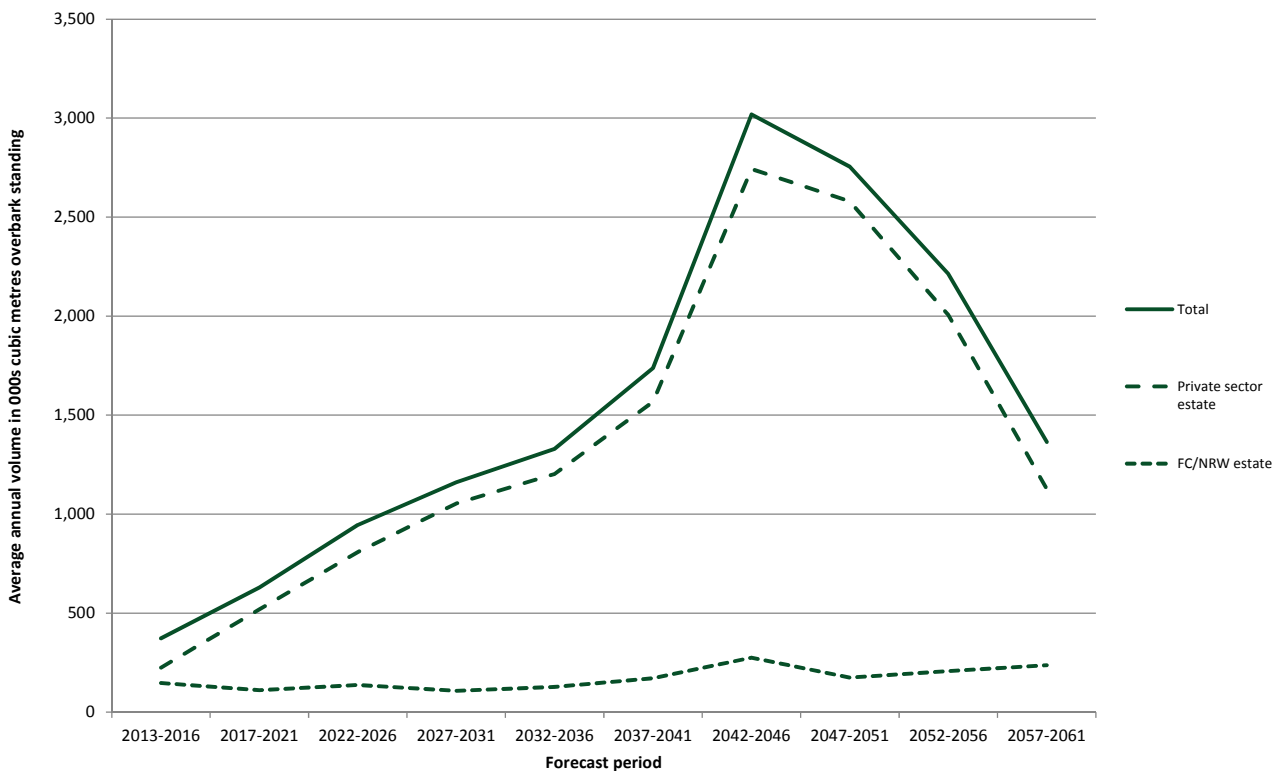




50-year forecast of hardwood timber availability

Overview of 50-year forecast of hardwood timber availability



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Summary

The National Forest Inventory provides a record of the size and distribution of forests and woodlands in Great Britain and information on key forest attributes. This information, together with Forestry Commission growth and yield models, is used to forecast softwood and hardwood timber availability. This Report provides a 50-year forecast of hardwood timber volume that could potentially be produced from broadleaves growing in forests and woodlands in GB. It includes estimates for England, Scotland, and Wales, broken down by Forestry Commission/Natural Resources Wales (FC/NRW) and Private sector ownership.

Some of the key findings of this report are:

- According to the 'headline' scenario in this report, where harvesting is limited to areas with evidence of recent thinning activity, the forecast of hardwood availability for the GB forest estate is an average of 1.6 million m³ of hardwood timber per annum over the 50-year period. For England this equates to an average of 1.0 million m³ per annum; for Scotland 0.4 million m³; and for Wales 0.2 million m³.
- If the unrestricted scenario of biological potential is applied to the same growing stock, potential production is significantly higher and the forecast of hardwood availability for the GB forest estate under this scenario is an average of 6.25 million m³ of hardwood timber per annum over the 50-year period. The difference between this volume and that of the 'headline' forecast illustrates the potential impact of bringing more broadleaved woodland into management than is currently the case.
- Under the 'headline' scenario, hardwood availability varies substantially between the time periods covered by the forecast; it increases from an average of 0.4 million m³ per annum in the first forecast period (2013–16), rising continuously to a maximum of 3.0 million m³ per annum in the seventh period (2042–46), after which it declines, reaching an average of 1.4 million m³ per annum in the last period of the forecast (2057–61).
- Forecast availability of hardwood from the FC/NRW estate is small but relatively stable, with a tendency towards increased availability in the later time periods of the forecast. The average annual availability from this sector over the 50 year period of the forecast is 170 thousand m³ if existing forest management plans are followed, with 147 thousand m³ in the first forecast period (2013–16), reaching 237 thousand m³ in the last period in 2057–61.
- In the Private sector, forecast availability is higher than that from the FC/NRW estate but more volatile over time. From a low point of 0.2 million m³ in the first forecast period (2013–16) it increases to an annual average of 2.7 million m³ in

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2042-46, before declining to 1.1 million m³ in the last period of the forecast in 2057-61.

- This equates to average potential availability of hardwood timber from the Private sector estate of 1.4 million m³ per annum for the next 50 years, under a management scenario of maximising timber productivity in crops that have been subjected to recent thinning. For England the average is 0.9 million m³ per annum; for Scotland 0.3 million m³ per annum; and for Wales 0.1 million m³ per annum.
- The forecasts of hardwood availability under the headline scenario represent only a small fraction of the volume in the broadleaves growing stock; over the full period of the forecast, the forecast availability represents removals that are an average of 0.4% per year from the standing volume in the growing stock.
- The forecasts of availability are also substantially less than the forecasts of growth in the broadleaved growing stock, being on average only 26% of net annual increment.
- As a consequence, the standing volume in the broadleaves growing stock in GB is forecast to increase continuously throughout the forecast period, from 245 million m³ at the start of the forecast (31 March 2012) to an annual average of 450 million m³ in the last period of the forecast.

The actual levels of timber that will be produced will vary from the results reported here as production depends on the harvesting choices made by forest and woodland owners.

In this report, a range of alternative scenarios have been explored for the Private sector to assess the impact of such choices on the amount and timing of production from this sector.

This report is a summary of the 50-year forecast of broadleaf availability. A separate NFI report is simultaneously published providing 50-year forecasts of softwood timber availability in Great Britain. NFI reports are published at www.forestry.gov.uk/inventory.

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Table 1a Summary of FC/NRW hardwood forecast

| | 2013-2016 | 2017-2021 | 2022-2026 | 2027-2031 | 2032-2036 |
|----------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| | volume (000 m ³ obs) | volume (000 m ³ obs) | volume (000 m ³ obs) | volume (000 m ³ obs) | volume (000 m ³ obs) |
| England | 126 | 92 | 110 | 86 | 99 |
| Scotland | 9 | 9 | 10 | 10 | 15 |
| Wales | 12 | 11 | 17 | 12 | 14 |
| Great Britain | 147 | 111 | 137 | 108 | 128 |

| | 2037-2041 | 2042-2046 | 2047-2051 | 2052-2056 | 2057-2061 |
|----------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| | volume (000 m ³ obs) | volume (000 m ³ obs) | volume (000 m ³ obs) | volume (000 m ³ obs) | volume (000 m ³ obs) |
| England | 129 | 189 | 116 | 134 | 146 |
| Scotland | 24 | 31 | 40 | 45 | 64 |
| Wales | 19 | 56 | 19 | 28 | 28 |
| Great Britain | 172 | 276 | 175 | 208 | 237 |

Table 1b Summary of Private sector hardwood forecast

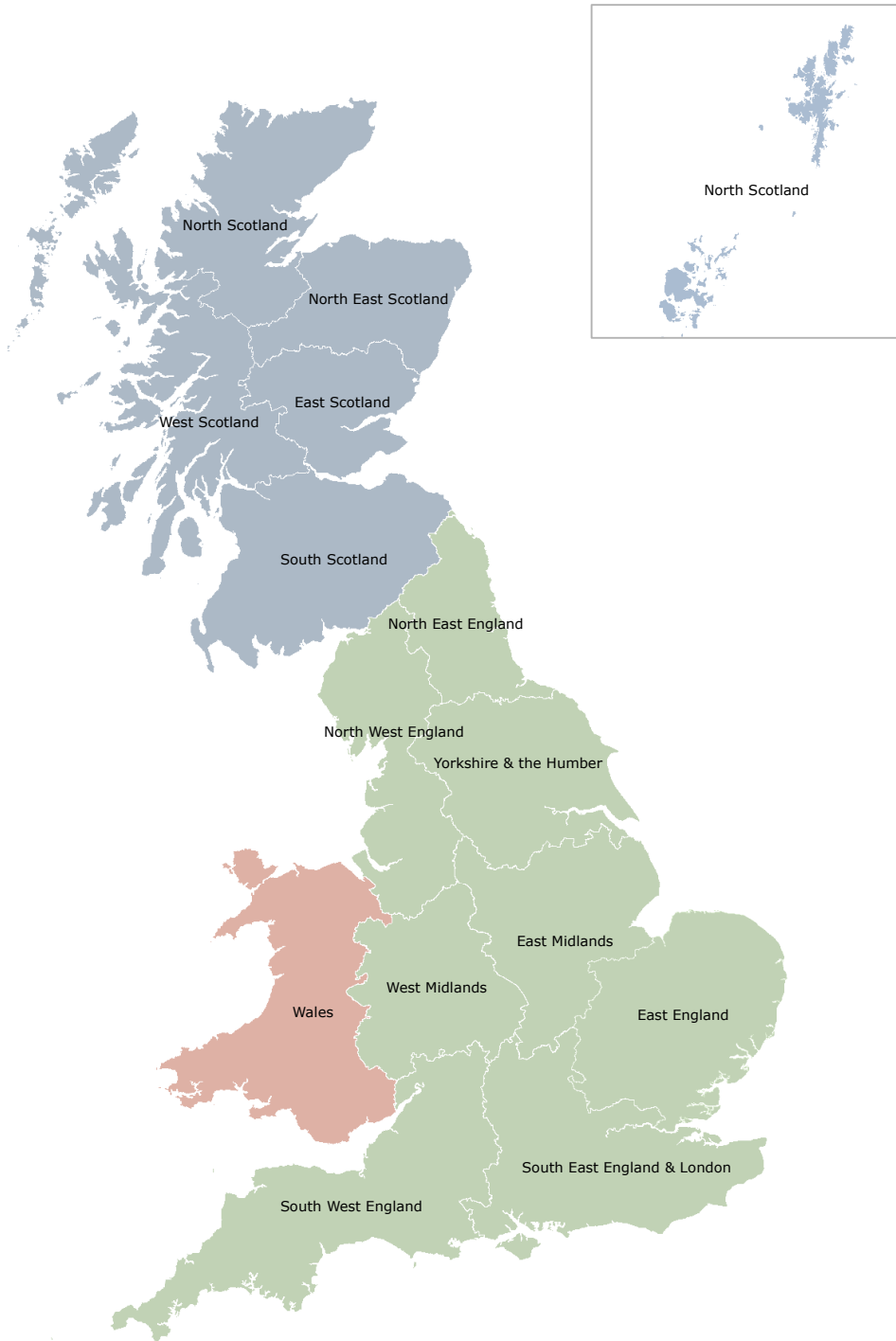
| | 2013-16 | | 2017-21 | | 2022-26 | | 2027-31 | |
|----------------------|------------------------------------|----------|------------------------------------|----------|------------------------------------|----------|------------------------------------|----------|
| | volume (000 m ³ obs) | SE % | volume (000 m ³ obs) | SE % | volume (000 m ³ obs) | SE % | volume (000 m ³ obs) | SE % |
| England | 122 | 5 | 333 | 3 | 538 | 3 | 720 | 2 |
| Scotland | 83 | 18 | 139 | 8 | 193 | 6 | 233 | 5 |
| Wales | 20 | 14 | 46 | 9 | 77 | 8 | 100 | 7 |
| Great Britain | 225 | 7 | 519 | 3 | 808 | 2 | 1,054 | 2 |

| | 2032-36 | | 2037-41 | | 2042-46 | | 2047-51 | |
|----------------------|------------------------------------|----------|------------------------------------|----------|------------------------------------|----------|------------------------------------|----------|
| | volume (000 m ³ obs) | SE % | volume (000 m ³ obs) | SE % | volume (000 m ³ obs) | SE % | volume (000 m ³ obs) | SE % |
| England | 825 | 2 | 1,047 | 3 | 1,915 | 3 | 1,678 | 4 |
| Scotland | 262 | 5 | 367 | 7 | 586 | 6 | 675 | 7 |
| Wales | 115 | 6 | 153 | 10 | 243 | 10 | 227 | 10 |
| Great Britain | 1,202 | 2 | 1,567 | 3 | 2,743 | 3 | 2,580 | 3 |

| | 2052-56 | | 2057-61 | |
|----------------------|------------------------------------|----------|------------------------------------|----------|
| | volume (000 m ³ obs) | SE % | volume (000 m ³ obs) | SE % |
| England | 1,254 | 4 | 645 | 4 |
| Scotland | 554 | 7 | 343 | 8 |
| Wales | 198 | 11 | 139 | 12 |
| Great Britain | 2,006 | 3 | 1,127 | 3 |

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Figure 1 National Forest Inventory Reporting Regions



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Introduction

National forest inventories are carried out by the Forestry Commission to provide accurate, up-to-date information about the size, distribution, composition and condition of the forests and woodlands in Great Britain (GB). This information is essential for developing and monitoring policies and guidance to support sustainable forest management.

The current National Forest Inventory (NFI), which began in 2009 (the first cycle is due for completion in 2015), is a multi-purpose operation that has involved the production of a forest and woodland map for GB and a continuing programme of field surveys of the mapped forest and woodland areas.

Information and data collected by the National Forest Inventory will be used for a number of purposes, including estimates of current values and forecasts of future values of forest metrics such as:

- Standing volume
- Timber availability
- Tree growth and increment
- Carbon stocks
- Biomass

Estimates of aspects of the biodiversity and social value of forests and woodlands will also be provided by the Inventory.

This NFI Report sets out the results of the 50-year forecast of hardwood timber* availability for all forests and woodlands in GB. For the purposes of this report, woodland is separated into that which is in public or private ownership. Public sector woodland comprises of forests and woodlands managed by Forestry Commission England, Forestry Commission Scotland and Natural Resources Wales. Private sector woodland is all other forests and woodlands owned and managed by other bodies or individuals.

A 50-year forecast of softwood timber availability is being published simultaneously with this report. Further information on this and other National Forest Inventory outputs is available from www.forestry.gov.uk/inventory.

*Timber is defined in this report as the volume of stemwood to 7 cm top diameter in m³ overbark standing (obs), including stump (above ground) and usable branchwood (of minimum 3 m in length and 7 cm top diameter).

Forecast of hardwood availability

This is the first forecast of hardwood availability for Britain. This report, in addition to providing the latest overall forecasts for 25 and 50 years, gives a breakdown of the forecast volume by country, by principal species, by size and age class and by National Forest Inventory region.

The baseline for the forecast of hardwood availability for Great Britain is the National Forest Inventory assessment of Standing timber volume, the original version of which was published in 2012 (*NFI preliminary estimates of quantities of broadleaved species in British woodlands, with special focus on ash*). This assessment of standing volume has subsequently been revised as more samples from the National Forest Inventory have been collected and this revised assessment forms the baseline of this forecast.

How forecasts are derived

Forecasts of hardwood availability are derived by assessing:

- Woodland area.
- Woodland characteristics (e.g. age, species) within this area.
- How quickly the trees are growing (yield class).
- When the trees will be harvested.

