New schemes are currently in development to continue delivery of the Forests for Our Future Programme and promote the further expansion of forestry in NI. DAERA intends to increase annual afforestation rates from the current average rate of 460 hectares per year planted since 2021/22 to an annual rate of 600 hectares per year for the remaining three years of the first Climate Action Plan period in 2027. This would create 3,560 hectares of new woodland under the Forests for Our Future programme by 2027, with the intention of increasing afforestation rates from 2027, ensuring Northern Ireland is on the pathway to delivering 9,000 hectares by 2030.

The Climate Change Act (Northern Ireland) 2022 sets an ambitious target to reduce Northern Ireland's greenhouse gas (GHG) emissions to Net Zero by 2050. The draft Climate Action Plan to 2027 incorporates delivery of the Forest for Our Future programme objectives and targets. However, the Climate Change Committee recommendations advise that annual afforestation rates of 3,100 hectares by 2035 and 4,100 hectares are required to contribute to achieving net zero by 2050.

Forecast Methodology

Species list

An analysis of tree species used in recent afforestation and reforestation showed that six tree species including the umbrella category of "additional broadleaves" accounted for more than 98% of annual planting. With the trend in increased broadleaf planting, consideration was given to expanding the list of tree species to be included in the surveys and subsequent demand estimates. However, the range of potential tree species at over forty was too unwieldy and a shorter list of ten species (five conifers and five broadleaves) was decided upon. This included other conifers and other broadleaves categories which would potentially catch the minor tree species (see Table 1).

Treatment of planting categories

Traditionally planting referred simply to afforestation and reforestation. In more recent years there has been the emergence of the voluntary non-grant aided sector with a number of organisations spread across the island of Ireland. In addition, the recent Nature Restoration Law[9] (NRL) requires the ROI to put measures in place to improve various woodland habitats and in ROI the ACRES scheme and its successors are likely to create significant plant demand. Thus, there are five categories of planting to be considered – (1) afforestation in ROI and NI, (2) reforestation in ROI and NI, (3) non-grant aided planting in ROI and NI, (4) planting in ROI related to the Nature Restoration Law and (5) agricultural sector environment schemes in ROI and NI

In NI, the Environmental Farming Scheme under the Northern Ireland Rural Development Programme supported farmers to adopt a series of actions on farms to enhance biodiversity and increase carbon sequestration such as planting new hedges, agroforestry and establishing riparian buffers. Going forward, as the Environmental Farming Scheme is replaced by the Farming with Nature Package in 2025, delivery of carbon sequestration and biodiversity benefits on farmland will continue to be important outcomes for agri-environment schemes. The Farming with Nature Package, being developed as part of the Sustainable Agriculture Programme, will focus on actions to reverse the trends in nature decline by creating and restoring habitats and improving biodiversity in line with the goals and targets of the draft NI Nature Recovery (Biodiversity) and Peatland Strategies. The Farming with Nature Transition Scheme is currently open for applications and offers funding for actions such as planting new hedges and farmland trees and establishing riparian buffers. DAERA does not publish annual statistics on the take-up of the various hedge laying and tree planting measures. However, between 2018 and 2024, EFS participants established or enhanced approximately 1,000km of hedgerow and planted approximately 500,000 trees[10]. This equates to annual creation/enhancing of 160 km of hedgerow and the planting of 85,000 trees.

1. Afforestation

DAFM forest statistics for afforestation over the past decade (2015-2023) indicates a clear trend with the reduction in the use of Sitka spruce (see Figure 5) and the increase in broadleaf planting of native species (excluding ash). Given the relatively recent introduction of the new DAFM Forestry Programme (2023-2027) and the diverse afforestation strategy it represents, an approach was adopted to estimate the level of uptake of each of the fourteen forest types and then translate this into species level estimates. This was compared with the survey results which confirmed the relative proportions of the main species and indicated changes in the species mix over the study period. An initial estimate of the species mix for afforestation was based on the analysis of recent planting and the planting under the fourteen forest types in the DAFM afforestation program (Figure 5) and data supplied by DAFM and DAERA.

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[9]   Regulation (EU) 2024/1991 of the European Parliament and of the Council of 24 June 2024 on nature restoration and amending Regulation (EU) 2022/869

[10]   https://www.daera-ni.gov.uk/news/application-window-efs-higher-opens-daera
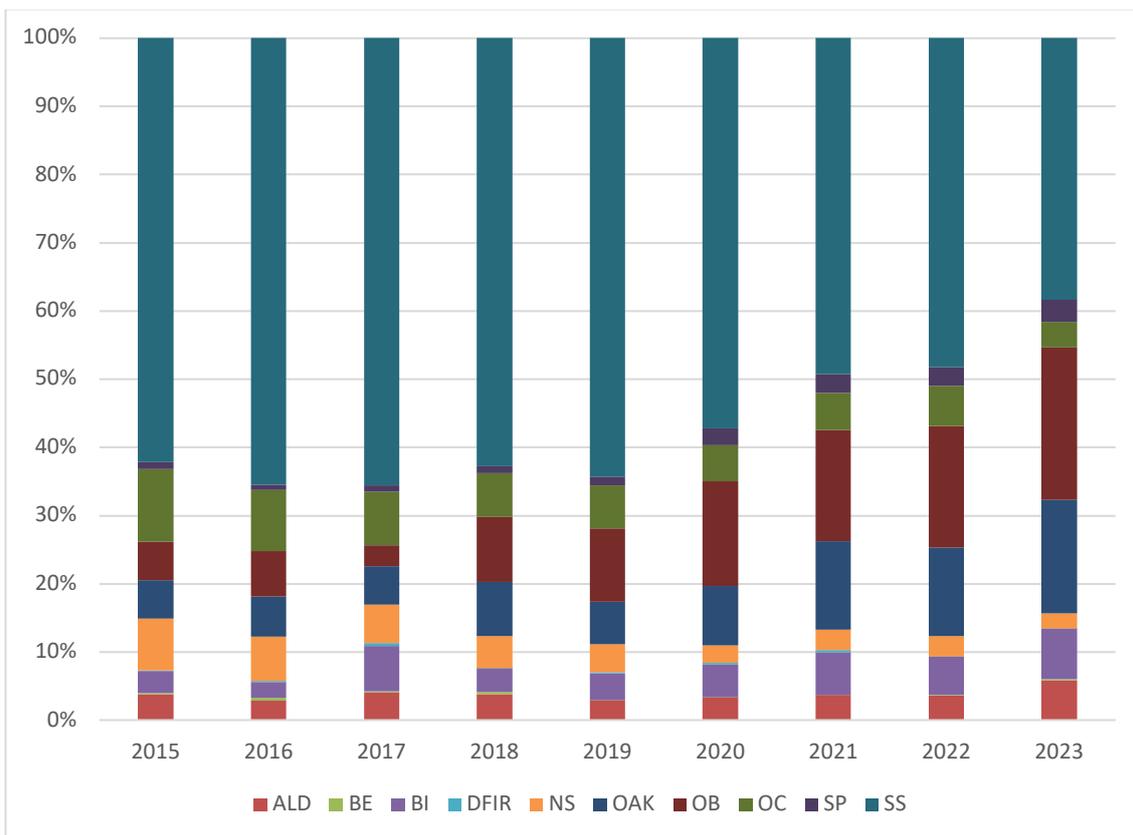
Figure 5: ROI Past afforestation by species, by percentage (source: DAFM grant-aid records)

Based on the company survey results, this trend of a reduction in the use of Sitka spruce and an increase in broadleaf planting of native species (excluding ash) will continue over the study period except for NI which had a small number of respondents which indicated an increase in Sitka spruce and conifer planting with a decrease in broadleaves.

Table 4: Species Proportion by Afforestation Forest Type ROI

Forest Type	SS%	NS%	SP%	DFIR%	OC%	OAK%	BI%	ALD%	BE%	OB%	Description	SPH
FT1	0%	0%	5%	0%	0%	60%	10%	10%	0%	15%	Native forests	2,500
FT2	0%	0%	5%	0%	0%	60%	10%	10%	0%	15%	Forests for water	2,500
FT3	0%	0%	5%	0%	0%	50%	10%	10%	5%	20%	Forests on public lands	2,500
FT4	0%	5%	15%	0%	10%	30%	5%	10%	5%	20%	Neighbourwod scheme	2,500
FT5	0%	0%	5%	0%	0%	60%	10%	10%	0%	15%	Emergent forests	1,000
FT6	0%	0%	0%	0%	0%	60%	10%	5%	20%	5%	Broadleaves - oak and beech	2,500
FT7	0%	0%	0%	0%	0%	30%	10%	5%	10%	45%	Diverse broadleaves	2,500
FT8	0%	0%	10%	0%	10%	20%	20%	10%	5%	25%	Agroforestry	500
F10	45%	10%	5%	5%	15%	10%	0%	0%	0%	10%	Continuous cover forestry	2,500
FT11	0%	20%	15%	10%	35%	5%	5%	5%	0%	5%	Mixed high forest minor conifers	2,500
FT12	70%	10%	0%	0%	0%	0%	5%	5%	0%	10%	Mixedhigh forest mainly Sitka	2,500
NTA1	0%	0%	5%	0%	0%	60%	10%	10%	0%	15%	Small Native forests	2,500
NTA2	0%	0%	5%	0%	0%	60%	10%	10%	0%	15%	Small Native forests - water protect	2,500
NRL-R	0%	0%	5%	0%	0%	60%	10%	10%	0%	15%	NRL Restoration oak woodland	1,000
NRL-A	0%	0%	5%	0%	0%	60%	10%	10%	0%	15%	NRL new oak woodland	2,500
NRL-R	0%	0%	5%	0%	0%	15%	20%	45%	0%	15%	NRL Restoration alluvial woodland	1,000
NRL-A	0%	0%	5%	0%	0%	15%	20%	45%	0%	15%	NRL new alluvial woodland	2,500

2. Reforestation

The All Ireland roundwood production forecast 2021-2040[11] was used to provide an initial estimate for reforestation areas apart from Coillte, over the period 2025-2035. Coillte's new strategic vision for forestry announced in July 2022 foresees the redesign of 30,000 hectares of peatland forests by 2050 through a programme of rewetting or rewilding. The reforestation areas for Coillte were therefore reduced by 350 ha per year to allow for this restoration. The reforestation areas in ROI may be impacted by Storm Éowyn in January 2025, particularly in the private sector. Coillte has stated that all of the windblow within the Coillte estate will be processed by the end of 2026. The estimate for the private sector windblow to be processed is two to three years based on current contracting infrastructure and timber markets. Data supplied directly by Coillte was used to estimate the species mix in its reforestation programme. Reforestation shows a higher percentage of Sitka spruce and conifers than afforestation (see Figure 6 and Table 6). However, the trend over the study period is for a reduction in conifers matched by an increase in broadleaves.