The forecast of hardwood availability for GB is composed of three separate forecasts: a forecast for the Forestry Commission (FC) estate in England and Scotland; a forecast for the Natural Resources Wales (NRW) estate* and a forecast for the Private sector estate in GB. The forecasts have been derived separately for the FC/NRW estate and for the Private sector estate. They are based upon the same principles but use different data sources.

For the FC/NRW estate, information on woodland area and woodland characteristics has been extracted from the Forestry Commission's long-established Sub-compartment database. For the Private sector estate, the estimates were derived from results obtained to date from the National Forest Inventory.

* The Natural Resources Wales estate in this report refers to the estate formerly managed by Forestry Commission Wales. It does not include former holdings in Wales of the Environment Agency or Countryside Council for Wales, which are treated as Private sector woodland in this report.

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The *National forest inventory forecasts methodology overview* and the technical documentation on *Felling and removals forecasts* give more information on the approaches used to derive the forecasts (see www.forestry.gov.uk/inventory).

Sub-compartment database

The Sub-compartment database is a record of all land managed by the Forestry Commission and Natural Resources Wales. Each stand of trees is represented spatially, together with information on individual stand characteristics (for example species, planting year, spacing and yield class) which is periodically updated. As new surveys of stands are conducted (e.g. for operational purposes), survey results are also recorded against the stands. In addition, the database contains details of how the stands are to be managed – in particular, the planned frequency and type of thinning operations and a 'due date' for felling.

National Forest Inventory

The National Forest Inventory is composed of two elements: a woodland map and a field survey. The woodland map covers all forests and woodlands over 0.5 hectares with a minimum of 20% canopy cover (or the potential to achieve it), including new planting, clearfelled sites and restocked sites. The map was established in 2010 and was based upon 25 cm resolution colour aerial photography for England and Scotland and 40 cm resolution aerial photography for Wales. The map was originally validated and updated using satellite imagery (available up to 2009), which gave an independent crosscheck of woodland present. Since then the map has been updated annually using 25cm resolution colour aerial photography and satellite imagery (available up to 2012). These sources were used in conjunction to identify areas of recently felled forests and newly established trees. Particular attention was paid to identifying areas of woodland loss verified as being due to the establishment of windfarms or the restoration of habitats.

Field survey work is then used to refine the map-based estimates of woodland and clearfelled areas and to measure detailed aspects of the forest. The field surveys used for this report were carried out between 2009 and 2013 to estimate standing volume and other forest metrics. This involved the ground surveying of one-hectare sample squares that were partially or entirely covered by forest, including clearfelled areas, according to the woodland map. Further details of the mapping work and the derivation of forested areas can be found in the 2010 & 2011 Woodland Area reports at www.forestry.gov.uk/inventory.

Estimates for the Forestry Commission estate

Information from the Sub-compartment database was used to estimate standing volume at the reference date of 31 March 2012 on a stand-by-stand basis. For each stand, if an operational survey had been carried out close to the reference date, information from that survey was used to estimate standing volume. Otherwise, an estimate was made of the state of the stand, normally involving the application of standard Forestry Commission growth and yield models that take into account the past management of the stand. This data formed the baseline of the volume forecasts for the FC/NRW estate.

Forestry Commission growth and yield models were then used to 'grow' the stands, based upon the Inventory data and yield class estimates. The stands were grown taking account of harvesting events that either thinned or felled a stand over the forecast period, producing the standing volume, increment and production volumes projected by the forecasts. The timing and scale of thinning and felling events was taken from Forestry Commission forest management plans, which set prescriptions for harvesting across productive forest areas on the FC estate. This was then aggregated to produce the estimated total production across a defined geographic area for particular types of stand (classified, for example, by species, age or size class). The production forecast is an output of this stand modelling process.

Because the resulting estimates are based on a full record of data from the Sub-compartment database, there is no sampling error involved in the estimation process, therefore no sampling standard error is calculated. However, the nature of the estimation process within each individual stand does introduce estimation error, with variable contributions from stand to stand, due to the type, age and accuracy of the information held in the Sub-compartment database. These estimation errors have not been quantified in this report.

Estimates for the Private sector estate

Forests on the National Forest Inventory woodland map were first separated into FC estate and Private sector estate holdings using Forestry Commission spatial records of management boundaries. Estimates of hardwood availability on the Private sector estate used a woodland area obtained from the map updated to 31 March 2012 (published in May 2013). A full account of the National Forest Inventory mapping exercise can be found in the National Forest Inventory forecasts methodology overview. The mapped woodland area results can be found in the *National Forest Inventory woodland map reports for Great Britain, England, Scotland and Wales*, available online at www.forestry.gov.uk/inventory.

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The results in this report are based on survey returns from 9,594 sample squares surveyed across all woodland types between October 2009 and August 2013. These surveyed sample squares represent a sub-sample of a planned 15 000 statistically representative squares covering all GB woodland that will be surveyed during this first cycle of the National Forest Inventory survey (due for completion in 2015).

At each sample square, the forest was stratified into different woodland types or stands, where information on species, age, management and a range of other parameters was collected. Typically, sample squares covered parts of two or more different forest stands, resulting in around 27,490 stands being assessed. Within each stand, field-based computer systems were used to locate two or three randomly located 100 m² (0.01 hectare) circular plots, within which all trees of greater than or equal to 4 cm diameter at breast height (DBH) were mapped, species and age identified, stocking assessed and diameters measured. A total of around 366,000 trees were measured. For around 105,000 of these trees, additional measurements of tree height and crown dimensions were taken to establish estimated yield class and for other purposes. The resulting data were used to estimate the standing volume of the trees and this formed the baseline of the volume forecast. All squares were marked on the ground with metal pegs and GPS data of their location were recorded for checking and future measurement. All measurements were subject to office-based checks and 7% were re-measured in the field by an independent quality assurance team to ensure consistency and high standards.

The 2012 Inventory data for the Private sector estate was then run against several future harvesting scenarios to assess the impact of different felling ages and thinning rates on future standing volume, increment and production volumes. Such alternative scenarios were investigated since there is neither a comprehensive record of felling and thinning plans for the Private sector estate nor a commitment to harvest a given volume.

From these scenarios, a single prescriptive and uniform management scenario was chosen to produce the 'headline' forecast. Under this scenario, in Private sector forests where there is evidence of recent thinning activity, stands are managed under a regime designed to maximise productivity (biological potential), within which it is assumed that timber will be harvested in the year of maximum Mean Annual Increment (MAI). This scenario, selected after consultation with Private sector woodland owners and timber processors, aims to maximise timber production in currently managed woodland in a way that involves relatively straightforward and transparent management prescriptions. In stands that do not show evidence of previous thinning activity, the scenario assumes that the stand has been and will remain unharvested throughout the forecast period. This differs from the assumptions behind the headline scenario used in the simultaneously released report on softwood availability, in which it is assumed that all conifer stands are subject to future harvesting.

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A similar approach was taken for thinning by applying a series of prescriptions set out in Forestry Commission management tables – known as management table thinning – to areas not at significant risk from windthrow if thinned. In areas considered to be at high risk, determined by a Detailed Aspect Methodology Score (DAMS) of 16 or more, a strategy of no thinning – and felling conditional upon attainment of a top height of 25 metres – was assumed. Forestry Commission growth and yield models were then used to predict future growth and consequent future standing and harvested volumes.

Alternative scenarios where all woodland area is brought into production are also provided for comparative purposes and to assess the total biological potential of the resource.

The harvesting scenarios considered in the forecast are described below. They generate a range of outcomes from a relatively high level of possible sustainable potential production to more restricted levels of production. Two are based upon the biological potential approach (felling at maximum MAI), with each of these biological potential based scenarios adopting a different approach to managing woodlands currently out of management. In addition to the scenarios based on biological potential, one other alternative scenario has been investigated, which is based upon felling and thinning to achieve a timber product at clearfell of a certain target diameter.

- **Clearfelling to biological potential.** This assumes choosing a felling age which maximises long-term productivity by clearfelling at year of maximum MAI. Within this overall approach to management, two variants were defined:
 - **Modified biological potential, thinning and felling assuming moderate wind risk measures.** This scenario assumes that all stands are managed to biological potential with all species being intermediately thinned until management table stocking is achieved and subsequently clearfelled at age of maximum MAI. It takes account of wind risk, but assumes a relatively risk-tolerant approach in applying wind-risk constraints to harvesting practice. This assumes felling to year of maximum MAI and thinning of all stands to management table in all crops planted in areas with a DAMS score of less 16, and felling at an assumed terminal height of 25 metres (if this is attained before year of maximum MAI) and no thinning for stands in areas with a DAMS score of 16 or more.
 - **Thin and fell only where evidence of thinning practice. - the 'headline' forecast.** This is a highly conservative assumption and restricts the modified biological potential assumption to those areas of woodland that show evidence of recent thinning activity. This approach excludes the majority of the woodland resource from being harvested, having the impact of:

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- Tying the scenario to current levels of activity.
 - Tying potential timber availability to past levels of production.
 - Making the scenario highly conservative in terms of potential availability.
- **Thin and fell all stands, with felling age driven by hardwood product size.** This scenario sets year of felling according to attainment of a 'target' mean stand dbh, as opposed to age of maximum MAI. This lengthens rotations, since the target mean dbh value used is higher than that expected to be attained at year of maximum MAI, but is designed to mirror industry practice in growing hardwood sawlogs. It also manages the large stock of overdue timber effectively through lengthening rotations. Oak and beech are felled at 80cm dbh and other species at 60cm dbh. Where stands are composed of larger stems they are designated as overdue and are treated as described in the section on overdue. This scenario also takes account of wind risk, but assumes a relatively risk tolerant approach, as described in the modified biological potential scenario above.
 - **75% of stands are under management plans.** This is primarily a policy evaluation scenario and aims to forecast availability if the policy of bringing more broadleaved woodlands into management occurred. This assumes that for 75% of stands some form of management plan exists where conscious management decisions are made, generally resulting in harvesting activity. For the remaining 25% of stands, it is assumed that no plans exist and that there are no harvesting interventions. For those stands that are under plans, it is assumed that:
 - 65% of stands are managed under low impact silvicultural systems (LISS), where rotation lengths are longer than those set by felling at age of maximum MAI and thinning is less intense than that of management table thinning;
 - For 15% of stands it is assumed that management is under a coppice regime, where harvesting is managed to achieve a target product diameter of 14 cm;
 - 10% of stands will be managed to clearfell at age of maximum MAI and thinned to management table; and
 - 10% of stands are planned non-intervention.

For LISS, clearfell and coppice stands, overdue timber is managed as set out in the 'overdue timber' section. Two variants of this scenario, with 50% and 25% of woodland under management plans are supplied in the supplementary spreadsheets.

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- **Management felling and thinning plans.** A forecast based upon detailed stand by stand plans prescribing age of felling and type and intensity of thinning. This applies to the FC/NRW estate only. There is one exception to this due to the fact that existing forest plans generally only contain information on one rotation of felling within a 50 year period. If the first clearfell is imminent and the next rotation is unusually short (e.g. for coppice) it may occasionally be the case that a second felling occurs within the forecast period. As the forest plans do not generally contain felling information for such a second felling, provision within the scenario must be made for such circumstances. In these instances it is assumed that sites are restocked with 'like for like' species after the design plan felling date and subsequently managed with management table thinning and felling at maximum MAI.

These scenarios were used to inform the choice of the headline forecast scenario, through exploring issues such as the impact of levels of activity, levels of thinning, current silvicultural practice and approaches to wind risk. Further exploration of the impact of applying alternative harvesting scenarios can be found in the NFI Report entitled *Interpreting National Forest Inventory timber volume forecasts*. The restricted biological potential was chosen as the headline forecast because it most closely reflects apparent current practise. If, however, total timber potential is of primary interest, the unrestricted 'Modified biological potential, thinning and felling assuming moderate wind risk measures' scenario should be referred to.

Modifying 25 year scenarios for a 50 year forecast

The scenario of modified biological potential, thinning and felling assuming moderate wind risk measures was used as the 'headline forecast' for the 2012 25-year softwood forecast. This was the starting point for developing the hardwood scenarios before taking into account the species specific factors of broadleaved silviculture. Lessons learnt from applying conifer scenarios over a 50 year period (as opposed to a 25 year period) were used to inform the development of the hardwood scenarios, again taking into account the species specific factors of broadleaved silviculture.

For the purposes of a 50-year hardwood forecast, refinements to the assumptions used needed to be made to provide realistic outlooks over 50 years. These new assumptions take factors into account that would impact more significantly on a longer term forecast. These factors were:

- how sites felled within the forecast period were restocked.
- how existing clearfell sites were restocked.
- how stands overdue for felling were treated.
- how FC and NRW land sales were accounted for within the forecast.

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The next section describes the assumptions made in the scenarios about future management and harvesting of stands.

Assumptions used in the forecasts

Ownership

As different harvesting strategies are used across different ownership types, and a forecast is largely based upon the approach taken to harvesting, assumptions have been made about future forest ownership and thus how stands will be harvested over the forecast period. In the 25-year softwood forecast, changing ownership was accounted for by:

- Removing any forest areas already sold by the Forestry Commission from the Sub-compartment database and transferring this area to the Private sector forecast.
- Accounting for any planned land sales by the FC or NRW (planned disposals are flagged in the Subcompartment database). In the 25-year softwood forecast these areas continued to contribute to the FC/NRW forecast until the date of disposal. After that point areas and volumes were reported separately from the main forecast. A variation of this procedure used in the 50-year forecasts of both softwood and hardwood is that planned disposals have been ignored and the assumption of this forecast is that ownership in the future will remain constant between sectors. This is due to the fact that it would be difficult to predict the extent of disposals and acquisitions out of and into the public sector estate over a 50-year period.

Restocking

This 50-year forecast uses the assumption that, when stands are felled within the forecast period, they are replanted with trees of the same species and yield class (i.e. like-for-like) for both FC/NRW and Private sector woodlands. The scenario also assumes that no additional open space is introduced to the original stocked area at restock. The like-for-like assumption is only one possible scenario out of many for restocking, but was judged to be adequately representative of common practice and ecology driven outcomes and was therefore thought to be sufficient for the purposes of a first phase of hardwood timber forecasting.

Conifer restocking is taken into account within this forecast in that the management of conifers and broadleaves are not independent of one another. This 50-year forecast of hardwood potential production has been simultaneously produced by the same process

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that also produced the 50-year forecast of softwood potential production. The main benefits of this are:

- Both conifer and broadleaved species that are found within mixed stands are included within the respective forecast.
- Restocking prescriptions for conifers that involve conversion of coniferous stocked area to broadleaved stocked area are accounted for within the hardwood forecast.

The chosen restocking scenarios for conifers were developed in consultation with the private sector (see *Consultation paper to inform requirements for a 50-year conifer forecast*). These explore the impact of increasing open space and broadleaved species within predominantly coniferous woodlands through establishing lower levels of stocked coniferous area and increased levels of broadleaved species on conifer restocking sites at point of restock. The 'headline' scenario for conifers assumes that 10% of conifer stocked area will be lost at restock, with 50% of the lost area (equivalent to 5% of the conifer area before restock) being converted to broadleaved stocked area. The broadleaved stocked area resultant from this activity has been fed directly into the broadleaved stocked area that forms the basis of this broadleaved forecast. Details of the conifer 50-year forecast and the scenarios used can be found in the NFI report *50-year forecast of softwood timber availability*.

Currently clearfelled areas

Forest area that was clearfelled as of 31 March 2011 was not included in the 25-year softwood forecast. It was acknowledged within the reports that not including some level of replanting would create a small underestimate of future softwood production in most 25-year softwood forecast results, which would be more evident in later years of the forecast.

Not restocking currently clearfelled areas would, on the other hand, have a significant impact on the results of a 50 forecast (and more so on a 100-year forecast), as such areas would become productive within the forecast period. To account for this the 50-year forecasts restock all clearfelled areas, applying the restocking assumptions as described above in the section on restocking.