There was no firm indication in the survey that Storm Éowyn would impact the levels of reforestation by Coillte or in the private sector and so no adjustments were made on this basis.
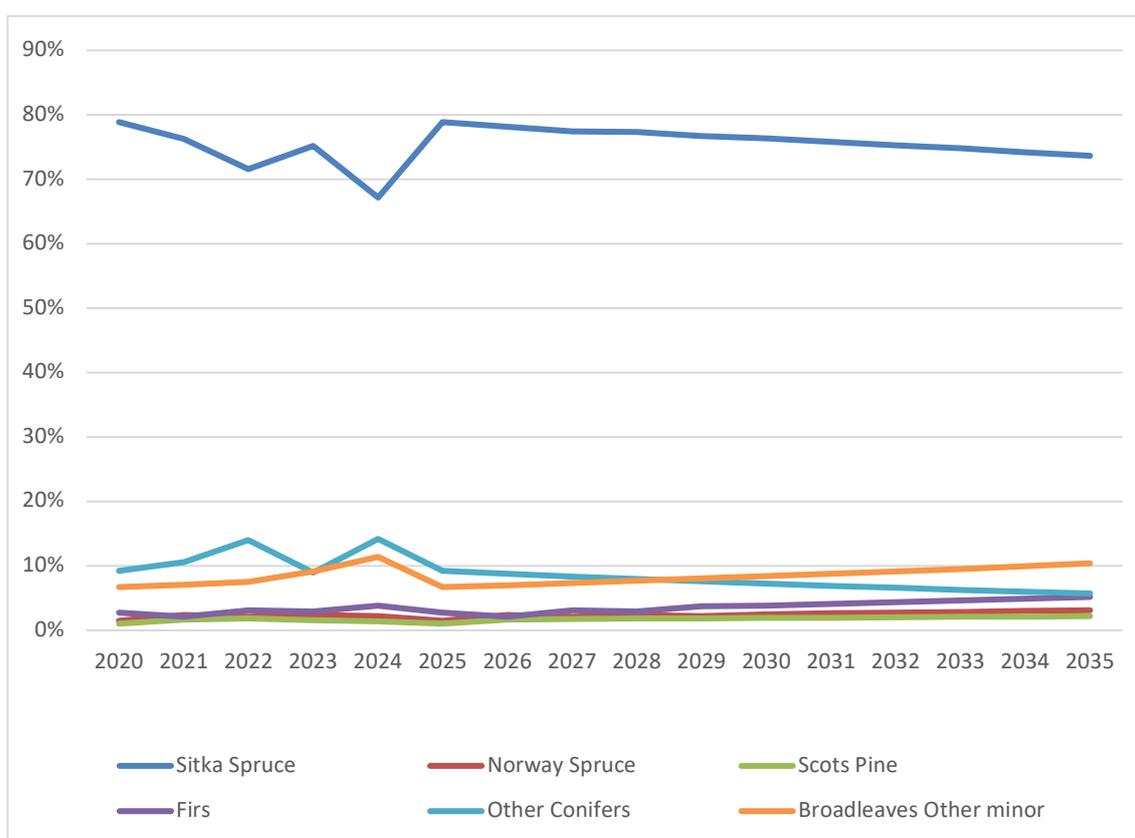
Figure 6: Coillte past (2020-2024) and future (2025-2035) reforestation, by % species

The survey results were used to estimate the species mix for the private sector ROI (see Table 4). An analysis of felling licence applications validated the survey results. DAERA records were used to estimate the species mix for NI private sector afforestation.

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[11] COFORD 2021. All Ireland Roundwood Production Forecast 2021-2040. COFORD, Kildare St., Dublin.

Table 5: Species Composition Private Sector ROI Reforestation - Survey

Year	SS%	NS%	SP%	DFIR%	OC%	OAK%	BI%	ALD%	BE%	OB%
2025	59.0%	10.1%	2.9%	2.6%	0.9%	6.1%	8.4%	5.8%	0.9%	3.4%
2026	59.0%	9.0%	3.1%	2.5%	1.0%	6.8%	9.0%	5.8%	0.6%	3.3%
2027	57.3%	8.9%	3.3%	2.5%	1.1%	7.5%	9.6%	6.4%	0.5%	3.0%
2028	55.6%	7.5%	3.4%	2.8%	2.0%	8.8%	10.0%	6.4%	0.5%	3.1%
2029	56.6%	8.1%	3.4%	2.8%	2.0%	8.1%	9.5%	5.8%	0.5%	3.3%
2030	55.1%	8.8%	3.4%	2.8%	2.3%	8.3%	9.6%	5.8%	0.6%	3.4%
2031	52.5%	8.3%	3.4%	2.9%	2.3%	9.4%	10.3%	6.6%	0.6%	3.9%
2032	52.5%	8.3%	3.4%	2.9%	2.3%	9.4%	10.3%	6.6%	0.6%	3.9%
2033	52.5%	8.3%	3.4%	2.9%	2.3%	9.4%	10.3%	6.6%	0.6%	3.9%
2034	52.5%	8.3%	3.4%	2.9%	2.3%	9.4%	10.3%	6.6%	0.6%	3.9%
2035	52.5%	8.3%	3.4%	2.9%	2.3%	9.4%	10.3%	6.6%	0.6%	3.9%

Table 6: Species Composition Coillte Reforestation

Year	SS%	NS%	SP%	DFIR%	OC%	OAK%	BI%	ALD%	BE%	OB%
2025	78.8%	1.5%	1.0%	2.8%	9.2%	1.0%	1.7%	3.7%	0.0%	0.3%
2026	78.1%	2.4%	1.7%	2.1%	8.7%	1.0%	1.7%	3.8%	0.0%	0.3%
2027	77.5%	2.1%	1.7%	3.1%	8.3%	1.1%	1.8%	4.0%	0.0%	0.4%
2028	77.3%	2.3%	1.8%	2.9%	8.0%	1.2%	1.9%	4.2%	0.0%	0.4%
2029	76.7%	2.1%	1.8%	3.7%	7.6%	1.2%	2.0%	4.4%	0.0%	0.4%
2030	76.3%	2.5%	1.9%	3.8%	7.2%	1.3%	2.1%	4.6%	0.0%	0.4%
2031	75.8%	2.6%	1.9%	4.0%	6.9%	1.3%	2.2%	4.8%	0.0%	0.4%
2032	75.3%	2.7%	2.0%	4.3%	6.5%	1.4%	2.3%	5.0%	0.0%	0.5%
2033	74.8%	2.8%	2.0%	4.6%	6.2%	1.4%	2.5%	5.2%	0.0%	0.5%
2034	74.2%	2.9%	2.1%	4.9%	5.9%	1.5%	2.6%	5.5%	0.0%	0.5%
2035	73.6%	3.1%	2.2%	5.1%	5.6%	1.6%	2.7%	5.7%	0.0%	0.5%

3. Non-grant Aided Planting

Non-grant aided planting is defined as any planting of forest tree species undertaken in non-forest areas outside of the DAFM or DAERA afforestation schemes. In the past such planting was undertaken by individuals, local authorities and tidy towns groups but there are now over twenty voluntary groups involved in organised non-grant aided planting in Ireland. With demand from this source now estimated to exceed 500,000 plants it is important to include this source of demand in the FRM forecast. The approach was to first identify the organisations, where possible determine the average number of trees planted in recent years and whether the organisations had plans to increase this over the study period. Some organisations collect their own seed and grow their own plants e.g. Hometree[12] while others rely to varying extent on tree donations e.g. Easy Treesie[13]. All of the non-grant aided planting focuses on native species planted either in small densely planted plots (Miyawaki method[14]) or groupings of plants with relatively few planting along traditional lines. While non-grant aided planting uses a wide range of native species the approach was to estimate the percentage species by the main (most common) tree species (Table 7). Based on interviews with the organisations involved in the sector, demand is likely to increase to over 1 million within ten years (see Figure 7). Given the variety of planting densities and site types involved, the estimate is kept to plant numbers, rather than area. None of the organisations involved in the sector were included in the company survey and so there is little risk of double counting.

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[12] https://www.hometree.ie/

[13] https://easytreesie.com/

[14] The Miyawaki method involves densely planting a wide variety of native tree and shrub species into specially prepared, enriched soil. This accelerated approach aims to quickly establish biodiverse, multi-layered forests that are self-sustaining within a few years, mimicking natural forest regeneration.

Table 7: Species Composition - Non-grant Aided Planting

Year	SS%	NS%	SP%	DFIR%	OC%	OAK%	BI%	ALD%	BE%	OB%
2025	0%	0%	5%	0%	5%	40%	20%	5%	5%	20%
2026	0%	0%	5%	0%	5%	40%	20%	5%	5%	20%
2027	0%	0%	5%	0%	5%	40%	20%	5%	5%	20%
2028	0%	0%	5%	0%	5%	40%	20%	5%	5%	20%
2029	0%	0%	5%	0%	5%	40%	20%	5%	5%	20%
2030	0%	0%	5%	0%	5%	40%	20%	5%	5%	20%
2031	0%	0%	5%	0%	5%	40%	20%	5%	5%	20%
2032	0%	0%	5%	0%	5%	40%	20%	5%	5%	20%
2033	0%	0%	5%	0%	5%	40%	20%	5%	5%	20%
2034	0%	0%	5%	0%	5%	40%	20%	5%	5%	20%
2035	0%	0%	5%	0%	5%	40%	20%	5%	5%	20%
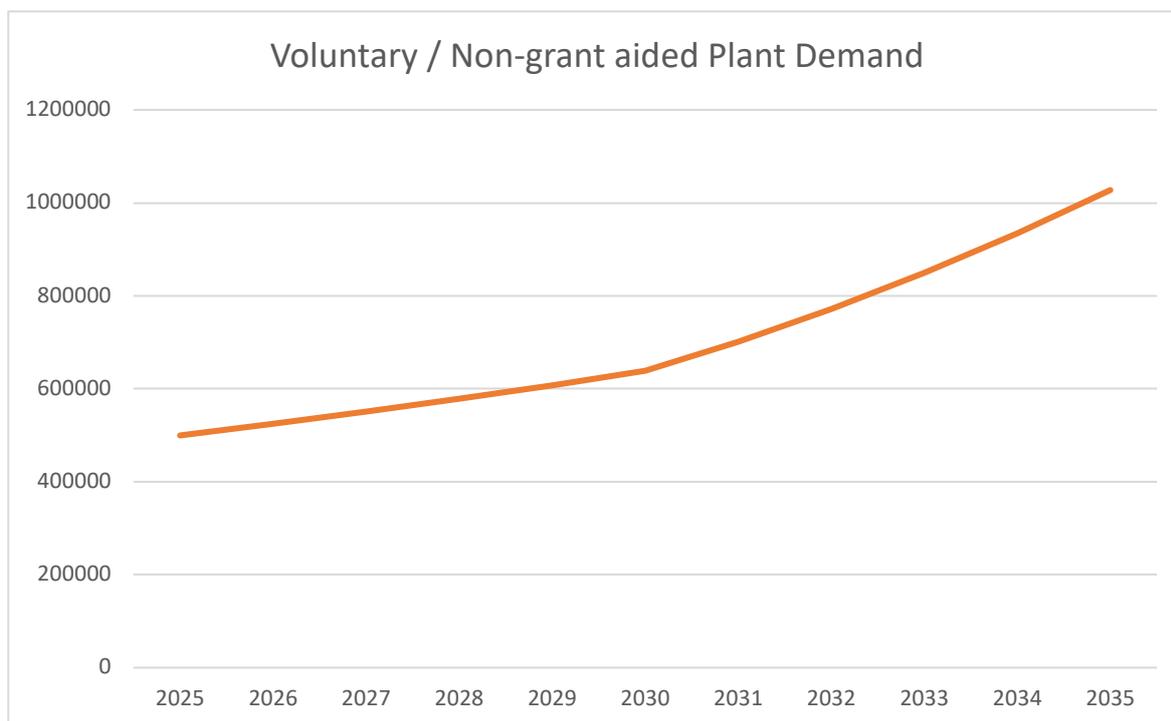
Figure 7: Estimated non-grant aided plant demand

4. Implementation of Nature Restoration Law

An Advisory Committee on Nature Restoration was established to support the development of ROI's Nature Restoration Plan (NRP) in April 2024[15] and Ireland is required to have measures in place to improve Annex I habitats to good condition in the following phases: 30% by 2030, 60% by 2040, 90% by 2050 and to have measures in place to re-establish Annex I habitats to Favourable Reference Area: 30% by 2030, 60% by 2040 and 100% by 2050 and the Government has announced a €3.15 billion Climate and Nature Fund to support implementation of all measures under the NRL. The draft targets below have been calculated based on the 2025 Article 17 report which was recently submitted to the European Commission (see Table 8). A derogation under Article 4(5) of the NRL of up to 10% of the 91A0 and 91E0 re-establishment targets is under consideration.

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[15] https://www.gov.ie/en/department-of-housing-local-government-and-heritage/press-releases/ministers-welcome-approval-of-the-nature-restoration-law-in-the-eu-environment-council/

Table 8: Draft NRL Targets

Habitat type	Units	2030	2040	2050
91A0 Old sessile oak woods				
Condition improvement targets		**30%**	**60%**	**90%**
Area with measures in place (cumulative)	ha	1,042	2,083	3,125
Re-establishment targets		**30%**	**60%**	**100%**
Area with measures in place (cumulative)	ha	10,353	20,705	34,509
91D0 Bog woodland				
Condition improvement targets		**30%**	**60%**	**90%**
Area with measures in place (cumulative)	ha	21	43	64
Re-establishment targets		**30%**	**60%**	**100%**
Area with measures in place (cumulative)	ha	0	0	0
91E0 Alluvial forests				
Condition improvement targets		**30%**	**60%**	**90%**
Area with measures in place (cumulative)	ha	325	650	975
Re-establishment targets		**30%**	**60%**	**100%**
Area with measures in place (cumulative)	ha	5,226	10,453	17,421
91J0 Yew woodland				
Condition improvement targets		**30%**	**60%**	**90%**
Area with measures in place (cumulative)	ha	23	46	69
Re-establishment targets		**30%**	**60%**	**100%**
Area with measures in place (cumulative)	ha	15	29	49

In the model developed, the NRL planting areas are included in the overall ROI annual planting target of 8,000 ha.

5. Agri-Climate Environmental Schemes

Republic Of Ireland

Past agri-environmental schemes such as REPS and GLAS have included provisions for hedge planting, providing financial incentives to farmers for establishing new hedges or managing existing ones (see Table 9). The current Agri-Climate Environmental Scheme (ACRES) provides incentives to farmer to not only plant hedges but also for a range of tree planting including (a) planting tree belts for ammonia capture, (b) tree planting in riparian buffer zones and (c) native tree planting. In addition, tree planting is supported under Non-Productive Investments (NPIs) which are small-scale environmental actions available to farmers in the ACRES Co-operation (CP) stream which support nature-friendly management of farms. These include (a) hedge laying, (b) planting trees and (c) planting small native woodlands.

Tree planting under ACRES was originally meant to close on 31st March 2024 but due to difficulties in sourcing plants the deadline was extended to 31st March 2025. There is no replacement scheme to support tree planting and /or planting of hedges. However, under the current Common Agricultural Policy (CAP), hedgerows are recognized as landscape features and are protected under Good Agricultural and Environmental Condition (GAEC) standards.

Table 9: Planting under Agri-Environmental Schemes in ROI

Scheme	Years	Km Hedge	Km/Year	Tree Planting (Numbers)
REPS 1994-2004	8	4,100	513	1,702,972
AEOS 2010-2014	5	1,322	264	464,910
GLAS 2014-2018	4	1,183	296	1,617,516
EFS 2018 - 2024	6	1,000	167	500,000
Totals		**7,605**		**4,285,398**

Methodology

Step 1: Identify the categories of planting eligible under ACRES

The categories of planting are set out in the details of the ACRES scheme and are (a) planting of new hedges, (b) tree planting in riparian zones, (c) planting tree belts for ammonia capture and (d) native tree planting. In addition, under the NPIs there is (a) planting of new hedgerows, (b) planting trees, (c) planting of small woodland 160 trees 0.05 ha and (d) planting of small woodland 300 trees 0.09 ha.

Step 2: Identify the main species for each planting category.

The lists of eligible species under each planting category are set out in the ACRES scheme details. The eligible species for the planting of new hedges is shown in Table 10.

Table 10: Eligible Species - Planting of New Hedges

Common Name	Proper Name
Blackthorn	Prunus spinosa
Dog-rose	Rosa canina
Guelder rose	Viburnumopulus
Hawthorn/Whitethorn	Crataegus monogyna
Hazel	Corylus avellana
Holly	Ilex aquifolium
Spindle	Euonymous europaeus
Alder Buckthorn	Frangula alnus

In 2024, DAFM announced that due to the difficulties in the sourcing of Whitethorn plants that applicants would no longer have to meet the Irish Provenance or Irish Origin requirement when purchasing Whitethorn plants from DAFM registered professional operators.

Step 3: Estimate the annual planting for each planting category.

The data from DAFM was analysed and this showed the number of trees planted up to March 31st, 2025, under each of the four planting categories. There is no new replacement scheme for these planting categories nor is there any certainty that any new agri-environmental scheme will include the planting of new hedges. However, in the past planting of hedges was included in the previous schemes i.e. REPS (1994-2010), Agri-environment Option Scheme (AEOS) (2010-2014) and GLAS (2014-2018).

The current CAP (2023-2027) will be replaced with a new CAP (2028-2032). The European Commission is expected to publish proposals for the post 2027 CAP in mid-2025. The current expectation is that this will include: -

Eco-Schemes and Agri-Environmental Measures: Eco-schemes are a core part of the current CAP and are expected to continue and expand in the next CAP. Planting trees**,** hedgerows, and shelterbelts is often funded under these schemes to: Increase biodiversity, provide carbon sequestration, reduce soil erosion and flooding

Nature Restoration and Biodiversity Objectives: The upcoming CAP will align more closely with the EU's Biodiversity Strategy and Nature Restoration Law. This includes stronger incentives for: planting and maintaining native hedgerows, creating agroforestry systems and enhancing landscape features that benefit wildlife

Carbon Farming and Climate Actions: Planting trees and hedgerows contributes to carbon storage and climate resilience. The EU may expand carbon farming initiatives, where farmers are paid for actions like tree and hedgerow planting that capture carbon.

New Financial Tools: The post-2027 CAP may introduce results-based payments: Farmers receive more support based on environmental outcomes (e.g. species diversity in hedgerows). Transition packages: For farms planting trees and hedgerows as part of a shift to more sustainable practices.

Based on this and on discussions with ACRES officials it is considered likely that any new scheme will include the planting of new hedges and tree planting, but the levels of planting are uncertain.

This report assumes that a new scheme would commence in 2029 under CAP (2028-2032) and continue to 2032. Thereafter the expectation is that a new five year CAP (2032-2037) will be introduced, and this will continue to support the planting of hedges and trees for the reasons outlined above.

DAFM also provided the summary of planting under the NPIs. This was analysed and a view taken that these small measures will continue until the end of ACRES and under any replacement scheme at more or less the same levels of planting (see Table 11).

Table 11: Estimated Future Agri-Environmental Planting

	Time Period		
Planting Category	**2025-2027**	**CAP (2028-2032)**	**CAP (2033-2037)**
Planting new hedgerows(km)	-	3,996,739	3,996,740
Planting trees in riparian buffer zones (No. trees)	42,153	42,154	42,155
Planting belts to capture ammonia from farmyards (ha)	7.4	7.4	7.4
Tree planting (No.trees)	151,060	151,061	151,062
NPI planting new hedgerows (km)	508,436	508,437	508,438
NPI planting tees (No. trees)	7,390	7,390	7,390
NPI riparian margin tree planting (No. trees)	1,965	1,965	1,965
NPI small woodland 160 trees 0.05ha (ha)	15	15	15
NPI small woodland 300 trees 0.09ha (ha)	15	15	15

Step 4: Estimate the species mix

Based on experience to date circa 80% or more of plants used in the planting of new hedges were whitethorn. This was assumed to continue and the balance of 20% was spread across the remaining eligible tree species (Table 12).

For riparian planting the main species are alder and willow accounting for 56% and the balance spread across the remaining eligible species. For tree planting the main species assumed are alder, Scots pine, birch and oak accounting for 77% of planting.

The assumptions about species mix are a best estimate based on previous planting.

Table 12: Species Mix – Agri-environmental Schemes

Species	Group	Hedges	Riparian Planting	Ammonia Capture	Tree Planting	NPI Hedge	NPI Riparian	NPI Small Woodland 160	NPI Small Woodland 300	Hedges	Tree Planting
					ACRES ROI					FNTS NI	
Alder	OB		40.0%	20.0%	20.0%		40.0%	25.0%	25.0%		20.0%
Alder Buckthorn	ALD	0.5%				0.5%					
Bay Willow	OB		5.0%				5.0%				
Blackthorn	OB	7.0%				7.0%				12.5%	
Dog Rose	OB	3.0%				3.0%				6.0%	
Downy Birch	BI		5.0%	15.0%	12.0%		5.0%				15.0%
English Whitebeam	OB										2.0%
Goatwillow	OB		12.5%	5.0%			12.5%				
Greywillow	OB		12.5%	5.0%			12.5%				
Gueder Rose	OB	3.0%				3.0%				3.0%	
Hawthorn	OB	78.0%				78.0%				60.0%	
Hazel	OB	4.0%		5.0%	7.0%	4.0%		5.0%	5.0%	12.5%	5.0%
Holly	OB	4.0%			6.0%	4.0%		5.0%	5.0%	6.0%	
Pedunculate oak	OAK		5.0%	10.0%	10.0%		5.0%	15.0%	15.0%		12.5%
Rowan	OB			5.0%	5.0%			1.0%	1.0%		3.0%
Scots pine				15.0%	15.0%			15.0%	15.0%		15.0%
Sessile oak	OAK		5.0%	10.0%	10.0%		5.0%	15.0%	15.0%		12.5%
Silver birch	BI		15.0%	10.0%	10.0%		15.0%	15.0%	15.0%		15.0%
Spindle	OB	0.5%				0.5%					
Strawberry Tree	OB							1.0%	1.0%		
Wild cherry	OB				5.0%			3.0%	3.0%		
Totals		**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Northern Ireland

In NI, the Environmental Farming Scheme (EFS) supported farmers to adopt a series of actions on farms to enhance biodiversity and increase carbon sequestration such as planting new hedges, agroforestry and establishing riparian buffers. Under the scheme farmers planted circa 1,000km of hedgerow and planted approximately 500,000 trees[16]. This equated to the annual creation/enhancement of 160 km of hedgerow and the planting of 85,000 trees.

The EFS was replaced by the Farming with Nature Transition Scheme (FNTS) in 2025 and this includes a similar series of actions including planting of new hedges, agroforestry and establishing riparian buffers.

A similar approach to ACRES outlined above was used to estimate future levels of activity which were based on the average annual performance under the EFS (Table 13). The species mix for hedgerows and tree planting was estimated based on the eligible species and guidance provided by the DAERA website[17].