This impacts on the 50-year hardwood forecast through adding 5% of currently clearfelled area to broadleaved stocked area. Converting only 5% of currently clearfelled area to broadleaved stocked area is based upon the assumption that the majority of currently clearfelled sites are former coniferous sites. This assumption is supported by the observation that most currently reported timber production is softwood (the current ratio of softwood to hardwood production is at a ratio of around 20:1 - *Forestry Statistics 2013*). The second cycle of the NFI will provide direct information on the actual relative

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level of conifer to broadleaved species restocking and this evidence will form the basis of future scenarios.

For the FC estate, the Sub-compartment database records of clearfelling were used to estimate area of clearfell. For the Private sector estate, the area of clearfell was first identified by aerial photography and then updated with satellite imagery. This was used in conjunction with the field survey to estimate stocked area and area of clearfell. The methodology of the 50-year forecast includes improved estimation of the area of clearfell. This improvement concerned distinguishing between clearfelled areas with a low density of live trees still standing from entirely clearfelled areas. The former was counted as stocked area in the 2012 25-year softwood forecast, but as only partially stocked area in the 50-year forecast. This will have the impact of increasing current felled area and reducing current stocked area in the 50-year forecast, but will not have impacted upon estimates of current standing volume.

'Overdue timber'

'Overdue timber' is timber contained within stands that are already over the age prescribed for felling at the start of the forecast period, according to the management scenario used for a forecast. Strict application of the rules of the scenario dictates that such stands be immediately felled on day one of the forecast.

When applying 'biological potential' scenarios to the hardwood resource a large amount of overdue timber was identified. This fact indicates that a portion of the estate is not currently being managed for timber production and this in turn implies that the current practice on at least a portion of the Private sector estate is to leave some stands beyond the age of maximum MAI. Since such stands are currently being managed in a way contrary to any biological potential-based prescription, these, and some other stands that are currently below the age of maximum MAI, are not likely to be managed in the assumed way in the future. As these 'overdue' stands represent a significant area of land and volume of timber, which will impact on a longer term timber forecast, special provision has now been made for them.

In the 50-year hardwood forecast a separate series of prescriptions for overdue timber have been derived and implemented and these were run in parallel to the main scenario. For example, if the biological potential scenario is used, those stands less than age of maximum MAI will be managed according to that scenario, but for those stands currently beyond maximum MAI a separate prescription was used. The proposed prescriptions were developed in consultation with the private sector and are set out below.

The overdue timber prescriptions take into account tree species, age of stand in relation to age of maximum MAI and current market practice in harvesting:

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- For Oak and Beech stands above maximum MAI but below 80 cm mean dbh, intermediate thin until fell at 80 cm mean dbh.
- For Oak and Beech stands between 80cm and 100cm mean dbh, clearfell evenly over a 20 year period with intermediate thinning.
- For Oak and Beech stands over 100cm mean dbh, fell evenly over 10 years.
- For Ash and other species beyond maximum MAI, fell evenly over ten years if mean dbh is less than 60 cm, or fell immediately if greater than 60cm dbh

These prescriptions were formulated with particular reference to mean stand dbh per species, with different species achieving optimal commercial value at different sizes.

All areas felled as overdue were restocked in the forecast according to the 'like for like' restock scenario, in common with any other felled stand in the forecast period.

Accuracy of estimates and forecasts from NFI sample data

The forecast results for individual surveyed squares were aggregated and scaled up to the areas identified by the woodland map, using standard statistical survey methodology, to produce the estimates and forecasts in this report. Along with these estimates and forecasts, associated sampling standard errors have also been calculated and reported, giving a measure of accuracy, conditional upon the underlying assumptions. The sampling standard error will account for random variation arising from the selection of the sample, and random measurement errors, but not from any systematic biases in the field measurements. However, because of the quality assurance process it is thought unlikely that any substantial biases of this nature are present in the survey data.

For estimates of current standing volumes and stocked areas, the sources of error that are not accounted for in the reported standard errors will be those arising from use of empirical models to estimate standing volumes from the recorded survey data and forecasting errors arising from the use of Forestry Commission growth and yield models. Sampling error makes the largest contribution to overall variability in these estimates and, as a result, the quoted standard errors are expected to be a good representation of the scale of the total error of the estimates.

For forecasts of future harvested and standing volumes and increment, the effects of unpredicted future events that impact upon the tree stock, and variations of future management strategies from those assumed by a particular scenario, are expected to cause the largest differences of forecasts from the eventual realised outcomes. The quoted sampling standard errors attached to a forecast are therefore indications of the variability of the estimates of future outcomes deriving from sampling of the

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population. Actual future outcomes are subject to the effects of unpredicted future perturbing events and deviations of future management of the woodland resource from that assumed by the scenario underlying the forecast. Sampling standard errors do not take such future uncertainties into account and therefore only indicate the expected scale of actual differences of forecasts from outcomes in the absence of future uncertainties. Taking account of such uncertainties would increase the standard errors attached to forecasts in such a way that forecasts further into the future are more uncertain than those made for near-term outcomes.

Impact of future events

The 50-year hardwood forecast makes no assumptions about the impact of pests and diseases. The volumes set out in the main reports assume no impact on production occurring from current or potential outbreaks of pests and diseases. This 'neutral' approach was taken since reliably predicting the rate of spread and impact of the pests and diseases currently of concern was considered to be impractical at this time.

Hard to harvest sites and timber

The 50-year hardwood forecast assumes that almost all hardwood timber within woodlands could come to market at some point, irrespective of ease of harvesting or site access. A proportion of the feedback arising from consultation was to exclude this timber from forecasts as it was thought that it would form a significant element of broadleaved woodland area. However, the results of the survey found that the level of hard to harvest sites (in terms of the physical nature of the site) was relatively low and that these would not significantly impact on the scenarios accounting for all woodland area. Figures on the proportion of 'difficult' sites to harvest are provided (broken down by individual NFI region), so users of the forecast can make their own estimate of what proportion of that timber would be unlikely to come to market due to these factors. Hard to harvest trees, where broadleaved trees have become too large or multi-stemmed to enable automated harvesting techniques, have not been taken into account within the forecast, nor has the size of the woodland been used as a category of exclusion from the forecast. Consequently, the forecast will include timber availability from small broadleaved woodlands down to 0.5 hectares in size. Such factors do not exclude timber from being available, but they may make it difficult to harvest the timber economically.

For more information about the Inventory methodology, see the *National Forest Inventory forecasts methodology overview*.

Results

Tables 2 and 3 give respectively the stocked area and standing volume of broadleaves by country and by sector (FC/NRW and Private sectors) as at 31 March 2012, the baseline for the forecast. Tables A1 and A2 in Appendix A provide breakdowns of these values by principal species.

Table 4 gives the 50-year forecast of hardwood timber availability from the headline scenario for GB and each country, broken down by FC/NRW estate and Private sector estate. The results are presented as average annual availability of hardwood timber in 5-year periods (apart from an initial 4-year period). Appendix B, Table B1 provides a breakdown of these values by principal species for GB and individual countries, separately for the FC/NRW estate and the Private sector estate. Table B2 (available outside the document in the accompanying spreadsheet file that can be found at [www.reference]) provides a further breakdown of availability from principal broadleaved species at NFI region level. Table B3 provides a breakdown of available volumes into top diameter classes for GB and individual countries separately for the FC/NRW estate and the Private sector estate.

Figures 2 and 3 illustrate the 50-year forecast broken down by country, sector and five-year period.

Table 5 and Figure 4 show the evolution of standing volume under the headline scenario used to derive the forecast results, in similar manner to Table 2 and Figure 3 for availability, while Table 6 and Figure 5 show the evolution of annual increment in like manner.

Figure 6 shows a schematic evolution of the forecast from the headline scenario in terms of future development of standing volume, production and net increment on a GB scale. From this, the essential functional relationships between these three key variables of the forecast can be observed. Similar presentations of these variables at the scale of individual countries are shown in Figures 7, 8 and 9 for England, Scotland and Wales respectively.

Table 7 gives the 50-year forecasts of hardwood timber availability for GB from the Private sector under the four scenarios investigated in the forecast, in terms of average annual production per period.

Figure 10 shows the availability over time from the Private sector for the four scenarios from Table 7 in graphical form.

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Figure 11 shows the forecast evolution of standing volumes of Private sector broadleaved tree stock as a consequence of implementation of scenarios 2, 3 and 4 in Table 7.

Two more variants of the '75% of stands under management plans' covering 50% and 25 % of stands under management plans are available in the supplementary spreadsheet tables provided alongside this report (figures 10 b, 11b, H1b and H2b).

In Appendix C, a number of tables are provided that present various aspects of future standing volumes of broadleaved growing stock, as forecast under the headline scenario. The individual tables in this appendix are:

- Table C1, providing forecasts of standing volumes for GB and individual countries broken down by sector and by principal species;
- Table C2, providing forecasts of standing volumes for individual NFI regions broken down by sector and by principal species;
- Tables C3, C4, C5 and C6, providing forecasts of standing volumes for England, Scotland, Wales and Great Britain respectively, broken down by sector and age class; and
- Tables C7, C8, C9 and C10, providing forecasts of standing volumes for England, Scotland, Wales and Great Britain respectively, broken down by sector and mean size (dbh) class.

A breakdown of forecast net increment under the headline scenario is provided in Appendix D, Table D1, in which net increment for GB and individual countries is broken down by sector and by principal species.

Figure E1 in Appendix E shows the mean yield classes calculated for broadleaved species from those recorded in the FC sub-compartment database for the FC/NRW estate, and from the results of the NFI field survey for the Private sector estate. They are presented for GB as a whole and for the individual countries.

Appendix F provides graphical representation of a number of aspects of the NFI field survey data used for the Private sector forecast that are relevant to the interpretation of these forecasts. Figures F1, F2, F3 and F4 show the percentage of broadleaved stands in England, Scotland, Wales and GB respectively that showed evidence of various aspects of stand management. Figure F5 shows the percentage of broadleaved stands that showed evidence of previous thinning activities in GB and in the individual countries. Figures F6, F7 and F8 respectively present the proximities to roads, the presence of roads or rides in the sample square, and the types of road present. Each figure presents the information at the levels of GB, individual country, and NFI region. Figure F9 shows the proportions of visited sites containing broadleaves across GB that NFI surveyors assessed to be in various categories of difficulty for harvesting.

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Table G1 provides information on the number of NFI sites surveyed by country and NFI region, from which the forecasts for the Private sector have been generated.

In Appendix H, Figure H1 extends the forecasts of availability of hardwood volume arising from Scenarios 2, 3 and 4 in Table 7 to a forecast series of annual average availability over the next 100 year period, while Figure H2 shows the impact of the same scenarios on the forecast evolution of broadleaved standing volumes over the 100 year period.

Appendix I, table I1 provides a detailed forecast of hardwood timber volume arising from the unrestricted modified biological potential scenario. Breakdowns of this forecast by NFI region, species and top diameter are available in the supplementary spreadsheet tables provided alongside this report.

The baseline date for these forecasts is 31 March 2012. The forecast starts in 2013, with 2013 defined as starting on 1 April 2012 and ending on 31 March 2013. This convention applies to all forecast years or periods quoted. All values are given in m³ overbark standing (obs) and, as in previous forecasts, all annual harvested volumes include 'thinning plus felling'. Volumes are presented as average annual harvested volume for each five year period, except for the first period of 2013-16, which is a four year period. The values in the tables have been independently rounded, so may not add to the totals shown. In some breakdowns of Private sector estimates and forecasts (e.g. by principal species) the estimates or forecasts in the body of the table may not sum to the quoted total because each individual value, including the total, has been independently generated by the estimation procedure used for deriving results from the NFI sample survey. Sampling standard errors (SE) attached to Private sector estimates are expressed in relative terms (%) to the right of the relevant estimate.

Stocked area at 31 March 2012

Table 2 Stocked area of broadleaves at 31 March 2012

| Country | FC/NRW | Private sector | | Total |
|----------------------|------------------|------------------|----------|------------------|
| | area (000 ha) | area (000 ha) | SE % | area (000 ha) |
| England | 53.7 | 848.6 | 1 | 902.3 |
| Scotland | 32.1 | 265.1 | 2 | 297.2 |
| Wales | 16.2 | 120.9 | 2 | 137.1 |
| Great Britain | 101.9 | 1,234.7 | 1 | 1,336.6 |

Standing volume at 31 March 2012

Table 3 Standing volume of broadleaves at 31 March 2012

| Country | FC | Private sector | | Total |
|----------------------|------------------------------------|------------------------------------|----------|------------------------------------|
| | volume (000 m ³ obs) | volume (000 m ³ obs) | SE % | volume (000 m ³ obs) |
| England | 8,708 | 172,327 | 2 | 181,035 |
| Scotland | 3,875 | 32,894 | 4 | 36,769 |
| Wales | 1,892 | 25,402 | 6 | 27,294 |
| Great Britain | 14,474 | 230,624 | 1 | 245,098 |

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50-year broadleaf forecast

Table 4 50-year forecast of hardwood timber availability

| Forecast period | FC/NRW | Private sector | | Total |
|----------------------|-----------------------------------|-----------------------------------|-----|-----------------------------------|
| | volume (000m ³ obs) | volume (000m ³ obs) | SE% | volume (000m ³ obs) |
| England | | | | |
| 2013-16 | 126 | 122 | 5 | 249 |
| 2017-21 | 92 | 333 | 3 | 425 |
| 2022-26 | 110 | 538 | 3 | 648 |
| 2027-31 | 86 | 720 | 2 | 806 |
| 2032-36 | 99 | 825 | 2 | 923 |
| 2037-41 | 129 | 1,047 | 3 | 1,176 |
| 2042-46 | 189 | 1,915 | 3 | 2,104 |
| 2047-51 | 116 | 1,678 | 4 | 1,795 |
| 2052-56 | 134 | 1,254 | 4 | 1,388 |
| 2057-61 | 146 | 645 | 4 | 791 |
| Scotland | | | | |
| 2013-16 | 9 | 83 | 18 | 92 |
| 2017-21 | 9 | 139 | 8 | 148 |
| 2022-26 | 10 | 193 | 6 | 203 |
| 2027-31 | 10 | 233 | 5 | 244 |
| 2032-36 | 15 | 262 | 5 | 277 |
| 2037-41 | 24 | 367 | 7 | 391 |
| 2042-46 | 31 | 586 | 6 | 616 |
| 2047-51 | 40 | 675 | 7 | 715 |
| 2052-56 | 45 | 554 | 7 | 599 |
| 2057-61 | 64 | 343 | 8 | 406 |
| Wales | | | | |
| 2013-16 | 12 | 20 | 14 | 32 |
| 2017-21 | 11 | 46 | 9 | 58 |
| 2022-26 | 17 | 77 | 8 | 94 |
| 2027-31 | 12 | 100 | 7 | 112 |
| 2032-36 | 14 | 115 | 6 | 130 |
| 2037-41 | 19 | 153 | 10 | 171 |
| 2042-46 | 56 | 243 | 10 | 299 |
| 2047-51 | 19 | 227 | 10 | 246 |
| 2052-56 | 28 | 198 | 11 | 227 |
| 2057-61 | 28 | 139 | 12 | 167 |
| Great Britain | | | | |
| 2013-16 | 147 | 225 | 7 | 373 |
| 2017-21 | 111 | 519 | 3 | 631 |
| 2022-26 | 137 | 808 | 2 | 945 |
| 2027-31 | 108 | 1,054 | 2 | 1,162 |
| 2032-36 | 128 | 1,202 | 2 | 1,330 |
| 2037-41 | 172 | 1,567 | 3 | 1,738 |
| 2042-46 | 276 | 2,743 | 3 | 3,019 |
| 2047-51 | 175 | 2,580 | 3 | 2,755 |
| 2052-56 | 208 | 2,006 | 3 | 2,214 |
| 2057-61 | 237 | 1,127 | 3 | 1,364 |

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Figure 2 50-year forecast of hardwood timber availability

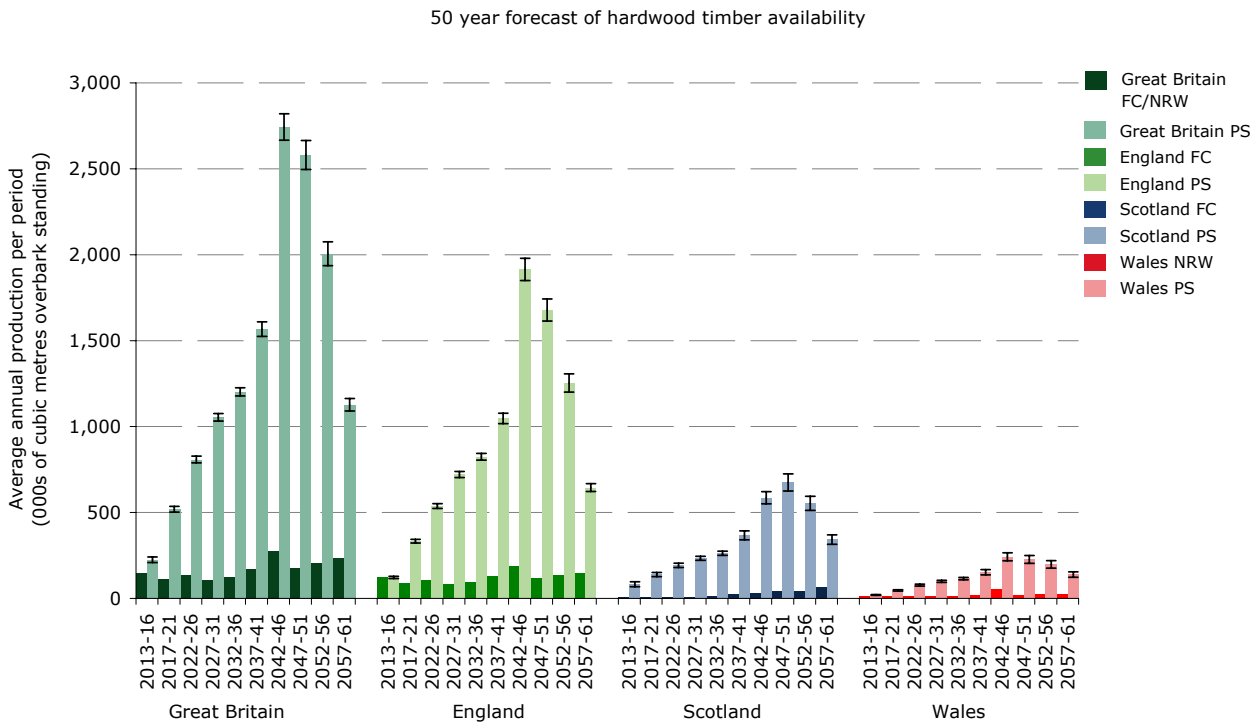


Figure 3 50-year forecast of hardwood timber availability



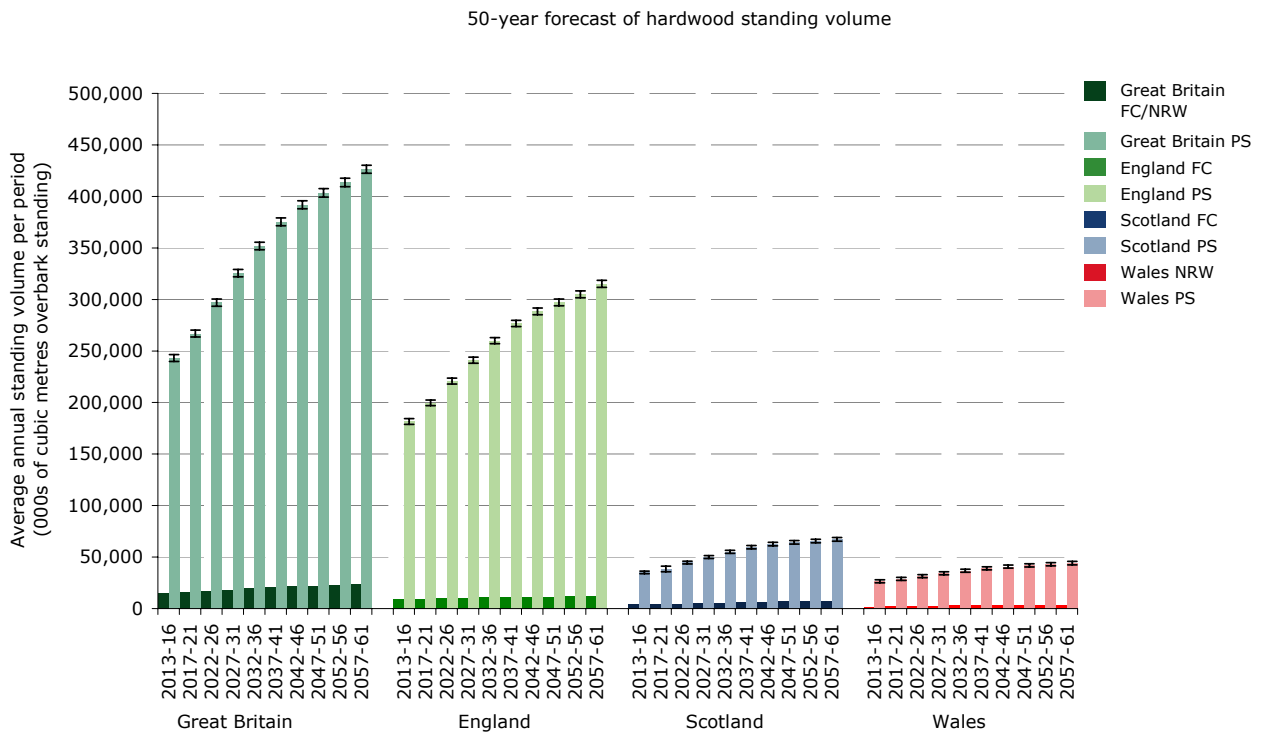
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Table 5 50-year forecast of hardwood standing volume

| Forecast period | FC/NRW | Private sector | | Total |
|----------------------|-----------------------------------|-----------------------------------|-----|-----------------------------------|
| | volume (000m ³ obs) | volume (000m ³ obs) | SE% | volume (000m ³ obs) |
| England | | | | |
| 2013-16 | 8,864 | 181,650 | 1 | 190,514 |
| 2017-21 | 9,320 | 199,698 | 1 | 209,018 |
| 2022-26 | 9,788 | 220,739 | 1 | 230,527 |
| 2027-31 | 10,298 | 241,143 | 1 | 251,440 |
| 2032-36 | 10,843 | 259,994 | 1 | 270,837 |
| 2037-41 | 11,248 | 276,702 | 1 | 287,950 |
| 2042-46 | 11,484 | 288,480 | 1 | 299,964 |
| 2047-51 | 11,614 | 297,056 | 1 | 308,669 |
| 2052-56 | 11,931 | 304,997 | 1 | 316,929 |
| 2057-61 | 12,121 | 315,057 | 1 | 327,178 |
| Scotland | | | | |
| 2013-16 | 4,037 | 35,046 | 4 | 39,083 |
| 2017-21 | 4,370 | 38,492 | 3 | 42,862 |
| 2022-26 | 4,777 | 44,670 | 3 | 49,447 |
| 2027-31 | 5,230 | 50,041 | 3 | 55,271 |
| 2032-36 | 5,728 | 55,141 | 3 | 60,869 |
| 2037-41 | 6,209 | 59,560 | 3 | 65,769 |
| 2042-46 | 6,634 | 62,626 | 3 | 69,261 |
| 2047-51 | 7,013 | 64,357 | 3 | 71,371 |
| 2052-56 | 7,341 | 65,486 | 3 | 72,828 |
| 2057-61 | 7,590 | 67,201 | 3 | 74,791 |
| Wales | | | | |
| 2013-16 | 1,966 | 26,541 | 6 | 28,507 |
| 2017-21 | 2,147 | 28,817 | 5 | 30,964 |
| 2022-26 | 2,346 | 31,560 | 5 | 33,905 |
| 2027-31 | 2,612 | 34,291 | 4 | 36,903 |
| 2032-36 | 2,892 | 36,855 | 4 | 39,746 |
| 2037-41 | 3,153 | 39,121 | 4 | 42,275 |
| 2042-46 | 3,316 | 40,787 | 4 | 44,103 |
| 2047-51 | 3,429 | 42,020 | 4 | 45,449 |
| 2052-56 | 3,611 | 43,025 | 4 | 46,636 |
| 2057-61 | 3,763 | 44,140 | 4 | 47,903 |
| Great Britain | | | | |
| 2013-16 | 14,866 | 243,237 | 1 | 258,104 |
| 2017-21 | 15,837 | 267,006 | 1 | 282,843 |
| 2022-26 | 16,911 | 296,968 | 1 | 313,879 |
| 2027-31 | 18,139 | 325,475 | 1 | 343,614 |
| 2032-36 | 19,462 | 351,990 | 1 | 371,452 |
| 2037-41 | 20,610 | 375,383 | 1 | 395,994 |
| 2042-46 | 21,435 | 391,893 | 1 | 413,328 |
| 2047-51 | 22,056 | 403,433 | 1 | 425,489 |
| 2052-56 | 22,883 | 413,509 | 1 | 436,392 |
| 2057-61 | 23,474 | 426,397 | 1 | 449,871 |

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Figure 4 50-year forecast of hardwood standing volume



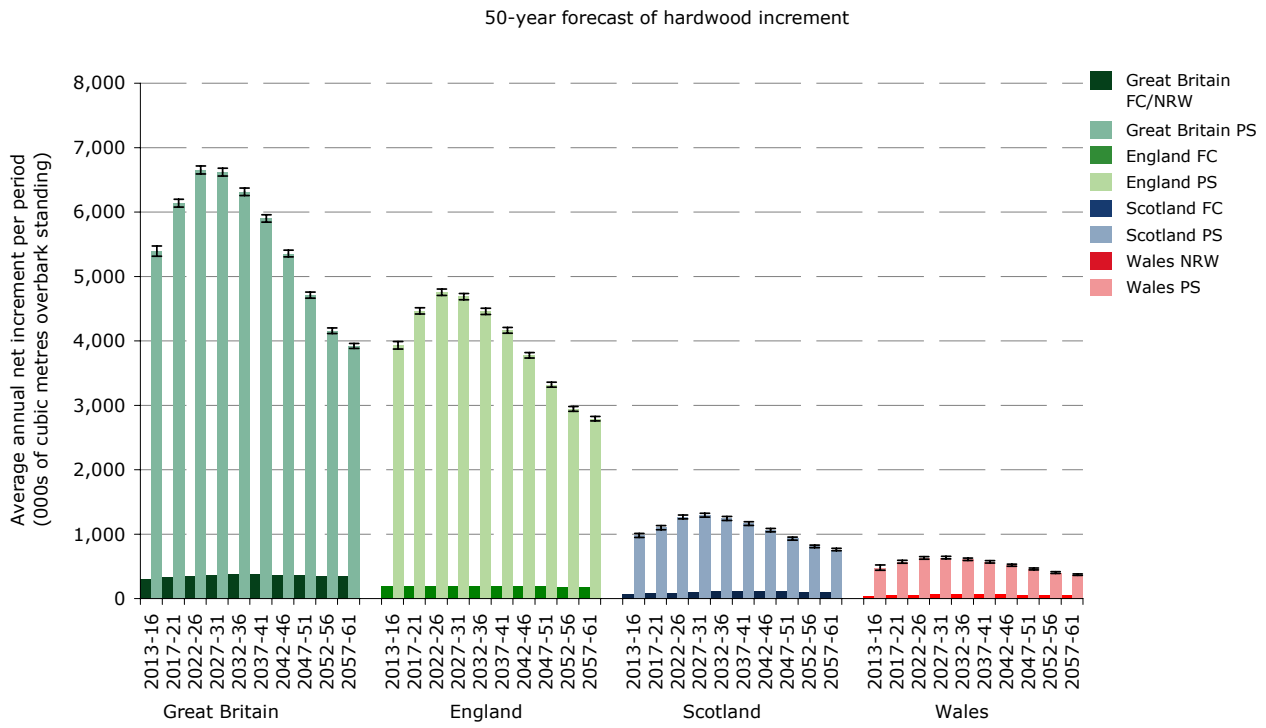
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Table 6 50-year forecast of hardwood increment

| Forecast period | FC/NRW | Private sector | | Total |
|----------------------|-----------------------------------|-----------------------------------|-----|-----------------------------------|
| | volume (000m ³ obs) | volume (000m ³ obs) | SE% | volume (000m ³ obs) |
| England | | | | |
| 2013-16 | 190 | 3,931 | 1 | 4,121 |
| 2017-21 | 194 | 4,466 | 1 | 4,660 |
| 2022-26 | 195 | 4,755 | 1 | 4,950 |
| 2027-31 | 197 | 4,689 | 1 | 4,886 |
| 2032-36 | 200 | 4,459 | 1 | 4,658 |
| 3037-41 | 196 | 4,163 | 1 | 4,359 |
| 2042-46 | 192 | 3,776 | 1 | 3,968 |
| 2047-51 | 187 | 3,321 | 1 | 3,508 |
| 2052-56 | 185 | 2,945 | 1 | 3,129 |
| 2057-61 | 181 | 2,792 | 1 | 2,973 |
| Scotland | | | | |
| 2013-16 | 72 | 980 | 3 | 1,052 |
| 2017-21 | 83 | 1,101 | 3 | 1,184 |
| 2022-26 | 92 | 1,266 | 2 | 1,358 |
| 2027-31 | 104 | 1,294 | 2 | 1,398 |
| 2032-36 | 112 | 1,245 | 2 | 1,357 |
| 3037-41 | 113 | 1,166 | 2 | 1,280 |
| 2042-46 | 112 | 1,061 | 2 | 1,174 |
| 2047-51 | 111 | 931 | 2 | 1,041 |
| 2052-56 | 108 | 810 | 2 | 918 |
| 2057-61 | 104 | 760 | 2 | 863 |
| Wales | | | | |
| 2013-16 | 43 | 481 | 8 | 524 |
| 2017-21 | 51 | 571 | 4 | 622 |
| 2022-26 | 59 | 633 | 3 | 692 |
| 2027-31 | 68 | 635 | 3 | 703 |
| 2032-36 | 71 | 611 | 3 | 682 |
| 3037-41 | 68 | 570 | 3 | 638 |
| 2042-46 | 64 | 518 | 3 | 583 |
| 2047-51 | 61 | 458 | 3 | 519 |
| 2052-56 | 60 | 403 | 3 | 463 |
| 2057-61 | 57 | 371 | 3 | 428 |
| Great Britain | | | | |
| 2013-16 | 305 | 5,392 | 1 | 5,697 |
| 2017-21 | 328 | 6,138 | 1 | 6,467 |
| 2022-26 | 346 | 6,654 | 1 | 7,000 |
| 2027-31 | 369 | 6,618 | 1 | 6,987 |
| 2032-36 | 383 | 6,314 | 1 | 6,697 |
| 3037-41 | 377 | 5,899 | 1 | 6,276 |
| 2042-46 | 369 | 5,356 | 1 | 5,724 |
| 2047-51 | 359 | 4,709 | 1 | 5,068 |
| 2052-56 | 352 | 4,158 | 1 | 4,510 |
| 2057-61 | 342 | 3,922 | 1 | 4,264 |

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Figure 5 50-year forecast of hardwood increment



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Figure 6 50-year summary of hardwood standing volume, increment and production for GB (FC/NRW and PS)