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[16] https://www.daera-ni.gov.uk/news/application-window-efs-higher-opens-daera

[17] https://www.daera-ni.gov.uk/articles/farming-nature-transition-scheme

Table 13: Estimated NI Agri-environmental Planting

Year	Hedge Planting (km)	Tree Planting (No Trees)
2025	83.5	41,667
2026	167	83,333
2027	167	83,333
2028	167	83,333
2029	167	83,333
2030	167	83,333
2031	167	83,333
2032	167	83,333
2033	167	83,333
2034	167	83,333
2035	167	83,333
Totals	**1,754**	**875,000**

Area and filling-in adjustments

The initial estimate for the numbers of plants required for filling in for afforestation and reforestation for conifers and broadleaves were based on the findings of the recent study into the economic contribution of forestry to the Irish economy[18]. The survey results, while indicating a range of values for filling in requirements for both conifers and broadleaves, provided an average which was broadly similar to the initial estimate. The survey results were used in the development of the forecast model.

An initial estimate for values for open space in afforestation and reforestation was based on the requirement set out in the various planting and environmental guidelines and on the Consultant's experience in the sector. The survey results while indicating a range of values for percentage open space requirements for both afforestation and reforestation provided an average which was broadly similar to the initial estimate. The survey results were used in the development of the forecast model.

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[18]   Forestry Services Ltd., Phillips, H. 2022. Economic activity and employment levels in the Irish forest sector. COFORD, Dublin, Ireland.

Development of a demand model

This end-user tool was developed in MS Excel to incorporate the different categories of planting, range of species, planting parameters and levels of planting. A prototype demand model was developed which comprised four components:

6. **Data worksheet** which collates all of model inputs into a format suitable for subsequent analysis. It holds data relating to planting areas, species mix and planting category.

7. **Look up tables** which provide the default areas for planting, the species mix for each forest type, the species mix for non-grant aided planting, and the species mix for reforestation for both ROI and NI.

8. **Pivot table**[19] **worksheet** which contains all of the data in a summary format by scenario and planting category.

9. **Output tables–** a series of fifteen worksheets which provide the estimated plant demand by species, planting category, location and year and the planting area by year.

Table 14: Model Output Tables

Geographic area	Description	Units	Formatted	Link to Sheet
ALL	Areas, as per survey & scenarios. ACRES and NGA area is indicative only and based on total seedlings and a set conversion ratio of 3,333 trees per hectare.	Hectares	YES	p1a - GROSS AREA'!A1
ALL	As above, with area adjusted for affor and refor % unplanted areas as per survey. ACRES and NGA area is indicative only and based on total seedlings and a set conversion ratio of 3,333 trees per hectare.	Hectares	YES	p1b - NET AREA'!A1
ALL	Seedling demand, '000 by all sub-categories	000 Seedlings	YES	p2a - ALL SEEDLING'!A1
ALL	Seedling demand, '000 by type (AFOR,REFOR,NRL,ACRES,NGA)	000 Seedlings	YES	p2b - ALL x TYPE'!A1
ALL	Seedling demand, '000 by SCENARIO	000 Seedlings		p2c - ALL x SCENARIO'!A1
ALL	Seedling demand, '000 by SCENARIO full detail	000 Seedlings		p2d - DETAIL x SCENARIO'!A1
ROI	Seedling demand, '000 for ROI full detail	000 Seedlings		p3a - ROI SEED'!A1
ROI	Seedling demand, '000 for ROI by forest / non-forest	000 Seedlings		p3b - ROI SEED X FOREST'!A1
ROI	Seedling demand, '000 for ROI by forest type	000 Seedlings		p3c - ROI SEED x TYPE'!A1
ROI	Seedling demand, '000 for ROI - forest only	000 Seedlings		p3d - ROI FOREST SEEDLINGS'!A1
ROI	Seedling demand, '000 for ROI - AFOR only, by forest type	000 Seedlings	YES	p3e - ROI SEED x FTYPE'!A1
ROI	Seedling demand, '000 for ROI - non forest	000 Seedlings		p5b - ROI NON FOREST SEEDLINGS'!A1
NI	Seedling demand, '000 for NI full detail	000 Seedlings		p4a - NI SEED'!A1
NI	Seedling demand, '000 for NI by forest type	000 Seedlings		p4b - NI SEED x TYPE'!A1
ROI	Detailed ACRES results	000 Seedlings	YES	Calculated Acres'!A1
ALL	Customiseable Pivot			Pivot - ALL'!A1

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19 A pivot table is an MS Excel tool that allows one to summarize, analyse, and explore large datasets interactively. It enables the user to quickly rearrange, group, and aggregate data to reveal trends, patterns, and insights that might otherwise be hidden.

Scenarios

Using the developed model, a number of demand scenarios were simulated for this report. The reader may interpret the likelihood of these scenarios arising based on their own judgement. This in turn will provide the context for any subsequent supply side analysis. The scenarios are:

- Scenario 1: Sector based - Baseline scenario
- Scenario 2: As Baseline except that afforestation reaches 50% of policy target
- Scenario 3: As Baseline except that afforestation reaches 100% of policy target

Results of the Baseline scenario are presented in the Results section of this document while all three scenarios are presented in the main report.

There are a number of assumptions underlining the three Scenarios including (a) compliance with the planting requirements (tree species and plant spacing) for the various afforestation / agri-environmental schemes and felling licences, (b) the continuation of State-aid at levels to meet planting targets over the forecast period, (c) no significant change in the regulatory environment that would impact negatively on either afforestation or reforestation levels and (d) sufficient capacity to administer the planting licensing and approval requirements

Baseline Scenario

This scenario reflects the views of the sector on likely demand and is based on the company survey, past performance and on discussions with forest companies and others within the forest sector. The Baseline scenario represents an afforestation policy achievement level of approximately 33% in ROI and 36% in NI.

Afforestation:

- Use the area estimates in the company survey for the ROI and the area estimates provided by DAERA for NI; and
- Use the species estimates from the Company survey to estimate the species mix for each forest type in ROI and analysis of previous planting provided by DAERA for NI species mix.

Table 15: Baseline Planting Area (ha) data (excluding agri-environmental schemes)

Year	Private Sector					Public sector		NRL				Grand Total
	Afor ROI	NGA	Afor NI	Refor ROI	Refor NI	Refor ROI	Refor NI	Restore Sessile Oak	Planting Sessile Oak	Restore Alluvial Woodland	Planting Alluvial Woodland	
2025	2,310	150	460	5,105	276	5,650	976	-	-	-	-	14,927
2026	2,044	158	460	5,476	276	5,649	686	63	621	20	314	15,765
2027	2,244	165	460	6,081	276	5,647	647	63	621	20	314	16,537
2028	2,600	174	460	6,308	276	5,621	737	63	621	20	314	17,192
2029	2,711	182	460	7,006	276	5,636	760	63	621	20	314	18,048
2030	2,733	191	460	7,787	276	5,636	693	63	621	20	314	18,793
2031	2,857	211	460	8,995	276	5,636	1,015	31	311	10	157	19,958
2032	2,857	232	460	10,494	276	5,644	1,312	31	311	10	157	21,783
2033	2,857	255	460	9,620	276	5,651	1,232	31	311	10	157	20,859
2034	2,857	280	460	10,328	276	5,660	967	31	311	10	157	21,337
2035	2,857	308	460	10,986	276	5,668	967	31	311	10	157	22,031
Totals	28,931	2,306	5,060	88,186	3,036	62,098	9,991	469	4,659	146	2,352	207,233

Reforestation:

- Use the clearfell areas from the All-Ireland forecast (2021-2040) to estimate the reforestation areas for the private sector ROI and the species mix from the company survey.

- Use the areas provided by DAERA for the State and private sectors in NI and also for the species mix.

- Use the data provided directly by Coillte to estimate future reforestation areas as this is more recent than the data included in the All-Ireland forecast.

- Use the reforestation species mix provided by Coillte as this is considered more reliable than the survey data; and

- Include an allowance in the Coillte and state NI reforestation for the rewetting of peatlands.

NRL Planting:

- Assume 30% achievement of the Condition Improvement and Re-Establishment targets for Old sessile oak woodland (Habitat code 91A0) and Alluvial forests (91E0) provided by NPWS (Table 8). As targets for 91D0 Bog woodland and 91J0 Yew woodland reach less than 100 hectares, respectively, by 2050, these have not been taken into consideration.

Non-grant Aided Planting:

- Use the estimates for the number of plants and for the species mix based on discussions with a sample number of organisations. Hectare area equivalents are obtained by dividing the number of plants by a nominal plant density of 3,333 per hectare.

Planting Parameters:

- Use the results of the Company survey for the average percentage of each site left unplanted in afforestation and reforestation and the numbers of additional plants required for replacement of failures in conifer and broadleaf planting in afforestation and reforestation.

Agri-environmental Schemes

- Use the estimated areas in Table 16 for ROI which are based on continuation of similar levels over the current CAP.

- Use the areas provided by DAERA for NI; and

- Use species mix based on guidelines issued by DAFM for ROI and DAERA for NI.

Table 16: Baseline Data Agri-environmental Schemes

Year	Hedge Planting (km)	Riparian Planting (No Trees)	Ammonia Capture (ha)	Tree Planting (No Trees)	NPI Hedge (km)	NPI Riparian (No Trees)	NPI Woodland 160 sph	NPI Woodland 300 sph	Hedge Planting (km)	Tree Planting (No Trees)
	ROI								**NI**	
2025	0	0	7	0	100	1,000	26	34	84	41,667
2026	0	0	7	0	100	2,500	42	70	167	83,333
2027	0	0	7	0	100	2,500	42	70	167	83,333
2028	150	25,000	7	0	50	2,500	40	70	167	83,333
2029	350	25,000	7	150,000	100	2,500	40	70	167	83,333
2030	350	25,000	7	150,000	100	2,500	40	70	167	83,333
2031	350	25,000	7	150,000	100	2,500	40	70	167	83,333
2032	350	25,000	7	150,000	100	2,500	40	70	167	83,333
2033	200	15,000	7	150,000	100	2,500	40	70	167	83,333
2034	350	25,000	7	150,000	100	2,500	40	70	167	83,333
2035	350	25,000	7	150,000	100	2,500	40	70	167	83,333
Totals	**2,450**	**190,000**	**77**	**1,050,000**	**1,050**	**26,000**	**430**	**734**	**1,754**	**875,000**

Policy Achievement Scenarios 2 and 3

Scenarios 2 and 3 represent increased performance in achieving policy targets and are intended to inform the sector and policy makers on the level of plant production required in order to meet policy targets. See section "Afforestation policy and targets" for details of targets established for ROI and NI. For these scenarios, in ROI the area under NRL is counted toward the achievement of the afforestation target.

Although outside the scope of this report, which is focussed on the demand-side only, increasing plant production levels to match the plant demand for Scenario 2 and 3 will undoubtedly be challenging.