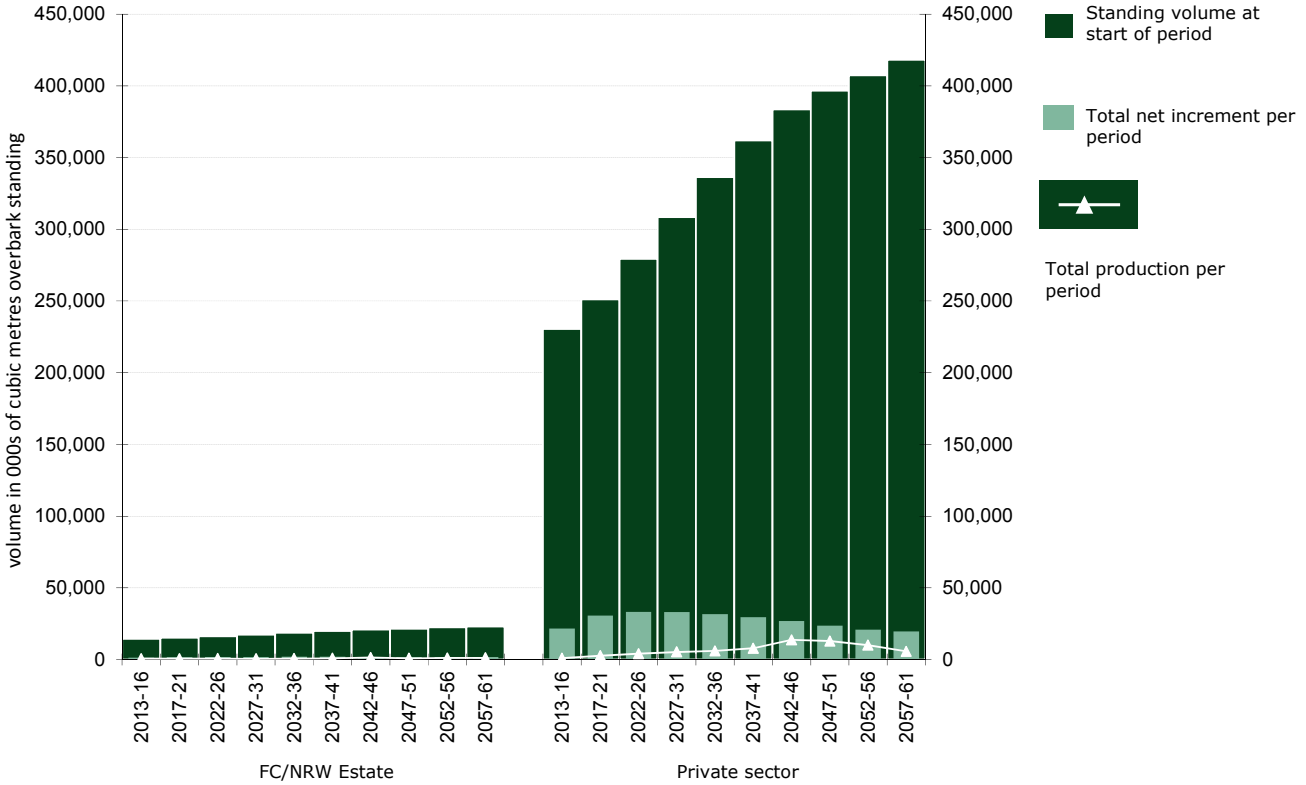
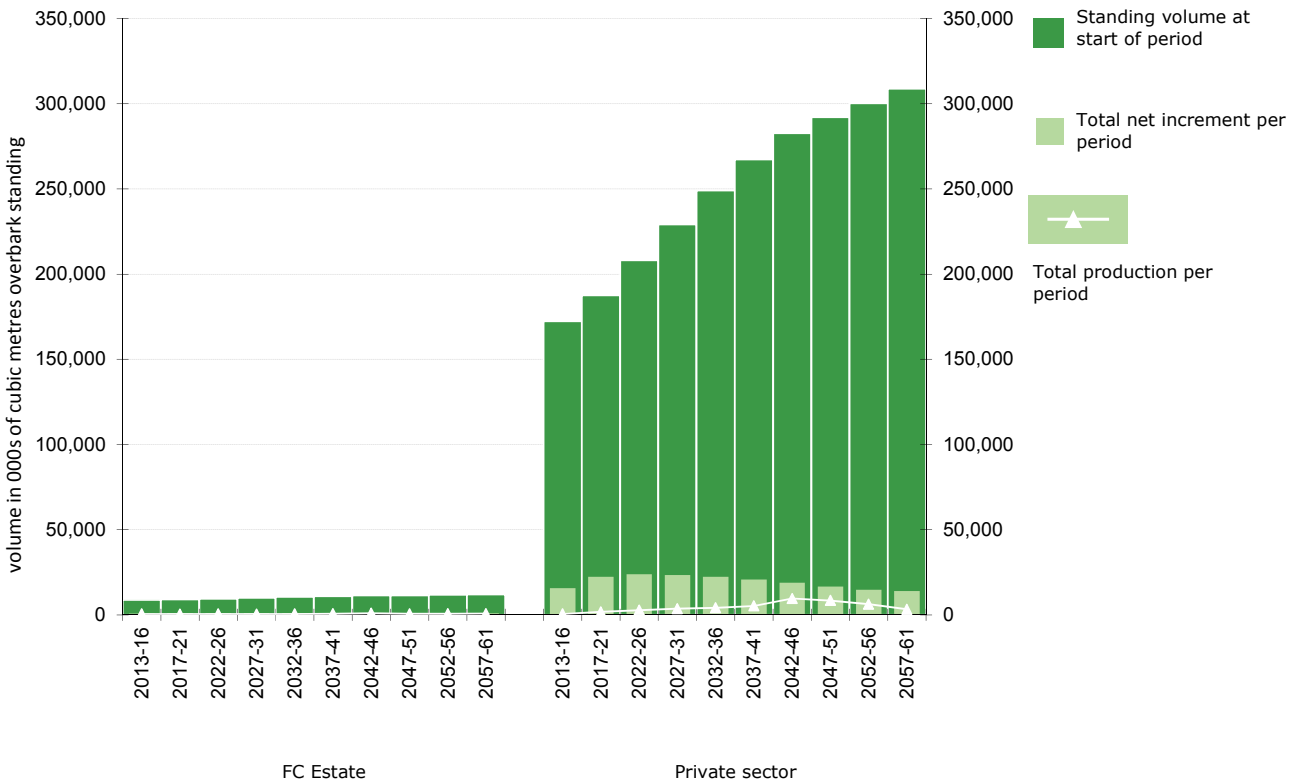


Figure 7 50-year summary of hardwood standing volume, increment and production for England (FC and PS)



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Figure 8 50-year summary of hardwood standing volume, increment and production for Scotland (FC and PS)

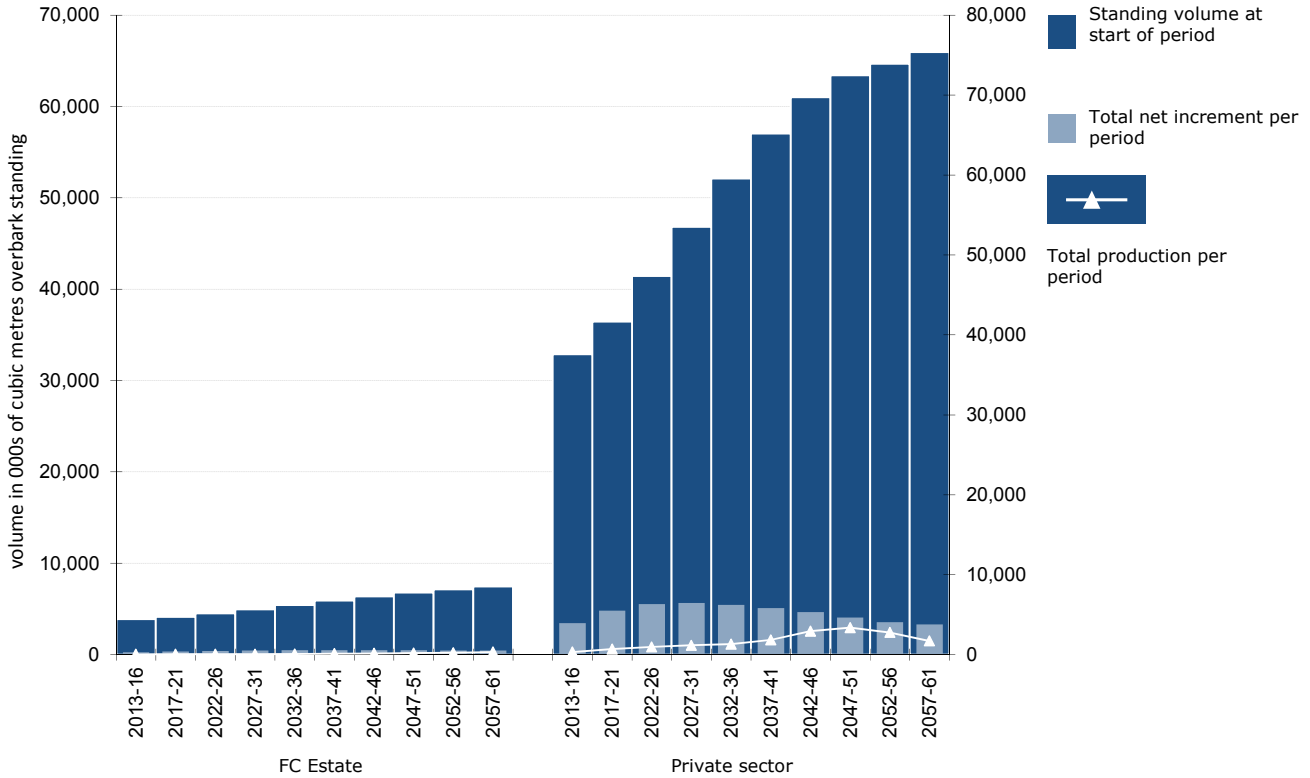
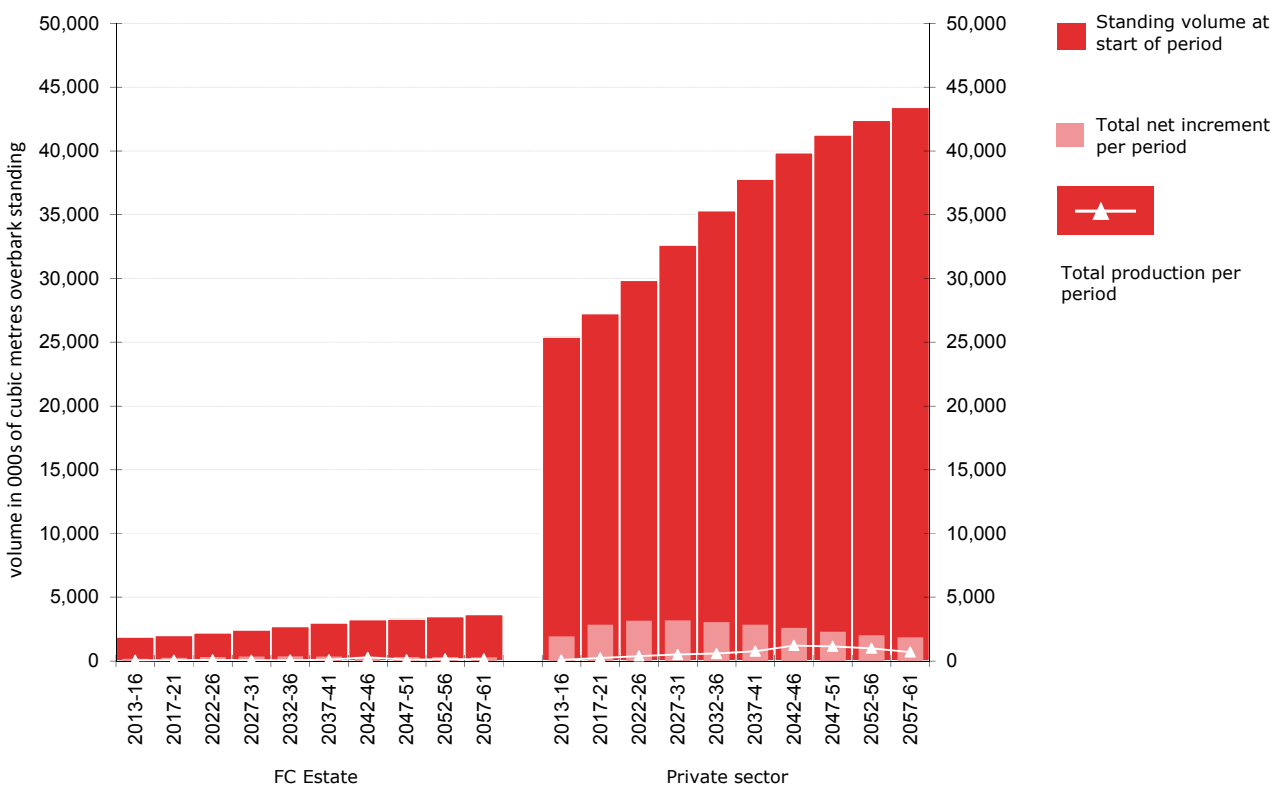


Figure 9 50-year summary of hardwood standing volume, increment and production for Wales (NRW and PS)



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Table 7 Impact of harvesting assumptions on potential availability

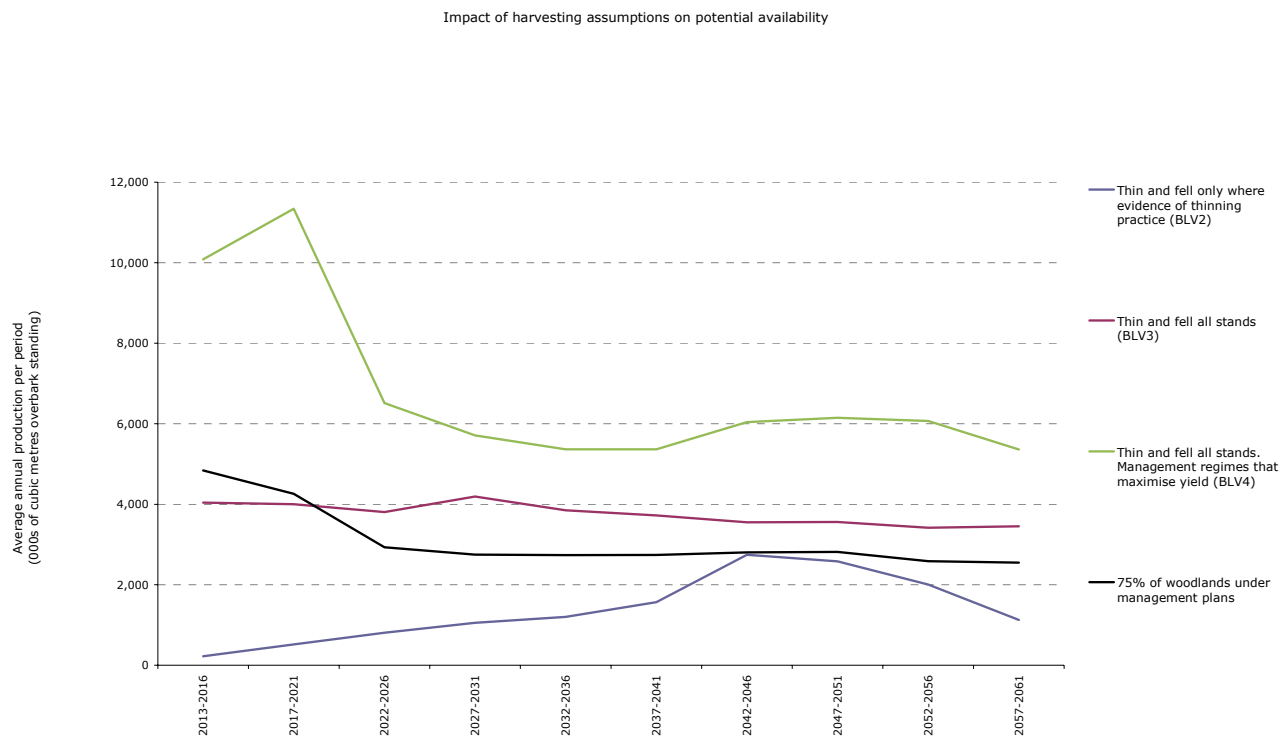
| Scenario | | Standing volume 2012 | Standing volume 2061 | Standing volume 2111 | Overdue |
|--|-----------|----------------------------|----------------------------|----------------------------|---------|
| Thin and fell only where evidence of thinning practice | 000m3 obs | 230,562 | 432,106 | 485,780 | |
| Thin and fell all stands target dbh | 000m3 obs | 229,295 | 321,155 | 327,301 | |
| Thin and fell all stands, regimes that maximise yield | 000m3 obs | 229,373 | 211,602 | 211,354 | |
| 75% of woodlands under management plans | 000m3 obs | 229,652 | 356,201 | 412,518 | |

| Scenario | 2013-2016 | 2017-2021 | 2022-2026 | 2027-2031 | 2032-2036 | 2037-2041 |
|--|-----------|-----------|-----------|-----------|-----------|-----------|
| Thin and fell only where evidence of thinning practice | 225 | 519 | 808 | 1,054 | 1,202 | 1,567 |
| Thin and fell all stands target dbh | 4,042 | 4,001 | 3,807 | 4,192 | 3,850 | 3,722 |
| Thin and fell all stands, regimes that maximise yield | 10,082 | 11,339 | 6,515 | 5,708 | 5,365 | 5,365 |
| 75% of woodlands under management plans | 4,841 | 4,262 | 2,931 | 2,748 | 2,737 | 2,742 |

| Scenario | 2037-2041 | 2042-2046 | 2047-2051 | 2052-2056 | 2057-2061 | Cumulative production to 2061 |
|--|-----------|-----------|-----------|-----------|-----------|-------------------------------------|
| Thin and fell only where evidence of thinning practice | 1,567 | 2,743 | 2,580 | 2,006 | 1,127 | 68,931 |
| Thin and fell all stands target dbh | 3,722 | 3,550 | 3,561 | 3,416 | 3,453 | 183,923 |
| Thin and fell all stands, regimes that maximise yield | 5,365 | 6,042 | 6,146 | 6,068 | 5,357 | 329,846 |
| 75% of woodlands under management plans | 2,742 | 2,805 | 2,817 | 2,586 | 2,549 | 150,240 |

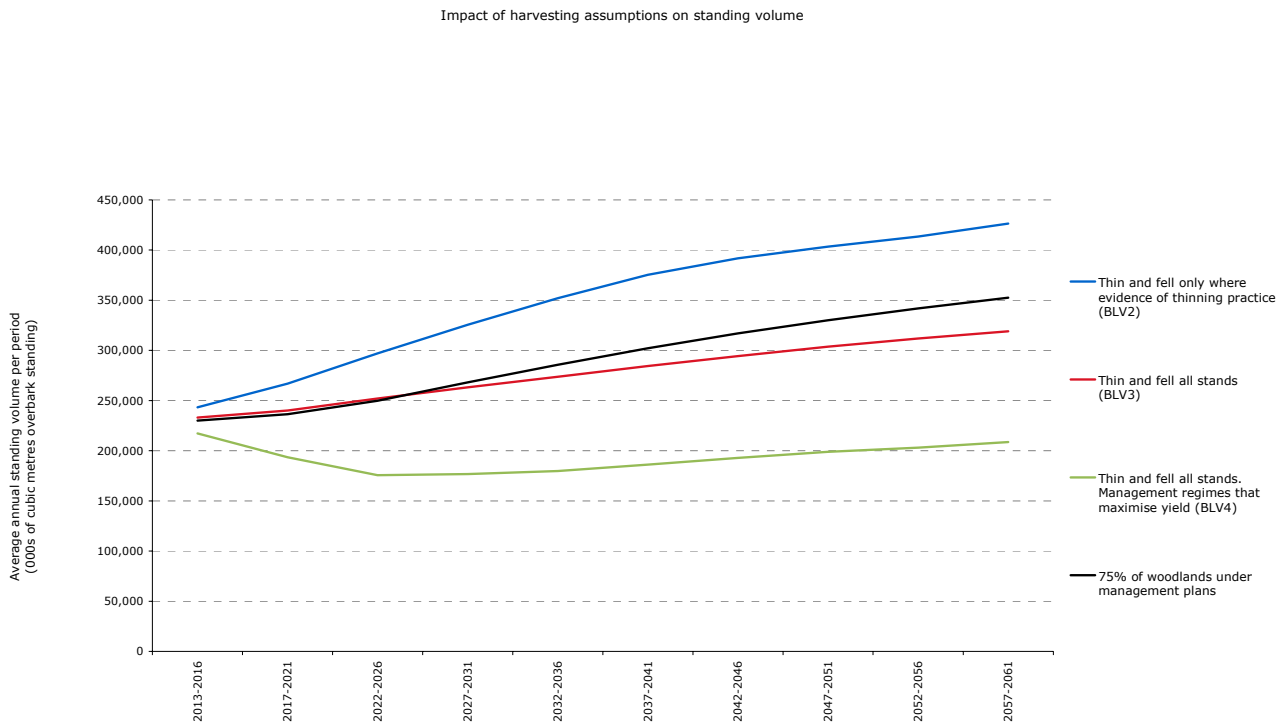
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Figure 10 Impact of harvesting assumptions on potential availability



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Figure 11 Impact of harvesting assumptions on standing volume



What the results tell us

Over the 50 year period average annual potential production under all harvesting scenarios is higher than current (2012) levels of production of around 590,000 m³ obs (532,000 green tonnes – *Forestry Statistics* 2013) per annum.

The headline scenario of harvesting to biological potential only where there is evidence of current thinning activity forecasts a similar amount of potential hardwood timber production in the first period of the forecast to that of the reported current level. From this level, potential production increases to over 2.5 million m³ per annum, before reducing to around 1 million m³ per annum in the last period of the forecast. This indicates that most stands currently in production are immature and will come to maturity later in the forecast period.

This forecast scenario, whilst having the benefit of being synchronised with current levels of harvesting activity (which can be useful for predicting probable future levels of standing volume and increment), is significantly underestimating potential availability. For this the results of the unrestricted biological potential scenario provides the best indication.

The unrestricted biological potential scenario forms a 'high ceiling' of potential production and shows an initial large rise in production from current levels. This initial peak in production is driven by the underlying age class structure of the forests in Britain. This peak is highly unlikely to occur, but it does demonstrate that there is a considerable volume of overdue timber within the current broadleaved resource. If this were to be harvested to maximise biological potential, a significant amount of timber would come to market in the near term. After the overdue timber is removed from the growing stock, average annual production from management of broadleaved stands according to biological potential is around 6 million m³ per annum.

The alternative harvesting scenario of felling and thinning to a target diameter is one favoured by those currently growing broadleaved sawlogs. As most broadleaved trees are below the target diameter size, there is not a significant spike in production at the start of the forecast period, but production would still average 4 million m³ per annum, again significantly above current actual production.

Within these overall trends there are different trends forecast for the FC/NRW and Private sector estates.

Forecast for the FC/NRW estate

The amount of broadleaved stocked area within the FC/NRW estate is relatively low compared to that of the private estate. As a result, the pattern of production arising from the FC/NRW estate has little influence on the overall profile of potential production. The FC/NRW estate's profile of potential production can be broadly described as a gradual increase in production through the forecast period, rising from 100,000 m³ per annum in the first period (2013-16) to 250,000 m³ per annum in the final period (2057-61). (This increase continues into the 50 – 100 year forecast period, where at one point nearly 500,000 m³ per annum is forecast.) This forecast is based upon existing felling and thinning plans and as a result is expected to be closer to realised future production than the scenario outcomes for the private sector.

However, this is a long term strategic forecast and as such will not entirely reflect either current policy or future policy as the forecast is entirely based on felling and thinning plans as of 31 March 2012. It should also be noted that whilst the Forestry Commission has made a series of strategic commitments associated with the standard 25-year softwood forecast, no such commitments apply to the 50-year forecast outside of existing contractual obligations.

Forecast for the Private sector estate

Over the 50 year period, average annual potential production is higher than the current (2012) level of non-FC production of 531 thousand m³ obs (478,000 green tonnes of hardwood timber in 2012 - FC *Forestry Statistics 2013*). The general trend in potential production for the 'headline' scenario is to increase from a low level of 225,000 m³ per annum in the first period (2013-16) to 2.74 million m³ per annum in 2042- 46. Volume levels increase strongly to this peak and then begin to decline to a level of 1.3 million m³ per annum by the end of the forecast period. This is still at a significantly higher level than the starting point. A larger peak and subsequent decline occurs in the following 50 to 100 year period, as shown in the summary results in Appendix H. However, this profile is very much determined by assuming that only woods currently thinned will be harvested in future.

The trends for the other two main scenarios are quite different. In these two scenarios, which fell and thin all woodland (rather than only areas where there is current activity, as specified in the 'headline' scenario) the area in production expands considerably compared to the headline scenario and as a consequence potential production is significantly higher in both scenarios, especially so for felling at age of maximum MAI.

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Figures 10 and 11 show markedly higher levels of potential availability for both scenarios and a corresponding commensurate impact on levels of standing volume.

Analysis of the underlying factors influencing the overall future trends in potential production for each scenario has shown that three main contributory factors determine these profiles;

- Age class structure
- Harvesting activity
- Overdue timber

These are discussed in more detail below.

Age class structure

The main factor behind the profile of potential production for the private sector estate is the age class structure of existing stands. The NFI report *NFI preliminary estimates of quantities of broadleaved species in British woodlands, with special focus on ash* is an – in-depth study of the composition of broadleaves within GB. The report shows that stocked area by age class is moderately well distributed across age classes, which, on the assumption of an 80 year rotation, will lead to relatively even flows of timber if stands are brought into management. Two of the scenarios, however, produce small peaks of production, and this is due to 26% of stocked area in broadleaves being within stands aged between 21 and 40 years, and a further 19% in stands aged between 41 and 60 years. This moderate clustering of ages leads to a small clustering of harvesting activity within similar bands of time and this produces the resultant small peaks in production in scenarios in which harvesting is closely associated with tree age. However, it is notable that the natural lifespan of most British broadleaves is greater than 80 years. The relative paucity of stands of over 80 or 100 years of age does not correspond with what would be expected of a long established woodland resource subject only to its own internal ecological processes, which in turn suggests that the broadleaved stock has been relatively recently established and otherwise impacted upon by human intervention. This foreshortening or clustering of broadleaved tree ages is a product of the history of the forest resource in GB and has led to an uneven and foreshortened age profile. This age profile is the principal determinant of the production profiles in the 50-year forecast. The principles and rationale behind equating age class structure and potential production profiles are expanded upon in the NFI report *Interpreting NFI Timber Volume Forecasts*.

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Harvesting activity

The unrestricted biological potential scenario analysed in the report represents the volume of timber that would be produced if felling took place in the year of maximum MAI and thinning conforms to management table thinning (except in high wind risk areas, as noted previously) across all stands. This represents an upper limit of what could be produced sustainably. Volumes arising from this scenario are presented in Appendix I. In contrast, the headline scenario, where harvesting is restricted to areas where there is evidence of thinning, dramatically reduces forecast volumes, most notably in the earlier part of the forecast period. Overall this scenario produced 80% less timber in comparison with the scenario which assumed all woodland was in production.

The target diameter scenario assumes the longer rotations that would be necessary to achieve the specified target mean diameter at breast height (dbh). These longer rotations depress cumulative volume production by 44% within the forecast period when compared to felling at age of maximum MAI.

Choosing the restricted biological potential based scenario over the unrestricted version illustrates the difference between the 'upper ceiling' of potential production attainable through harvesting choices and what may be achieved if the current low levels of harvesting activity are maintained. Choosing a scenario which aims to mimic current levels of harvesting activity leads to a projected reduction in cumulative volume production of around 70% over a 100-year period.

Similarly over 100 years the target diameter forecast produces 45% less potential volume than the unrestricted biological potential scenario. This arises because the biological potential forecast uses shorter rotations which are targeted at maximising yield, whereas the scenario harvesting to a target diameter seeks to maximise the out-turn of a specific product, which, dependent upon market demand, may be the optimum economic strategy for the grower.

The policy evaluation scenario of bringing 75% of stands under management plans produces a similar profile to the target dbh scenario. This would be expected as both bring most woodlands into production and both utilise silvicultural practices that fell beyond age of maximum MAI, which would depress overall volume production. However, silviculture of this nature will maximise other benefits, such as the ecological value of some habitats and the production of certain sized timber products.

Such variation in potential production shows how different harvesting strategies can have a significant impact on the timing of harvesting and on the level of volume forecasts within periods and demonstrates the difficulty in accurately predicting actual

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levels of future harvesting. The *Interpreting National Forest Inventory timber volume forecasts* report discusses how approaches to harvesting influence and constrain the amount of timber that is likely to be harvested in any given period.

Overdue timber

The management of overdue timber in the broadleaved resource is a significant factor in determining the profile over time of forecast timber volume. The first experimental forecasts that were run for broadleaved timber were based upon biological potential and felling at age of maximum MAI. This approach placed half of all broadleaved standing volume at the start of the forecast period into the overdue category and the production forecast tools at that time assumed that all overdue would be felled at day one of the forecast period. Clearly felling 50% of standing volume at day one would produce unrealistic profiles and this necessitated the establishment of realistic management approaches for handling overdue broadleaved timber. As a result the consultation exercise was established to find a practical set of assumptions of future management of such overdue broadleaved timber.

There was a consensus within the private sector that both undermanaged and overdue stands could be brought back into production through applying heavy initial thinning to gradually move stands to management table stocking levels. Once this was achieved then stands would be intermediate thinned with the aim of producing a specific target diameter at time of clearfell. In addition, it was recognised that after broadleaved stems achieve a certain age or diameter, there is a marked decrease in the quality of the timber product that would arise from such stands and for this reason stands composed of large individual stems should be felled expediently. Applying felling and thinning prescriptions based upon mean stem diameter was a significant departure from previous approaches using maximum MAI and required the research and development of new modelling tools to achieve this.

The approaches developed have been effective in providing more realistic future treatment of overdue timber. Under all three scenarios the removal of 50% of standing volume in the first year has been avoided and relatively even profiles have resulted. This smoothing has been achieved in two ways;

- The assumptions used in the scenarios impact upon the determination of what is overdue by setting this as either age of maximum MAI or attainment of a target diameter.
- By distributing the felling of overdue volumes over a period of time.

Introduction of these assumptions in place of felling at day one of the forecast significantly altered the overall profile of production, and varying these assumptions has

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also produced noticeable differences between the three main scenarios presented in this report.

The unrestricted biological potential scenario produces enhanced levels of production in the first two 5-year periods of the forecast compared to the other scenarios, but this is much smaller than the original 50% of standing volume. This is a product of the scenario criteria determining a large proportion of standing volume at the start of the forecast as significantly overdue (greater than 100cm dbh) and allocating it for harvest within the first two periods of the forecast.

The restricted biological potential scenario uses the same basis of discerning overdue timber, but there is no parallel smaller spike in production in this scenario which indicates an absence of significantly overdue timber in stands that have been thinned recently or relatively recently.

Overdue timber of less than 100cm mean dbh will often be retained for a long period under this scenario. This has the impact of lengthening the rotation length of overdue stands and smoothing out production.

Effectively, the application of the target diameter scenario classifies overdue timber by different criteria, reducing the 50% standing volume that is overdue according to the original definition (beyond maximum MAI). This has the effect of reducing the amount of near-term production due to felling of overdue timber.

Whether this timber is available for harvesting in practice will depend upon a number of factors, including management objectives and environmental constraints. A wide array of felling and retention practices will apply to these stands, with some being retained and some felled at different points in time in the future.

Impact of restocking

The 50-year softwood forecast restocks currently clearfelled land and reduces stocked area at restock, as well as altering the species mix. As the conifer forecast assumes that 5% of conifer stocked area is converted to broadleaved stocked area at time of restock this assumption has an impact upon the hardwood forecast.

These assumptions do not impact greatly within the first 25 years of either forecast, but in the second half of the 50-year forecast the impacts are evident. As there are around 50,000 hectares of currently clearfelled sites in the private sector and hundreds of thousands of hectares of future conifer clearfell sites generated by the forecast, this has the effect of adding a significant amount of broadleaved stocked area over time and will thus increase hardwood production potential in the long term.