Only the following parameters were changed under these scenarios while all others were held fixed:

- – ROI Afforestation
- – NI Afforestation
- – ROI Nature Restoration Law

See Figure 7 for a comparison for ROI of the categories with hectare estimates (Afforestation, reforestation, NRL) for each scenario. The category "Fixed" shows the hectares outside of the scenario simulation (Reforestation) and illustrates how dominant reforestation is in the forecast. See Figure 8 for a comparison for NI of the categories with hectare estimates (Reforestation and afforestation). Reforestation is outside the scenario simulations and so afforestation is the only varying parameter.
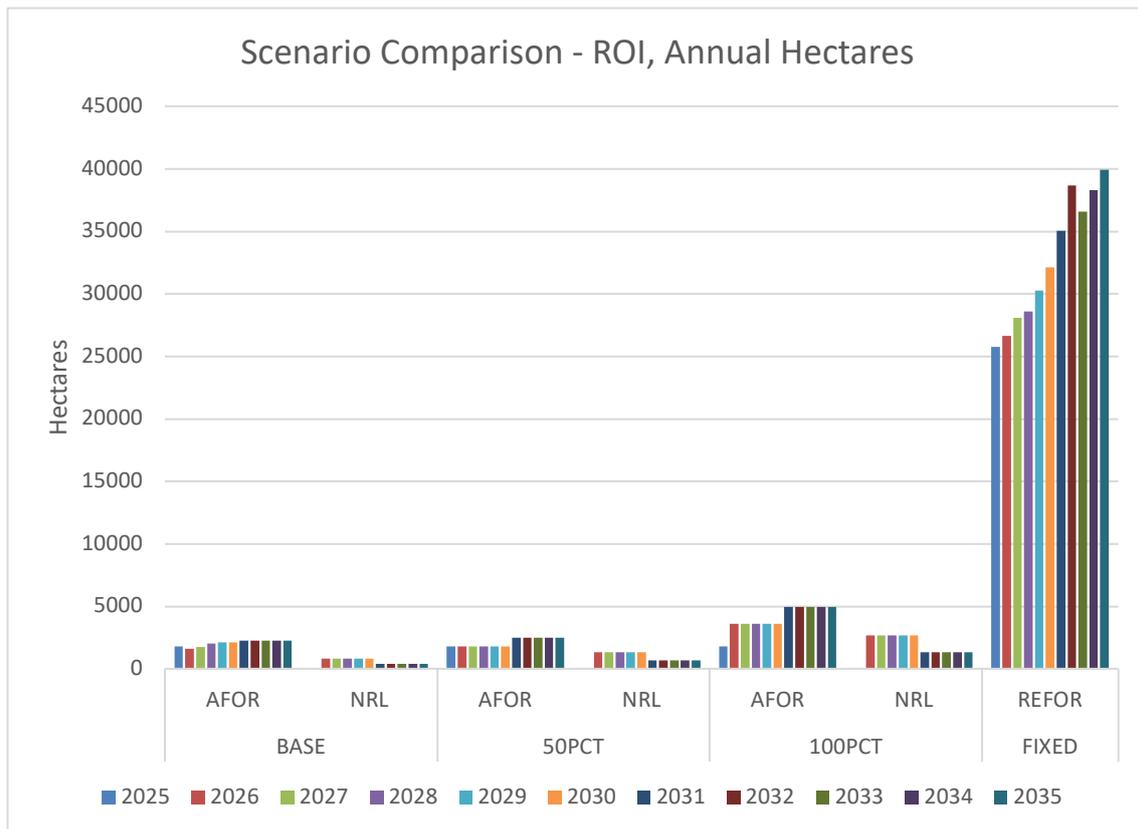
Figure 8: Scenario comparison ROI (Hectares)
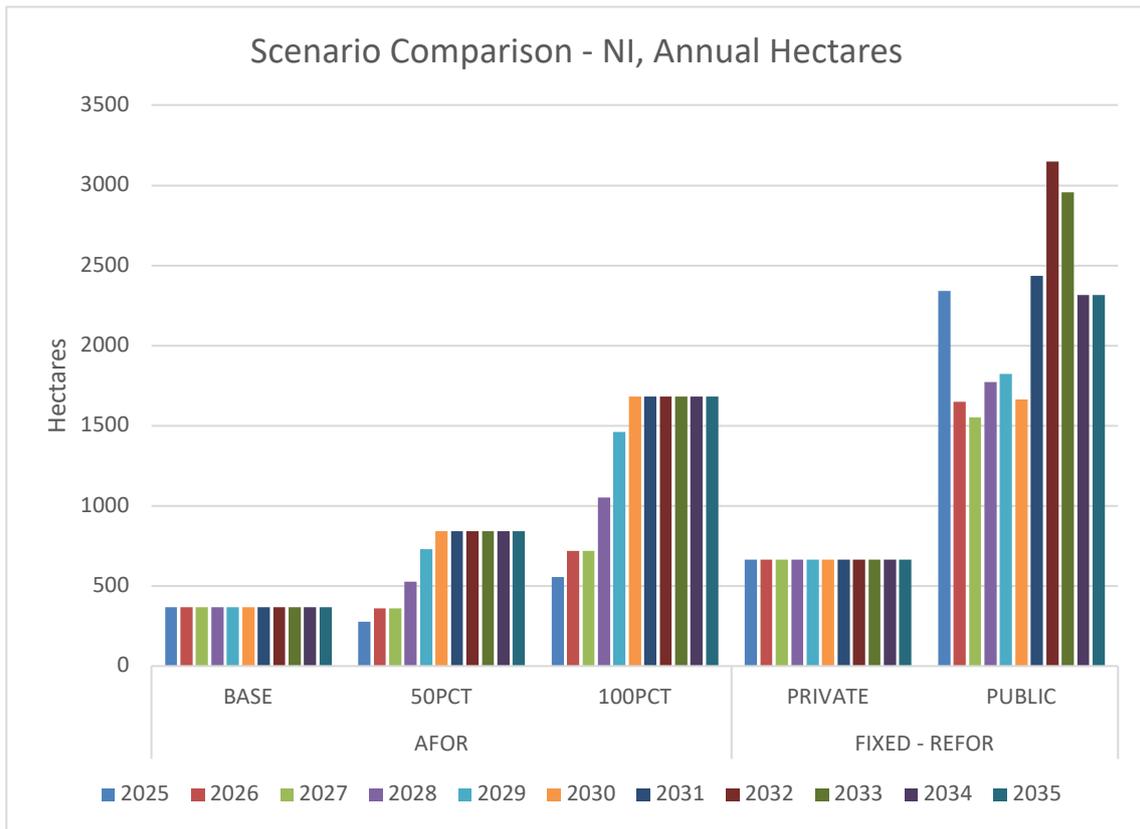
Figure 9: Scenario comparison NI (Hectares)

Demand for Seed

An estimate of the amount of seed necessary to meet the FRM Forecast is useful for planning purposes as seed collection is a vital process. The source used to convert raised plants back to the quantum of seed needed for the main tree species was a COFORD publication "Sustainable Development and Conservation of Forest Genetic Resources 2020-2030"[20] and for some of the lesser used and hedge species, a 2024 report commissioned by Coillte, None-So-Hardy and Fermoy Woodland nurseries.[21] The information was also validated against additional international sources.[22,23] See Table 17 and Table 18 from these two species groupings and sources, respectively.

Table 17: Saleable Plants per Kg Seed - Main Forest Species

	SS	NS	SP	DFIR	OC	OAK	BI	ALD	BE	OB
Saleable plants per Kg	100,000	40,000	40,000	25,000	N/A	80	45,000	30,000	800	N/A
Kg per '000 plants	0.01	0.03	0.03	0.04	N/A	12.5	0.02	0.03	1.25	N/A
Kg per 100k plants	1.0	2.5	2.5	4.0	N/A	1250.0	2.2	3.3	125.0	N/A

Source: Sustainable Development and Conservation of Forest Genetic Resources 2020-2030

Table 18: Saleable Plants per Kg Seed - Main Hedge Species

	Blackthorn	Dog Rose	Gulder Rose	Hawthorn	Haze	Holly	Rowan	Spindle	Wild Cherry
Saleable plants per Kg	700	53,000	11,976	1,700	198	12,000	15,000	3,788	1,333
Kg per '000 plants	1.43	0.02	0.08	0.59	5.04	0.08	0.07	0.26	0.75
Kg per 100k plants	143.00	1.89	8.35	58.82	504.00	8.33	6.67	26.4	75.00

Source: Tree Seed 2024: Projected requirements and availability

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20 COFORD, 2020. Sustainable Development and Conservation of Forest Genetic Resources 2020-2030. COFORD, Kildare St., Dublin 2. https://www.coford.ie/media/coford/content/35769COFORDbodyreportweb211220.pdf

21 Tree Seed 2024: Projected requirements and availability. Derek Fenton July 2024.

22 Gordon A 1992. Seed manual of forest trees, Bulletin 63. For. Comm. UK HMSO. Forest Nursery Practice. Bulletin 111, For. Comm. UK HMSO. Forestart Price List 2024-2025 – https://www.forestart.co.uk/wp-content/uploads/2024/08/Price-List-2024-2025.pdf

23 Table of Standard Adjustment Coefficients, OECD Forest Seed and Plant Scheme

Preliminary Results - Baseline

Under the Baseline scenario, overall plant demand increases from 34.31 million plants in 2025 to 52.72 million in 2035. In ROI plant demand increases from 30.03 million plants in 2025 to 47.93 million in 2035 (Table 19) while in NI the plant demand shows an initial decrease followed by an increase to a maximum of 5.56 million plants in 2032 and then a decease to 4.79 million plants for the remaining two years.

Table 19: Baseline Scenario - Estimated Plant Demand ('000)

	SS	NS	SP	DFIR	OC	OAK	BI	ALD	BE	OB	All
ROI											
2025	18,188	1,594	638	677	1,384	2,515	1,643	1,528	164	1,700	30,031
2026	18,425	1,626	863	592	1,340	3,521	2,074	2,067	137	2,016	32,661
2027	19,023	1,713	943	758	1,328	3,856	2,326	2,282	133	2,088	34,450
2028	19,241	1,630	1,009	786	1,424	4,313	2,503	2,401	144	2,732	36,183
2029	20,282	1,836	1,078	938	1,413	4,468	2,647	2,475	155	4,145	39,438
2030	20,979	2,130	1,147	988	1,449	4,663	2,854	2,604	187	4,237	41,237
2031	21,821	2,291	1,222	1,135	1,511	4,738	3,130	2,739	205	4,314	43,106
2032	23,537	2,585	1,346	1,267	1,549	5,082	3,497	2,990	228	4,458	46,541
2033	22,450	2,439	1,291	1,247	1,469	4,933	3,334	2,889	220	3,646	43,917
2034	23,229	2,586	1,356	1,328	1,471	5,120	3,526	3,031	233	4,477	46,356
2035	23,941	2,723	1,418	1,407	1,473	5,298	3,707	3,163	246	4,553	47,928
NI											
2025	1,673	167	191	144	292	579	427	230	27	546	4,275
2026	1,333	137	154	8	272	446	267	138	6	1,424	4,185
2027	1,360	44	129	16	258	448	273	138	5	1,427	4,097
2028	1,397	83	209	-	245	477	296	147	5	1,434	4,293
2029	1,484	109	122	12	319	446	280	138	5	1,430	4,345
2030	1,343	155	142	9	247	446	277	138	5	1,437	4,198
2031	1,840	152	210	74	304	479	269	138	13	1,423	4,902
2032	2,459	165	222	26	361	474	279	138	5	1,430	5,558
2033	2,136	206	285	43	366	482	295	138	5	1,424	5,381
2034	1,870	145	160	9	279	490	273	138	5	1,427	4,794
2035	1,870	145	160	9	279	490	273	138	5	1,427	4,794
Grand total											
2025	19,860	1,761	829	821	1,676	3,094	2,070	1,757	191	2,246	34,306
2026	19,759	1,764	1,016	599	1,612	3,967	2,341	2,205	143	3,440	36,846
2027	20,383	1,756	1,073	773	1,586	4,304	2,599	2,420	138	3,515	38,547
2028	20,639	1,713	1,219	786	1,669	4,789	2,799	2,548	148	4,166	40,475
2029	21,766	1,946	1,200	950	1,733	4,915	2,927	2,612	160	5,575	43,783
2030	22,322	2,285	1,288	997	1,696	5,108	3,132	2,742	192	5,674	45,435
2031	23,661	2,444	1,432	1,208	1,815	5,217	3,400	2,877	218	5,737	48,009
2032	25,996	2,750	1,568	1,293	1,910	5,556	3,776	3,128	233	5,887	52,098
2033	24,586	2,645	1,576	1,290	1,835	5,416	3,629	3,027	225	5,069	49,298
2034	25,099	2,731	1,516	1,337	1,750	5,609	3,798	3,168	238	5,904	51,150
2035	25,811	2,868	1,578	1,415	1,751	5,787	3,979	3,301	251	5,979	52,722

In terms of tree species, at an all-Ireland level Sitka spruce continues to be the main species with demand increasing from 19.86 million in 2025 to 25.81 million in 2035. Although Sitka spruce is the main driver for demand, as a proportion of all species it declines gradually over the period from 58.2% in 2025 to 47.2% over the forecast period. The demand for oak almost doubles from 3.09 million in 2025 to 5.79 million in 2035. Alder and other broadleaves show similar increases to oak.

Table 20: Plant Demand ('000) by Planting Category - ROI

	SS	NS	SP	DFIR	OC	OAK	BI	ALD	BE	OB	All
AFOR											
2025	1,419	244	156	26	99	1,474	371	352	43	640	4,825
2026	1,256	216	138	23	88	1,304	329	311	38	567	4,268
2027	1,379	237	152	25	97	1,431	361	342	42	622	4,686
2028	1,597	274	176	29	112	1,658	418	396	48	720	5,428
2029	1,665	286	183	31	117	1,729	436	413	50	751	5,660
2030	1,679	288	185	31	118	1,743	439	416	51	757	5,706
2031	1,618	297	212	42	160	1,840	456	432	49	797	5,903
2032	1,618	297	212	42	160	1,840	456	432	49	797	5,903
2033	1,618	297	212	42	160	1,840	456	432	49	797	5,903
2034	1,618	297	212	42	160	1,840	456	432	49	797	5,903
2035	1,618	297	212	42	160	1,840	456	432	49	797	5,903
REFOR											
2025	16,768	1,350	461	651	1,263	821	1,161	1,115	99	425	24,116
2026	17,170	1,411	596	569	1,230	954	1,315	1,183	76	440	24,943
2027	17,644	1,476	662	732	1,208	1,152	1,531	1,367	68	452	26,291
2028	17,644	1,356	702	756	1,287	1,371	1,642	1,422	70	486	26,738
2029	18,617	1,551	762	907	1,271	1,416	1,730	1,447	78	556	28,336
2030	19,300	1,842	828	957	1,304	1,586	1,928	1,572	108	637	30,062
2031	20,204	1,994	927	1,092	1,322	2,039	2,324	1,927	125	830	32,782
2032	21,920	2,288	1,048	1,225	1,357	2,359	2,678	2,175	146	961	36,156
2033	20,833	2,141	989	1,204	1,273	2,185	2,503	2,075	134	889	34,226
2034	21,611	2,288	1,051	1,286	1,271	2,340	2,679	2,208	144	952	35,831
2035	22,323	2,426	1,109	1,364	1,269	2,486	2,843	2,336	153	1,012	37,322
NGA											
2025	-	-	21	-	21	174	87	22	22	87	433
2026	-	-	22	-	22	182	91	23	23	91	455
2027	-	-	23	-	23	191	96	24	24	96	477
2028	-	-	25	-	25	201	100	25	25	100	501
2029	-	-	26	-	26	211	106	26	26	106	526
2030	-	-	27	-	27	222	111	28	28	111	553
2031	-	-	30	-	30	244	122	30	30	122	608
2032	-	-	33	-	33	268	134	34	34	134	669
2033	-	-	36	-	36	295	147	37	37	147	736
2034	-	-	40	-	40	324	162	41	41	162	809
2035	-	-	44	-	44	357	178	45	45	178	890
NRL											
2025	-	-	-	-	-	-	-	-	-	-	-
2026	-	-	107	-	-	996	294	477	-	331	2,206
2027	-	-	107	-	-	996	294	477	-	331	2,206
2028	-	-	107	-	-	996	294	477	-	331	2,206
2029	-	-	107	-	-	996	294	477	-	331	2,206
2030	-	-	107	-	-	996	294	477	-	331	2,206
2031	-	-	53	-	-	498	147	239	-	166	1,103
2032	-	-	53	-	-	498	147	239	-	166	1,103
2033	-	-	53	-	-	498	147	239	-	166	1,103
2034	-	-	53	-	-	498	147	239	-	166	1,103
2035	-	-	53	-	-	498	147	239	-	166	1,103

		SS	NS	SP	DFIR	OC	OAK	BI	ALD	BE	OB	All
ACRES												
	2025	-	-	-	-	-	47	24	39	-	548	658
	2026	-	-	-	-	-	86	44	72	-	587	790
	2027	-	-	-	-	-	86	44	72	-	587	790
	2028	-	-	-	-	-	87	49	81	-	1,093	1,310
	2029	-	-	-	-	-	117	82	111	-	2,400	2,710
	2030	-	-	-	-	-	117	82	111	-	2,400	2,710
	2031	-	-	-	-	-	117	82	111	-	2,400	2,710
	2032	-	-	-	-	-	117	82	111	-	2,400	2,710
	2033	-	-	-	-	-	116	80	107	-	1,647	1,950
	2034	-	-	-	-	-	117	82	111	-	2,400	2,710
	2035	-	-	-	-	-	117	82	111	-	2,400	2,710
ROI Total												
	2025	18,188	1,594	638	677	1,384	2,515	1,643	1,528	164	1,700	30,031
	2026	18,425	1,626	863	592	1,340	3,521	2,074	2,067	137	2,016	32,661
	2027	19,023	1,713	943	758	1,328	3,856	2,326	2,282	133	2,088	34,450
	2028	19,241	1,630	1,009	786	1,424	4,313	2,503	2,401	144	2,732	36,183
	2029	20,282	1,836	1,078	938	1,413	4,468	2,647	2,475	155	4,145	39,438
	2030	20,979	2,130	1,147	988	1,449	4,663	2,854	2,604	187	4,237	41,237
	2031	21,821	2,291	1,222	1,135	1,511	4,738	3,130	2,739	205	4,314	43,106
	2032	23,537	2,585	1,346	1,267	1,549	5,082	3,497	2,990	228	4,458	46,541
	2033	22,450	2,439	1,291	1,247	1,469	4,933	3,334	2,889	220	3,646	43,917
	2034	23,229	2,586	1,356	1,328	1,471	5,120	3,526	3,031	233	4,477	46,356
	2035	23,941	2,723	1,418	1,407	1,473	5,298	3,707	3,163	246	4,553	47,928

Reforestation is consistently the main driver for plant demand in ROI over the forecast period (Table 20) representing 76.2% of total plant demand in comparison with afforestation including NRL planting which accounts for 17.3%.

Table 21: Plant Demand ('000) by Planting Category - NI

	SS	NS	SP	DFIR	OC	OAK	BI	ALD	BE	OB	All
AFOR											
2025	157	23	65	-	-	273	149	79	3	257	1,007
2026	157	23	65	-	-	273	149	79	3	257	1,007
2027	157	23	65	-	-	273	149	79	3	257	1,007
2028	157	23	65	-	-	273	149	79	3	257	1,007
2029	157	23	65	-	-	273	149	79	3	257	1,007
2030	157	23	65	-	-	273	149	79	3	257	1,007
2031	157	23	65	-	-	273	149	79	3	257	1,007
2032	157	23	65	-	-	273	149	79	3	257	1,007
2033	157	23	65	-	-	273	149	79	3	257	1,007
2034	157	23	65	-	-	273	149	79	3	257	1,007
2035	157	23	65	-	-	273	149	79	3	257	1,007
REFOR											-
2025	1,515	144	125	144	292	170	115	42	24	153	2,725
2026	1,176	114	88	8	272	152	93	42	3	145	2,093
2027	1,203	20	64	16	258	154	99	42	2	147	2,005
2028	1,240	60	144	-	245	183	122	52	2	154	2,201
2029	1,327	86	57	12	319	152	106	42	2	150	2,253
2030	1,185	132	76	9	247	152	103	42	2	158	2,106
2031	1,683	129	145	74	304	186	95	42	10	143	2,810
2032	2,302	142	156	26	361	180	105	42	2	150	3,466
2033	1,979	183	220	43	366	189	121	42	2	144	3,289
2034	1,713	122	95	9	279	196	98	42	2	147	2,702
2035	1,713	122	95	9	279	196	98	42	2	147	2,702
FNTS											
2025	-	-	-	-	-	136	163	109	-	136	543
2026	-	-	-	-	-	21	25	17	-	1,023	1,085
2027	-	-	-	-	-	21	25	17	-	1,023	1,085
2028	-	-	-	-	-	21	25	17	-	1,023	1,085
2029	-	-	-	-	-	21	25	17	-	1,023	1,085
2030	-	-	-	-	-	21	25	17	-	1,023	1,085
2031	-	-	-	-	-	21	25	17	-	1,023	1,085
2032	-	-	-	-	-	21	25	17	-	1,023	1,085
2033	-	-	-	-	-	21	25	17	-	1,023	1,085
2034	-	-	-	-	-	21	25	17	-	1,023	1,085
2035	-	-	-	-	-	21	25	17	-	1,023	1,085
NI Total											
2025	1,673	167	191	144	292	579	427	230	27	546	4,275
2026	1,333	137	154	8	272	446	267	138	6	1,424	4,185
2027	1,360	44	129	16	258	448	273	138	5	1,427	4,097
2028	1,397	83	209	-	245	477	296	147	5	1,434	4,293
2029	1,484	109	122	12	319	446	280	138	5	1,430	4,345
2030	1,343	155	142	9	247	446	277	138	5	1,437	4,198
2031	1,840	152	210	74	304	479	269	138	13	1,423	4,902
2032	2,459	165	222	26	361	474	279	138	5	1,430	5,558
2033	2,136	206	285	43	366	482	295	138	5	1,424	5,381
2034	1,870	145	160	9	279	490	273	138	5	1,427	4,794
2035	1,870	145	160	9	279	490	273	138	5	1,427	4,794

Reforestation is consistently the main driver for plant demand in NI over the forecast period (Table 21) representing 55.8% of total plant demand in comparison with afforestation which accounts for 21.8% and FNTS 22.4%.