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The assumption of restocking 100% of clearfelled broadleaved stocked area at restock will have impacted upon potential hardwood timber production by maintaining stocked area in the long term. There is an interaction between the hardwood and softwood forecasts with respect to restocking options, and reducing previous conifer areas on restock by up to 20% (10% in the scenarios published in this report), with partial replacement with broadleaves, benefits potential future hardwood availability, but at the expense of up to 1 million m³ per year in potential softwood production. This loss to potential softwood production is especially notable in the 50 – 100 year period. It is not unreasonable to assume that broadleaves will be treated as prescribed, but it will have a marked impact in the long term and later forecasts may explore this dynamic further.

Yield class

The yield classes applied in this forecast for the Private sector estate are derived from the NFI fieldwork. Physical measurements were taken on a stand-by-stand basis to derive the yield classes applied in the growth and yield models used to project future development of each stand. For young stands on which an estimated yield class could not be reliably established, the mean yield class observed on older stands of the same species in the same NFI region were used. These are based upon 9546 NFI samples in the current forecast. The mean yield class for broadleaves derived from the sample is yield class 6. The mean yield classes found for individual species were:

- Oak 5.7
- Beech 7.5
- Sycamore 6.9
- Ash 7.2
- Birches 5.8
- Sweet Chestnut 7.8
- Hazel 4.3
- Hawthorn 4.6
- Alder 6.4
- Willow 5.4
- Other broadleaves 5.9

Woodland area, stocked area and standing volume

NFI first published an assessment of stocked area and standing volume of broadleaves as at 31 March 2011 in the 2012 NFI report *NFI preliminary estimates of quantities of broadleaved species in British woodlands, with special focus on ash*. This 2014 50-year hardwood forecast is based upon a later assessment of stocked area and standing volume as at 31 March 2012; the estimates of which can be found in Tables 2 and 3 (and in Appendix A, Tables A1 and A2) of this report. The stocked area of broadleaved

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trees in this later assessment was 4% more than estimated by the previous assessment (1,235,000 ha compared to 1,186,000 ha). Standing volume was 1.3% higher in the later assessment. These differences are due to:

- The base year for the forecast changing from 2011 to 2012, reflecting real change on the ground, such as clearfelling, new planting, restocking and growth between the two assessments.
- Improved methodology in separating out from stocked area the very small amounts of open space intimately mixed within stands, such as clearfell and grassed areas less than 0.01 ha in area.
- Improved methodology in identifying clearfell sites with a few remaining live trees as predominantly unstocked rather than as stocked area.
- Improved methodology in stratifying tree heights in stands with a complex storey structure. This is particularly applicable to broadleaved stands which have a higher proportion of complex storey structure than conifer stands.
- An improved estimate based upon 9594 samples as opposed to 4036 samples.

This increase in stocked area is not thought to have impacted on the forecast to any great extent. The increase in standing volume is expected to have arisen as a product of the first point, in particular due to an increase in standing volume as a result of actual volume increment in existing stock.

Impact of harvesting on standing volume

The level and frequency of thinning and felling will have an impact on standing volume and increment over time. If removals exceed increment then standing volumes will be reduced and vice versa. Standing volume for GB at 31 March 2012 is around 245 million m³. As the harvesting scenarios of this forecast are applied, total standing volume increases in the headline restricted biological potential scenario to 450 million m³ in the last period of the forecast (2057-61) and continues to increase to almost 500 million m³ at the end of a 100 year period. Similarly under the target mean dbh scenario standing volumes increase to 325 million m³ by the end of the forecast period (2057-61). These profiles arise as forecast increment exceeds forecast removals.

Under the unrestricted biological potential scenario standing volume marginally declines to an average annual figure of around 215 million m³ by the last period of the forecast (2057-61). This profile arises as forecast removals exceed forecast increment.

Under the headline scenario, annual net increment is 5.7 million m³ for the first period (2013–16) and for the remaining periods ranges between 4.3 to 7.0 million m³ per annum. The forecast average annual cut for the forecast period under the headline scenario is 1.6 million m³, and as such it can be concluded that increment is currently

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forecast to be greater than potential harvest within GB, which is the cause of the increase in standing volumes. However, this relies on the harvesting assumptions used, which will vary over time. It is noticeable that net increment declines in the later periods of the forecast. This probably reflects aging of the tree stock, and the inbuilt pattern in the FC yield tables of declining increment in aging tree stocks.

A large determinant in the forecast for total standing volume in GB is the underlying age class structure of the forests in Britain, where the majority of broadleaves are less than 100 years of age and most are less than 40 years of age. This is evidently due to the reestablishment of broadleaved woodland after the devastation of woodland that occurred during the two world wars and the preceding centuries, which seriously depleted GB woodlands. This has driven a broadleaved resource that is in 'recovery', one which has developed from a largely unstocked phase through to a current predominantly immature phase that is in the process of development into a more mature phase. This history is reflected in the age class structure of broadleaves found by the NFI and previous surveys. The forecasts presented in this document show that, without a significant increase in removals in the future, standing volumes of broadleaves will be expected to almost double in the forecast period.

This contrasts with forests of a more evenly distributed age found in most other countries, which result in a more even evolution of total standing volume, increment and production through time. Any comparisons of level of cut to increment should account for this. It should also be noted that the core 50-year forecast of this report is a limited projection of standing volume of broadleaves through time, focussing on a 50 year period, which represents a fraction of the life cycle of GB forests. It is for this reason that an indicative forecast of 100-years has been provided and some reference has been made to this in the text to set the results over 50 years within a wider context.

The reports *Standing timber volume for coniferous trees in Britain, 25-Year forecast of standing coniferous volume and increment* and *Interpreting National Forest Inventory timber volume forecasts* cover this subject in more detail.

Species and composition of volumes

The main species that contribute to potential production varies throughout the forecast period, with Beech, Oak, Birch and Sycamore as the respective top four contributors during the first period (2013-16). These relative contributions change through the forecast period until in the period of peak production (2042-46) the respective contributions are from Birch, Ash, Sycamore and Oak.

The assortments in Appendix B, Table B3 show a relatively high proportion of production in small diameter classes (7-14 cm) in the first periods of the forecast, a product of Management table thinning in the predominantly young age classes. In the later periods, as the growing stock ages and felling starts to form a larger component of harvesting, the assortments are spread more evenly between small and larger diameter classes, with the larger proportion of volume being produced in the size classes 24-34 cm and 34-44cm. Other scenarios would produce different assortments. Of those run for this report, the target diameter scenario in particular produces a different profile.

Impact of future events

The impact of future harvesting events on production levels in the Private sector is explored through the use of the scenarios. However, as current levels of activity are so low and owners have a wide range of objectives, it is unlikely that any of the scenarios will closely reflect what does occur over the 50 year forecast period and as such the scenarios should be viewed as illustrative.

For example, in terms of the headline forecast, it is unlikely that the small proportion of forests and woodlands that harvesting is restricted to will be the only woodlands and stands that are harvested in future, or that these be managed strictly according to biological potential. The scenario does however use evidence collected in the NFI fieldwork (2009 to 2013) to restrict the amount of stands in management for timber production to those that show evidence on the ground of currently being under such management. The forecast volume for the first four year period (2013-2016) resulting from this approach is the closest to current actual volume production out of the three scenarios, which suggests that the assumptions being applied are not greatly unrealistic.

The historic decline in broadleaved timber production does not suggest a significant increase in activity in the near term, which is the assumption inherent in the other scenarios provided. Such a step change in harvesting activity would not be expected to occur in the short term, but recent initiatives in prospective energy provision from forestry may possibly instigate increased demand. (It can be noted that use of GB hardwood timber as woodfuel is already its dominant use, accounting for 75% of

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hardwood deliveries in 2012.) With this in mind, these scenarios have been formulated to illustrate the potential of the broadleaved resource in this respect. The results illustrate that potential is far higher than current levels of activity and, over time, if certain regulatory and economic drivers were in place, the levels of production of the magnitude projected could be achieved within sustainable objectives.

It can be seen therefore that actual harvesting activity may follow a number of possible patterns and, as a result, actual production will almost certainly vary from the headline forecast results and the other scenarios supplied. In addition to the impact of harvesting decisions, there are other unpredictable external factors that are likely to have an impact on production over the period of the forecast. For example, pest and disease outbreaks (current risks include *Chalara fraxinea* and *Acute Oak Decline*), economic factors, developments in sectoral demands for hardwoods, severe weather events (windthrow), changes in land use (development and habitat restoration) and changes in government policy (affecting for example grants and regulation, energy provision and forest management) will all have impacts.

Conclusions

The National Forest Inventory aims to monitor all woodlands equally, irrespective of type or ownership. This strategy was to enable a broad evidence base to be established; one which could meet a range of policy requirements, current and emergent.

As a result broadleaved trees were measured equally alongside conifers and for the first time GB has a robust mensurational inventory of broadleaved trees and their timber potential.

The forest products industry in UK predominantly utilises and relies upon conifer timber and as a consequence previous FC timber forecasts of potential timber availability have exclusively concentrated on softwoods.

As interest in alternative sources of energy has risen and the concern surrounding the biodiversity impact of undermanaging broadleaved woodland has consolidated, it became increasingly apparent that there would be value in providing statistics on current broadleaved timber stocks and of providing forecasts of potential broadleaved timber production. In conjunction with the NFI Report *NFI preliminary estimates of quantities of broadleaved species in British woodlands, with a special focus on ash*, this report is aimed at addressing that requirement.

Forecasting potential broadleaved timber availability is more complex than that of conifers as there is no sizeable precedent of managing the majority of the resource for timber production, from which the likely course of future activity can be assessed (as there is for conifers). This proved problematic when formulating scenarios for the forecast. For example if the forecast was based upon the assumption of current levels of activity, which are very low, this will give very different results in comparison to assuming all broadleaved woodlands are managed. This is not the case for conifers, where most stands are managed in some way and projecting forward from that evidence base gives a firmer foundation for forecasts.

This divergence between actual and potential production leads to the broadleaved forecast being far more contingent upon the assumptions used for rates of harvesting than those of the conifer forecasts. For the biological potential and target diameter scenarios, the assumptions used on rate of harvesting have little basis in past practice. There is, however, the underlying knowledge of the growth rates of broadleaves in GB, combined with information from NFI on the current age, size and yield class of the resource. These can be used to assess future growth and the potential size and attributes of the population, and through this an assessment of future prospects for utility of the resource can be attained. To help formulate potential harvesting strategies

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for the broadleaved resource, a consultation exercise was undertaken within the forestry sector between 2010 and 2013, where views were sought from within the industry as to how the broadleaved resource could be managed to maximise timber availability. The views expressed in this consultation were divergent, with opinions ranging from a future decline from current levels of production, to a large increase in production arising from a step change in demand driven by energy and wood product needs. There was also a divergence of opinion as to how stands should be managed between low impact silviculture systems and clearfelling. The scenarios selected have attempted to reflect most aspects of this range of views, and as a result the four main scenarios forecast a wide range of mean annual production equating to around 1.6, 2.5, 4, and 7 million m³ per annum over the forecast period.

With current reported broadleaved production at 591,000 m³ per annum (*FC Forestry Statistics 2013*), there is a significant gap between actual production and the forecast of potential availability. As such this forecast should be viewed principally as one of potential and is different in nature to the conifer forecast, where forecast potential production and actual production have historically had a much closer relationship.

The conclusion that can be drawn from the results is that there is a significant amount of underutilised increment in broadleaved timber and that this trend is set to continue if current levels of harvesting are maintained. This will lead to a significant increase in standing broadleaved timber stocks, which will nearly double in the forecast period under the harvesting scenario that most closely reflects current practice.

The vast majority of this potential timber availability is therefore additional to current domestic utilisation, and when that additional timber is forecast to come to market varies significantly within the forecast periods and between harvesting scenarios. It should also be noted that the further into time that the forecast projects, the more contingent it is upon the assumptions used around harvesting and restocking and less upon the baseline condition of the resource assessed by the current inventory.

When and if timber is harvested will depend on a number of factors, not least of which are the choices made by those who drive domestic utilisation and those who meet the consequent demand, the latter being the Private sector forest and woodland owners. For the Private sector, the biological potential scenario is one of many possible scenarios. Based upon current actual levels of production, owners are unlikely to manage all their forests and woodlands to either biological potential or target diameter throughout the 50-year period and actual production will therefore vary from these estimates. The species composition of the volumes forecast and the size of the products produced also vary significantly through the forecast period and between scenarios. This will have a bearing on what is harvested and when. There is also the factor to consider of the significant amount of overdue timber within woodlands, which, being large and more

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variable in form, would be difficult to harvest. It is also possible that much of this overdue timber resides within areas of conservation and aesthetic interest and thus would be less likely to come to market. The forecast takes no account of statutory or policy choices around conservation.

When drawing conclusions from the core figures and tables in this report it should also be noted that this is a limited forward outlook of potential production, taken within a 50-year time period, which will omit some aspects of the evolution of the growing stock over the longer term. To help build such a wider view, taking some of these aspects into account, a summary 100-year forecast has also been supplied in addition to the 50-year forecast. This provides a wider perspective on potential production and standing volume, illustrating how, if the assumptions used in the forecast hold true in the longer term, two of the scenarios show a higher level potential production between 50 and 100 years into the future. It can also be observed that, under most scenarios, forecast standing volume continues to increase in broadleaved woodlands.

Future work

Future reports will explore alternative harvesting scenarios, including specific Government policy aims for bringing lower proportions of English woodland into management. In future, account could be taken of timber that is unlikely to come to market because of economies of scale in woodland parcel size or conservation constraints. Once information from the second cycle of the NFI fieldwork becomes available, statistics on the rate and type of timber removals in GB can be estimated from direct observation. These will be used to inform future harvesting scenarios. All such information is an essential part of planning for sustainable forest management across a range of interests, including, for example, biodiversity and climate change in addition to the development of the forest products industry.