Table 22: Estimated annual demand for seed for selected main species (kg)

		SS	NS	SP	DFIR	OAK	BI	ALD	BE	Total
ROI										
	2025	182	48	19	27	31,438	33	46	205	31,997
	2026	184	49	26	24	44,015	41	62	171	44,572
	2027	190	51	28	30	48,200	47	68	167	48,782
	2028	192	49	30	31	53,908	50	72	179	54,512
	2029	203	55	32	38	55,856	53	74	193	56,504
	2030	210	64	34	40	58,284	57	78	233	59,000
	2031	218	69	37	45	59,221	63	82	256	59,990
	2032	235	78	40	51	63,525	70	90	286	64,374
	2033	225	73	39	50	61,667	67	87	275	62,481
	2034	232	78	41	53	63,994	71	91	292	64,850
	2035	239	82	43	56	66,220	74	95	308	67,117
NI										
	2025	17	5	6	6	7,231	9	7	34	7,314
	2026	13	4	5	0	5,570	5	4	8	5,610
	2027	14	1	4	1	5,601	5	4	6	5,636
	2028	14	2	6	-	5,957	6	4	6	5,997
	2029	15	3	4	0	5,576	6	4	6	5,614
	2030	13	5	4	0	5,571	6	4	6	5,609
	2031	18	5	6	3	5,992	5	4	17	6,050
	2032	25	5	7	1	5,926	6	4	6	5,979
	2033	21	6	9	2	6,029	6	4	6	6,083
	2034	19	4	5	0	6,120	5	4	6	6,164
	2035	19	4	5	0	6,120	5	4	6	6,164
Total										
	2025	199	53	25	33	38,669	41	53	239	39,311
	2026	198	53	30	24	49,586	47	66	179	50,182
	2027	204	53	32	31	53,801	52	73	173	54,418
	2028	206	51	37	31	59,865	56	76	186	60,509
	2029	218	58	36	38	61,432	59	78	199	62,118
	2030	223	69	39	40	63,854	63	82	239	64,609
	2031	237	73	43	48	65,212	68	86	272	66,040
	2032	260	82	47	52	69,451	76	94	292	70,353
	2033	246	79	47	52	67,696	73	91	281	68,564
	2034	251	82	45	53	70,114	76	95	298	71,014
	2035	258	86	47	57	72,340	80	99	314	73,281

Table 22 is an estimate of seed demand for the baseline scenario for selected species ("OC" and "OB" are excluded). The demand for seed reflects the estimated plant demand in Table 21 and Table 22.

Table 23: Baseline seed requirements for selected minor species for ACRES – ROI (kg)

Year	Blackthorn	Dog Rose	Guelder Rose	Hawthorn	Hazel	Holly	Rowan	Spindle	Wild cherry	Total
2025	143.0	0.3	1.3	229.4	140.4	2.3	0.1	0.7	3.4	520.8
2026	50.1	0.3	1.3	229.4	173.1	2.8	0.2	0.7	6.3	464.1
2027	50.1	0.3	1.3	229.4	173.1	2.8	0.2	0.7	6.3	464.1
2028	100.1	0.6	2.5	458.8	272.7	4.5	0.2	1.3	6.2	846.9
2029	225.2	1.3	5.6	1,032.4	577.6	9.4	0.7	3.0	11.8	1,867.0
2030	225.2	1.3	5.6	1,032.4	577.6	9.4	0.7	3.0	11.8	1,867.0
2031	225.2	1.3	5.6	1,032.4	577.6	9.4	0.7	3.0	11.8	1,867.0
2032	225.2	1.3	5.6	1,032.4	577.6	9.4	0.7	3.0	11.8	1,867.0
2033	150.2	0.8	3.8	688.2	426.4	6.9	0.7	2.0	11.8	1,290.8
2034	225.2	1.3	5.6	1,032.4	577.6	9.4	0.7	3.0	11.8	1,867.0
2035	225.2	1.3	5.6	1,032.4	577.6	9.4	0.7	3.0	11.8	1,867.0
Totals	**1,844.7**	**9.9**	**43.8**	**8,029.4**	**4,651.2**	**75.7**	**5.7**	**23.1**	**104.9**	**14,788.3**

Table 24: Baseline seed requirements for selected minor species for FNTS – NI (kg)

Year	Blackthorn	Dog Rose	Guelder Rose	Hawthorn	Hazel	Holly	Rowan	Total
2025	89.6	0.6	1.3	176.8	326.1	2.5	0.1	596.9
2026	179.1	1.1	2.5	353.6	652.3	5.0	0.2	1,193.8
2027	179.1	1.1	2.5	353.6	652.3	5.0	0.2	1,193.8
2028	179.1	1.1	2.5	353.6	652.3	5.0	0.2	1,193.8
2029	179.1	1.1	2.5	353.6	652.3	5.0	0.2	1,193.8
2030	179.1	1.1	2.5	353.6	652.3	5.0	0.2	1,193.8
2031	179.1	1.1	2.5	353.6	652.3	5.0	0.2	1,193.8
2032	179.1	1.1	2.5	353.6	652.3	5.0	0.2	1,193.8
2033	179.1	1.1	2.5	353.6	652.3	5.0	0.2	1,193.8
2034	179.1	1.1	2.5	353.6	652.3	5.0	0.2	1,193.8
2035	179.1	1.1	2.5	353.6	652.3	5.0	0.2	1,193.8
Totals	**1,880.6**	**11.9**	**26.4**	**3,713.3**	**6,848.7**	**52.6**	**1.8**	**12,535.3**

Modelling forecast uncertainty with Monte Carlo simulation

Past activity levels have been uncertain, particularly in the area of afforestation, and a novel approach could be more useful than picking high, low and medium scenarios on a somewhat arbitrary basis, especially when the model represents a number of complex interactions. Monte Carlo Simulation[24] is a method of communicating the potential impact on the plant forecast of the uncertainty demonstrated in the survey replies. However, in the baseline scenario reforestation accounts for over 74% of plant demand and very few reforestation-related parameters used in the model were subject to company or individual survey questions. For example, reforestation rates for Coillte were obtained from the company itself and Private sector reforestation rates were based on the All-Ireland Timber Production Forecast, given the fidelity of actual events to that forecast. Thus, the range of inputs available for the Monte Carlo treatment was limited to the following:

– Afforestation hectares: ROI and NI

– Afforestation forest types ROI, afforestation species % NI

– Reforestation species mix ROI private

– Afforestation & Reforestation: filling in, percent stocking

Excluded from Monte Carlo simulation (although retained in model):

– Reforestation hectares

– Voluntary levels hectares / species

– Nature Restoration hectares / species

– Reforestation NI species %

– ACRES in ROI / FNTS in NI

The Company and Individual survey returns were combined, with Company returns given a weighting of three times that of the individual returns. Weighted means and standard deviations were then calculated for use in the model. Sample outputs include the following:

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[24] The Monte Carlo method is a computational technique that uses repeated random sampling to obtain numerical results. It is particularly useful for problems that are too complex to solve analytically, such as those involving many coupled degrees of freedom or probabilistic inputs.
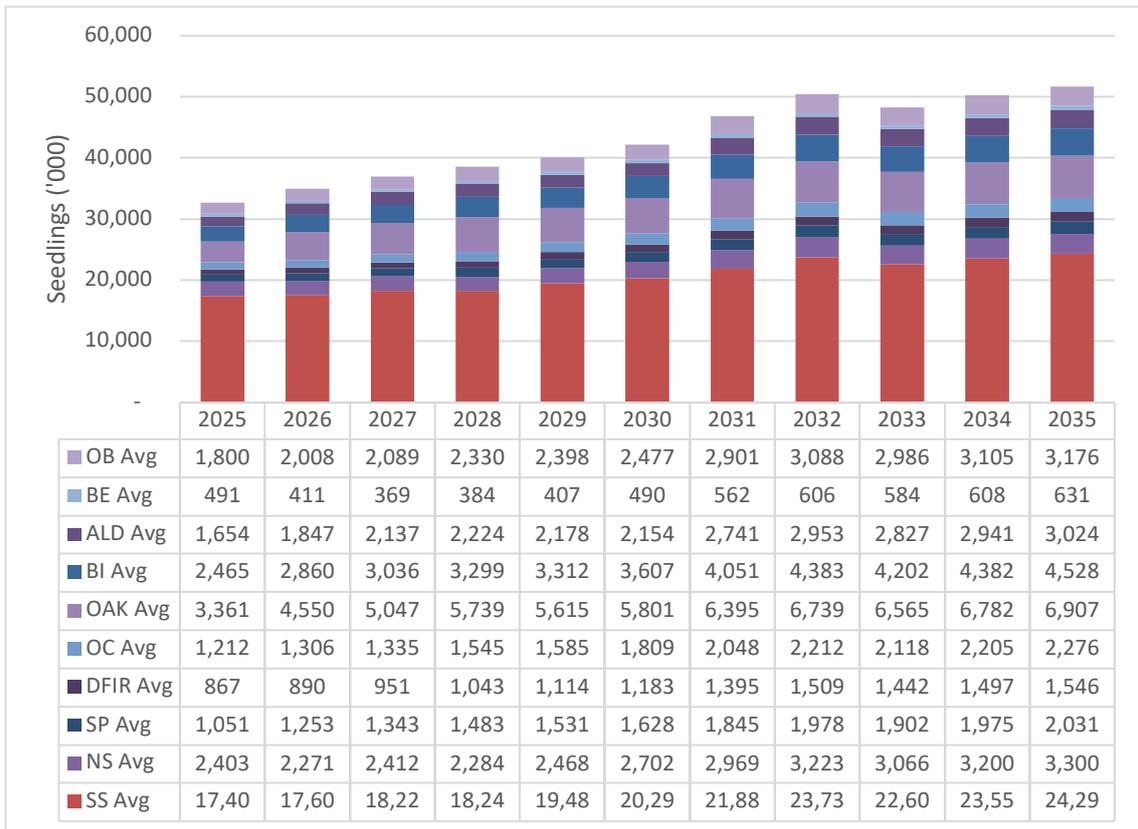
	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
OB Avg	1,800	2,008	2,089	2,330	2,398	2,477	2,901	3,088	2,986	3,105	3,176
BE Avg	491	411	369	384	407	490	562	606	584	608	631
ALD Avg	1,654	1,847	2,137	2,224	2,178	2,154	2,741	2,953	2,827	2,941	3,024
BI Avg	2,465	2,860	3,036	3,299	3,312	3,607	4,051	4,383	4,202	4,382	4,528
OAK Avg	3,361	4,550	5,047	5,739	5,615	5,801	6,395	6,739	6,565	6,782	6,907
OC Avg	1,212	1,306	1,335	1,545	1,585	1,809	2,048	2,212	2,118	2,205	2,276
DFIR Avg	867	890	951	1,043	1,114	1,183	1,395	1,509	1,442	1,497	1,546
SP Avg	1,051	1,253	1,343	1,483	1,531	1,628	1,845	1,978	1,902	1,975	2,031
NS Avg	2,403	2,271	2,412	2,284	2,468	2,702	2,969	3,223	3,066	3,200	3,300
SS Avg	17,40	17,60	18,22	18,24	19,48	20,29	21,88	23,73	22,60	23,55	24,29

Figure 10: Forecast Demand by Year (afor, refor, NRL, non-grant aided), n=500 Monte Carlo simulations

Figure 10 illustrates how confidence intervals may be calculated, in this case at 95% confidence. Note how the interval increases slightly with passage of time, as survey respondent uncertainty grew. The error bars do not overlap, indicating a distinct yearly trend.

SS Forecast Demand By Year, with 95% confidence intervals

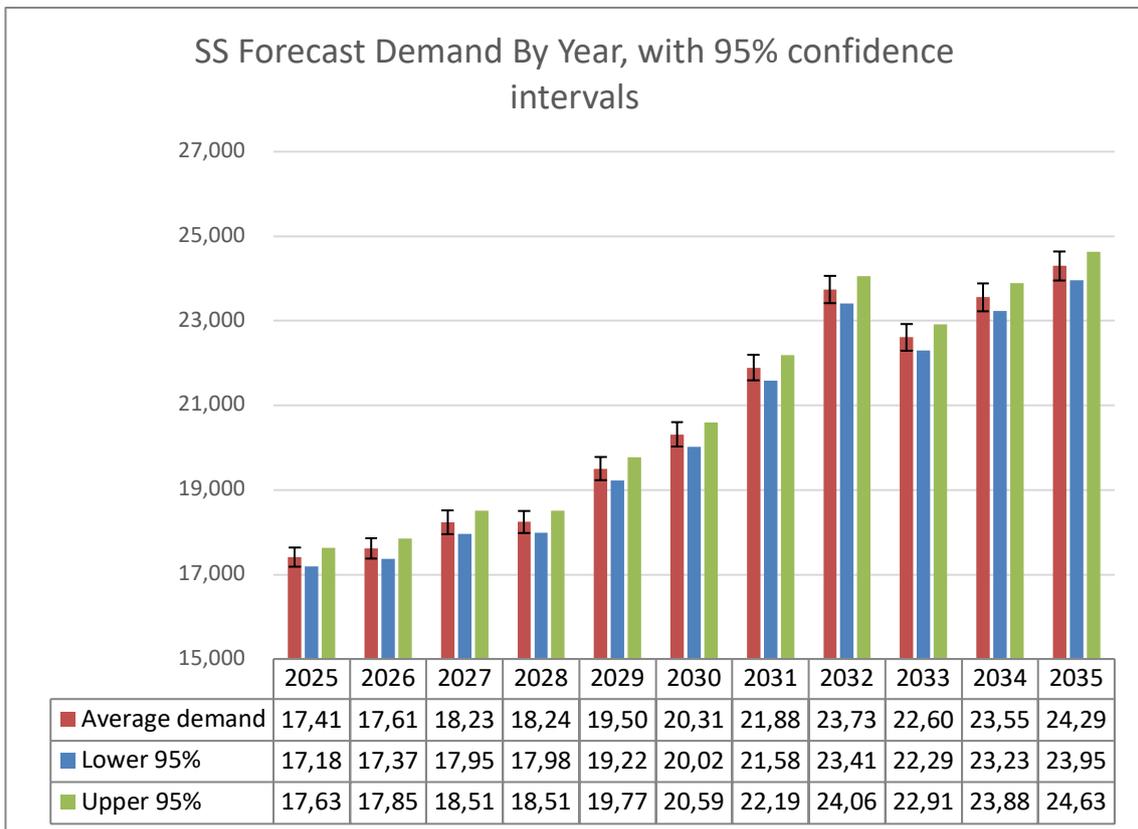|	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Average demand	17,41	17,61	18,23	18,24	19,50	20,31	21,88	23,73	22,60	23,55	24,29
Lower 95%	17,18	17,37	17,95	17,98	19,22	20,02	21,58	23,41	22,29	23,23	23,95
Upper 95%	17,63	17,85	18,51	18,51	19,77	20,59	22,19	24,06	22,91	23,88	24,63

Figure 11: Sitka spruce Forecast Demand by Year (afor, refor, NRL, non-grant aided) with 95% confidence intervals

Figure 11 may be used by selecting a cumulative frequency on the y-axis, e.g. 90% and reading off the corresponding value on the X-axis. In this case, there is a 90% chance that demand will reach at least 21 million plants in 2025.
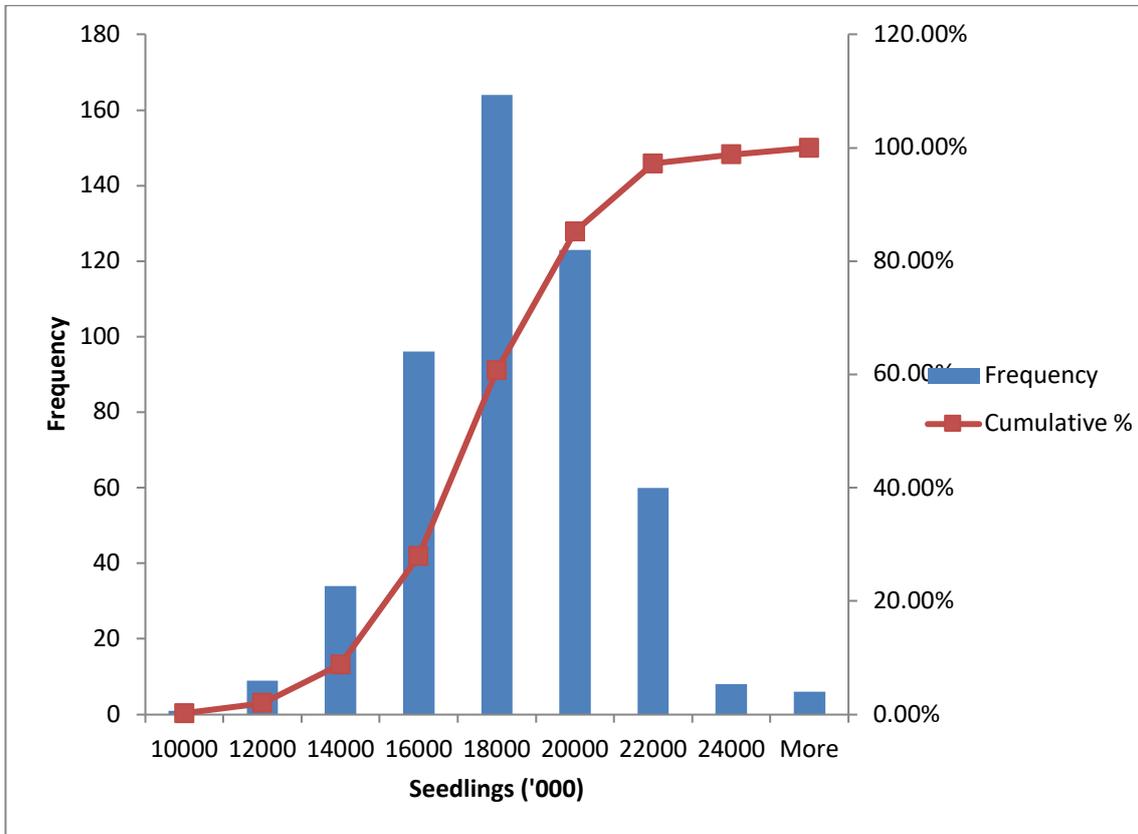

Figure 12: 2025 Sitka Spruce Demand (afor, refor, NRL, non-grant aided): Cumulative Frequency Curve

In conclusion, the Monte Carlo method of communicating uncertainty could be very useful for forecasts of this nature. However, given the dominance in this forecast of parameters such as reforestation area and others that were not subject to survey, its usefulness is diminished.

Appendix 1 – Survey format

AFOR 1 On average, what area of afforestation has your company managed in the last 5 years?

[_____] ha

2 What in your opinion will be the future levels of afforestation (ha) in ROI in the following years (2020 to 2023 actual data are provided for reference)?

2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031-2035 Average
2,434	2,016	2,273	1,651	1,539							

3 What in your opinion will be the future levels of afforestation (ha) in Northern Ireland in the following periods? Leave blank if very unsure.

2025	2026	2027	2028	2029	2030	2031-2035 Average

4 On average, how many plants per ha are required for filling in / beating up in afforestation until free growing stage?

Mainly Conifer sites		plants/ha
Mainly broadleaf sites		plants/ha

5 On an average afforestation site, what percentage of the gross areas will be left unplanted due to planting setbacks, unproductive areas, biodiversity etc.?

[_____] % area

6 In your opinion what factors will have the greatest impact on afforestation levels to 2035?

Please indicate the expected effect of each issue by marking the appropriate cell

	Very Negative			Neutral			Very Positive
	-3	-2	-1	0	1	2	3
Grants and premiums							
Replanting obligation							
Land price							
Land eligibility criteria							
Administrative processes							
Environmental regulations							
Possible reward for carbon capture							
Importance of climate change							
Importance of biodiversity							
Other (please specify)							
Other (please specify)							

7 ROI: Assuming a continuation of the Forestry Programme, what is your best estimate of the % area under the following Forest Types for the periods below?

Forest Type	Description	Provisional 2024	2025 - 2030	2031 to 2035
FT1	Native forests	38%		
FT2	Forests for water	0%		
FT3	Forests on public lands	1%		
FT4	Neighbourwood scheme	0%		
FT5	Emergent forests	0%		
FT6	Broadleaves - oak and beech	1%		
FT7	Diverse broadleaves	1%		
FT8	Agroforestry	1%		
F10	Continuous cover forestry	2%		
FT11	Mixed high forest minor conifers	2%		
FT12	Mixed high forest mainly Sitka	46%		
NTA 1	Small Native forests	5%		
NTA 2	Small Native forests - water protect	1%		
	Totals (should reach 100%)	100%	0%	0%

8 Northern Ireland: What do you estimate will be the proportions of conifer and broadleaf species in afforestation In NI for the periods below: (leave blank if very unsure)

	2025 - 2030	2031 to 2035
Sitka spruce		
Norway spruce		
Scots Pine		
Douglas Fir		
Other conifers		
Oak		
Birch		
Alder		
Beech		
Other broadleaves		
Totals (should reach 100%)	0%	0%

REFOR

Reforestation, which is currently averaging circa 10,000 ha per annum is expected to continue to be the main driver for seedling demand. However with reforestation sites subject to changed rules on setbacks, a reliable estimate of not only gross area but net productive area is essential to forecast seedling demand.

There is a growing interest in broadleaves, especially native species. Reforestation offers forest owners to change the species for the second rotation. It is important in estimating future demand to be able to have an informed view regarding any change in species requirements.

9   On average, what area of reforestation has your company managed in the last 5 years?

[   ] ha

10   On average, how many plants per ha are required for filling in/ beating up on reforestation until free growing stage

Mainly Conifer sites		plants/ha
Mainly broadleaf sites		plants/ha

11   On an average reforestation site, what percentage of the gross areas will be left unplanted due to planting setbacks, unproductive areas, biodiversity etc. ?

[   ] %

12   What factors in your opinion will have the greatest impact on future reforestation levels to 2035?

Please indicate the expected effect of each issue by marking the appropriate cell

	Very Negative			Neutral			Very Positive
	-3	-2	-1	0	1	2	3
Clearance of storm affected forests							
Clearance of pest/disease affected forests							
Timber prices							
Replanting obligation							
Environmental restrictions							
Administrative processes							
Change to continuous cover							
Community objections to felling							
Lack of contractors for felling							
Other (please specify)							
Other (please specify)							

13   What is your best estimate of the proportions of conifer and broadleaf species in reforestation for the periods below?

	2025	2026	2027	2028	2029	2030	2031 to 2035
Sitka spruce							
Norway spruce							
Scots Pine							
Douglas Fir							
Other conifers							
Oak							
Birch							
Alder							
Beech							
Other broadleaves							
Totals (should reach 100%)	0%	0%	0%	0%	0%	0%	0%

14   "Storm damaged forests will be cleared and restocked without causing a marked increase in reforestation area over recent levels."
      To what extent do you agree or disagree with this statement?

Please choose: [   ]

Survey end: Many thanks for your participation!

COFORD