Appendix A Stocked area and standing volume at 31 March 2012

Table A1 Stocked area by principal broadleaved tree species at 31 March 2012

| Principal species | FC | | Private sector | | Total area (000 ha) |
|------------------------|---------------|----------|----------------|----------|---------------------|
| | area (000 ha) | SE% | area (000 ha) | SE% | |
| England | | | | | |
| All broadleaves | 53.7 | 1 | 848.6 | 1 | 902.3 |
| Oak | 15.8 | 2 | 151.3 | 2 | 167.0 |
| Beech | 12.7 | 4 | 59.3 | 4 | 72.0 |
| Sycamore | 1.1 | 4 | 74.4 | 4 | 75.5 |
| Ash | 2.9 | 3 | 119.8 | 3 | 122.8 |
| Birch | 5.8 | 3 | 89.7 | 3 | 95.5 |
| Sweet Chestnut | 0.8 | 7 | 27.6 | 7 | 28.5 |
| Hazel | 0.4 | 4 | 64.1 | 4 | 64.6 |
| Hawthorn | 0.0 | 5 | 57.5 | 5 | 57.5 |
| Alder | 0.5 | 6 | 30.2 | 6 | 30.7 |
| Willow | 0.0 | 5 | 40.8 | 5 | 40.8 |
| Other broadleaves | 13.5 | 3 | 132.6 | 3 | 146.1 |
| Scotland | | | | | |
| All broadleaves | 32.1 | 2 | 265.1 | 2 | 297.2 |
| Oak | 2.8 | 8 | 23.4 | 8 | 26.2 |
| Beech | 0.7 | 9 | 14.7 | 9 | 15.3 |
| Sycamore | 0.4 | 8 | 21.2 | 8 | 21.6 |
| Ash | 0.5 | 8 | 15.0 | 8 | 15.5 |
| Birch | 11.5 | 3 | 116.3 | 3 | 127.8 |
| Sweet Chestnut | 0.0 | 60 | 0.0 | 60 | 0.0 |
| Hazel | 0.2 | 13 | 7.7 | 13 | 7.9 |
| Hawthorn | 0.0 | 12 | 7.6 | 12 | 7.6 |
| Alder | 0.7 | 9 | 16.3 | 9 | 17.0 |
| Willow | 0.0 | 13 | 13.3 | 13 | 13.4 |
| Other broadleaves | 15.3 | 6 | 29.1 | 6 | 44.4 |
| Wales | | | | | |
| All broadleaves | 16.2 | 2 | 120.9 | 2 | 137.1 |
| Oak | 2.7 | 7 | 23.1 | 7 | 25.8 |
| Beech | 1.8 | 17 | 4.6 | 17 | 6.3 |
| Sycamore | 0.1 | 12 | 9.2 | 12 | 9.2 |
| Ash | 0.5 | 8 | 18.3 | 8 | 18.8 |
| Birch | 1.6 | 11 | 10.6 | 11 | 12.2 |
| Sweet Chestnut | 0.1 | 51 | 0.4 | 51 | 0.4 |
| Hazel | 0.0 | 9 | 14.3 | 9 | 14.3 |
| Hawthorn | 0.0 | 13 | 7.5 | 13 | 7.5 |
| Alder | 0.1 | 11 | 9.7 | 11 | 9.9 |
| Willow | 0.0 | 11 | 11.1 | 11 | 11.1 |
| Other broadleaves | 9.3 | 9 | 12.2 | 9 | 21.4 |
| Great Britain | | | | | |
| All broadleaves | 101.9 | 1 | 1,234.7 | 1 | 1,336.6 |
| Oak | 21.3 | 2 | 197.8 | 2 | 219.1 |
| Beech | 15.2 | 4 | 78.5 | 4 | 93.7 |
| Sycamore | 1.6 | 3 | 104.8 | 3 | 106.3 |
| Ash | 3.9 | 2 | 153.1 | 2 | 157.0 |
| Birch | 18.9 | 2 | 216.6 | 2 | 235.5 |
| Sweet Chestnut | 0.9 | 7 | 28.0 | 7 | 28.9 |
| Hazel | 0.7 | 3 | 86.1 | 3 | 86.8 |
| Hawthorn | 0.0 | 5 | 72.6 | 5 | 72.6 |
| Alder | 1.3 | 5 | 56.3 | 5 | 57.6 |
| Willow | 0.1 | 5 | 65.2 | 5 | 65.2 |
| Other broadleaves | 38.1 | 2 | 173.8 | 2 | 211.9 |

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Table A2 Standing volume by principal broadleaved tree species at 31 March 2012

| Principal species | FC | | Private sector | | Total volume (000 m ³ obs) |
|------------------------|---------------------------------|----------|---------------------------------|----------|---------------------------------------|
| | volume (000 m ³ obs) | SE% | volume (000 m ³ obs) | SE% | |
| England | | | | | |
| All broadleaves | 8,708 | 2 | 172,327 | 2 | 181,035 |
| Oak | 3,340 | 3 | 51,697 | 3 | 55,037 |
| Beech | 2,807 | 6 | 19,803 | 6 | 22,610 |
| Sycamore | 149 | 6 | 16,211 | 6 | 16,360 |
| Ash | 408 | 4 | 30,083 | 4 | 30,491 |
| Birch | 502 | 4 | 11,319 | 4 | 11,821 |
| Sweet Chestnut | 127 | 8 | 7,658 | 8 | 7,785 |
| Hazel | 46 | 6 | 5,012 | 6 | 5,058 |
| Hawthorn | 0 | 6 | 2,755 | 6 | 2,755 |
| Alder | 69 | 8 | 6,846 | 8 | 6,915 |
| Willow | 1 | 8 | 4,864 | 8 | 4,864 |
| Other broadleaves | 1,258 | 5 | 15,961 | 5 | 17,219 |
| Scotland | | | | | |
| All broadleaves | 3,875 | 4 | 32,894 | 4 | 36,769 |
| Oak | 620 | 11 | 5,633 | 11 | 6,253 |
| Beech | 143 | 15 | 5,152 | 15 | 5,295 |
| Sycamore | 48 | 10 | 4,802 | 10 | 4,850 |
| Ash | 41 | 16 | 2,780 | 16 | 2,820 |
| Birch | 1,664 | 4 | 8,458 | 4 | 10,122 |
| Sweet Chestnut | 0 | 1 | 1 | 59 | 1 |
| Hazel | 39 | 24 | 441 | 24 | 480 |
| Hawthorn | 0 | 16 | 274 | 16 | 274 |
| Alder | 86 | 17 | 1,854 | 17 | 1,941 |
| Willow | 0 | 15 | 873 | 15 | 873 |
| Other broadleaves | 1,234 | 13 | 2,558 | 13 | 3,792 |
| Wales | | | | | |
| All broadleaves | 1,892 | 6 | 25,402 | 6 | 27,294 |
| Oak | 467 | 10 | 7,678 | 10 | 8,145 |
| Beech | 414 | 23 | 1,612 | 23 | 2,026 |
| Sycamore | 14 | 16 | 2,398 | 16 | 2,412 |
| Ash | 80 | 19 | 6,949 | 19 | 7,030 |
| Birch | 111 | 12 | 1,169 | 12 | 1,280 |
| Sweet Chestnut | 9 | 60 | 201 | 60 | 210 |
| Hazel | 7 | 14 | 913 | 14 | 920 |
| Hawthorn | 0 | 16 | 388 | 16 | 388 |
| Alder | 20 | 15 | 2,149 | 15 | 2,169 |
| Willow | 0 | 20 | 786 | 20 | 786 |
| Other broadleaves | 770 | 14 | 1,079 | 14 | 1,849 |
| Great Britain | | | | | |
| All broadleaves | 14,474 | 1 | 230,624 | 1 | 245,098 |
| Oak | 4,427 | 3 | 65,008 | 3 | 69,434 |
| Beech | 3,364 | 6 | 26,567 | 6 | 29,931 |
| Sycamore | 212 | 5 | 23,411 | 5 | 23,623 |
| Ash | 529 | 5 | 39,813 | 5 | 40,341 |
| Birch | 2,277 | 3 | 20,946 | 3 | 23,223 |
| Sweet Chestnut | 136 | 8 | 7,860 | 8 | 7,996 |
| Hazel | 91 | 5 | 6,367 | 5 | 6,458 |
| Hawthorn | 0 | 5 | 3,416 | 5 | 3,416 |
| Alder | 175 | 6 | 10,850 | 6 | 11,025 |
| Willow | 1 | 7 | 6,522 | 7 | 6,523 |
| Other broadleaves | 3,262 | 5 | 19,598 | 5 | 22,860 |

Appendix B 50-year broadleaf forecast - production

Table B1 50-year forecast volume by principal broadleaf tree species

| Principal species | 2013-16 | | | 2017-21 | | | 2022-26 | | | 2027-31 | | |
|-------------------|----------------|------------|---|----------------|------------|---|----------------|------------|---|----------------|------------|---|
| | Private sector | | FC/NRW volume (000m ³ obs) | Private sector | | FC/NRW volume (000m ³ obs) | Private sector | | FC/NRW volume (000m ³ obs) | Private sector | | FC/NRW volume (000m ³ obs) |
| | SE% | volume | | SE% | volume | | SE% | volume | | SE% | volume | |
| England | 126 | 122 | 5 | 92 | 333 | 3 | 110 | 538 | 3 | 86 | 720 | 2 |
| All broadleaves | 34 | 12 | 13 | 27 | 29 | 10 | 28 | 45 | 7 | 24 | 64 | 6 |
| Oak | 56 | 6 | 17 | 35 | 17 | 14 | 50 | 26 | 12 | 31 | 38 | 10 |
| Beech | 4 | 10 | 17 | 4 | 29 | 10 | 3 | 50 | 8 | 3 | 63 | 7 |
| Sycamore | 8 | 22 | 12 | 5 | 59 | 8 | 7 | 92 | 7 | 6 | 121 | 6 |
| Ash | 6 | 6 | 15 | 5 | 39 | 8 | 5 | 70 | 7 | 5 | 84 | 7 |
| Birch | 3 | 6 | 27 | 2 | 15 | 16 | 3 | 22 | 14 | 2 | 29 | 13 |
| Sweet Chestnut | 0 | 5 | 20 | 0 | 14 | 11 | 0 | 32 | 8 | 0 | 42 | 7 |
| Hazel | 0 | 19 | 14 | 0 | 31 | 9 | 0 | 39 | 9 | 0 | 41 | 8 |
| Hawthorn | 1 | 3 | 23 | 0 | 12 | 18 | 1 | 22 | 13 | 0 | 25 | 12 |
| Alder | 0 | 7 | 16 | 0 | 15 | 12 | 0 | 26 | 10 | 0 | 44 | 9 |
| Willow | 15 | 27 | 10 | 12 | 73 | 6 | 14 | 113 | 5 | 14 | 168 | 5 |
| Other broadleaves | | | | | | | | | | | | |
| Scotland | 9 | 83 | 18 | 9 | 139 | 8 | 10 | 193 | 6 | 10 | 233 | 5 |
| All broadleaves | 1 | 5 | 29 | 1 | 9 | 23 | 1 | 19 | 36 | 1 | 14 | 15 |
| Oak | 1 | 2 | 39 | 1 | 4 | 23 | 1 | 5 | 20 | 2 | 6 | 18 |
| Beech | 1 | 20 | 56 | 0 | 14 | 22 | 1 | 14 | 14 | 0 | 15 | 14 |
| Sycamore | 0 | 4 | 40 | 0 | 9 | 20 | 0 | 13 | 14 | 0 | 18 | 12 |
| Ash | 3 | 34 | 24 | 3 | 62 | 15 | 5 | 81 | 10 | 3 | 98 | 8 |
| Birch | 0 | 0 | - | 0 | 0 | 93 | 0 | 0 | 93 | 0 | 0 | 93 |
| Sweet Chestnut | 0 | 1 | 71 | 0 | 2 | 34 | 0 | 4 | 25 | 0 | 6 | 22 |
| Hazel | 0 | 3 | 37 | 0 | 5 | 21 | 0 | 8 | 18 | 0 | 8 | 16 |
| Hawthorn | 0 | 1 | 31 | 0 | 6 | 26 | 0 | 11 | 20 | 0 | 16 | 16 |
| Alder | 0 | 7 | 36 | 0 | 10 | 23 | 0 | 15 | 21 | 0 | 22 | 20 |
| Willow | 3 | 6 | 19 | 2 | 18 | 15 | 3 | 23 | 10 | 3 | 31 | 9 |
| Other broadleaves | | | | | | | | | | | | |

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Table B1 cont. 50-year forecast volume by principal broadleaf tree species

| Principal species | 2032-36 | | | 2037-41 | | | 2042-46 | | | 2047-51 | | |
|-------------------|-----------------------------------|-----------------------------------|----------|-----------------------------------|-----------------------------------|----------|-----------------------------------|-----------------------------------|----------|-----------------------------------|----------------|----------|
| | FC/NRW | Private sector | SE% | FC/NRW | Private sector | SE% | FC/NRW | Private sector | SE% | FC/NRW | Private sector | SE% |
| | volume (000m ³ obs) | volume (000m ³ obs) | | volume (000m ³ obs) | volume (000m ³ obs) | | volume (000m ³ obs) | volume (000m ³ obs) | | volume (000m ³ obs) | | |
| England | 99 | 825 | 2 | 129 | 1047 | 3 | 189 | 1915 | 3 | 116 | 1678 | 4 |
| All broadleaves | 23 | 77 | 6 | 29 | 84 | 6 | 73 | 87 | 6 | 36 | 88 | 6 |
| Oak | 43 | 48 | 9 | 66 | 53 | 8 | 54 | 54 | 8 | 38 | 55 | 8 |
| Beech | 3 | 64 | 7 | 3 | 94 | 10 | 5 | 236 | 9 | 4 | 187 | 11 |
| Sycamore | 8 | 122 | 6 | 6 | 181 | 8 | 20 | 401 | 8 | 10 | 303 | 11 |
| Ash | 6 | 85 | 7 | 7 | 113 | 7 | 10 | 340 | 8 | 8 | 269 | 11 |
| Birch | 2 | 34 | 12 | 3 | 36 | 12 | 3 | 36 | 12 | 2 | 36 | 12 |
| Sweet Chestnut | 0 | 48 | 6 | 0 | 66 | 10 | 0 | 104 | 11 | 0 | 203 | 9 |
| Hazel | 0 | 55 | 7 | 0 | 68 | 6 | 0 | 78 | 8 | 0 | 78 | 8 |
| Hawthorn | 1 | 25 | 12 | 0 | 31 | 14 | 1 | 94 | 17 | 1 | 79 | 19 |
| Alder | 0 | 58 | 9 | 0 | 65 | 8 | 0 | 65 | 8 | 0 | 65 | 8 |
| Willow | 13 | 206 | 5 | 14 | 251 | 5 | 22 | 414 | 6 | 17 | 308 | 7 |
| Other broadleaves | | | | | | | | | | | | |
| Scotland | 15 | 262 | 5 | 24 | 367 | 7 | 31 | 586 | 6 | 40 | 675 | 7 |
| All broadleaves | 1 | 17 | 14 | 2 | 22 | 13 | 6 | 26 | 12 | 7 | 28 | 11 |
| Oak | 1 | 8 | 14 | 1 | 19 | 36 | 2 | 13 | 14 | 2 | 21 | 42 |
| Beech | 1 | 15 | 14 | 0 | 37 | 25 | 1 | 52 | 15 | 1 | 40 | 25 |
| Sycamore | 0 | 18 | 12 | 0 | 29 | 18 | 1 | 50 | 14 | 0 | 53 | 21 |
| Ash | 5 | 104 | 7 | 8 | 138 | 12 | 7 | 265 | 9 | 10 | 367 | 11 |
| Birch | 0 | 0 | 93 | 0 | 0 | 93 | 0 | 0 | 93 | 0 | 0 | 93 |
| Sweet Chestnut | 0 | 6 | 21 | 0 | 14 | 54 | 0 | 14 | 28 | 0 | 19 | 28 |
| Hazel | 0 | 8 | 16 | 0 | 9 | 15 | 0 | 10 | 14 | 0 | 10 | 14 |
| Hawthorn | 2 | 18 | 14 | 4 | 24 | 14 | 4 | 56 | 28 | 5 | 46 | 13 |
| Alder | 0 | 26 | 19 | 0 | 28 | 18 | 0 | 28 | 18 | 0 | 28 | 18 |
| Willow | 5 | 39 | 8 | 9 | 46 | 8 | 10 | 70 | 13 | 15 | 63 | 11 |
| Other broadleaves | | | | | | | | | | | | |

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Table B1 cont. 50-year forecast volume by principal broadleaf tree species

| Principal species | 2052-56 | | 2057-61 | |
|------------------------|---|-----------------------|---|-----------------------|
| | FC/NRW volume (000m ³ obs) | Private sector SE% | FC/NRW volume (000m ³ obs) | Private sector SE% |
| England | 134 | 4 | 146 | 4 |
| All broadleaves | 1254 | 5 | 645 | 5 |
| Oak | 41 | 89 | 41 | 89 |
| Beech | 49 | 57 | 54 | 59 |
| Sycamore | 4 | 110 | 3 | 11 |
| Ash | 8 | 268 | 8 | 26 |
| Birch | 11 | 113 | 17 | 25 |
| Sweet Chestnut | 2 | 36 | 3 | 36 |
| Hazel | 0 | 102 | 0 | 71 |
| Hawthorn | 0 | 78 | 0 | 78 |
| Alder | 1 | 32 | 1 | 1 |
| Willow | 0 | 65 | 0 | 64 |
| Other broadleaves | 18 | 296 | 18 | 182 |
| Scotland | 45 | 7 | 64 | 8 |
| All broadleaves | 554 | 10 | 343 | 9 |
| Oak | 8 | 30 | 7 | 33 |
| Beech | 2 | 16 | 2 | 12 |
| Sycamore | 1 | 21 | 0 | 16 |
| Ash | 1 | 43 | 0 | 5 |
| Birch | 9 | 256 | 16 | 150 |
| Sweet Chestnut | 0 | 0 | 0 | 0 |
| Hazel | 0 | 18 | 0 | 4 |
| Hawthorn | 0 | 10 | 0 | 10 |
| Alder | 16 | 78 | 27 | 37 |
| Willow | 0 | 28 | 0 | 28 |
| Other broadleaves | 10 | 52 | 11 | 47 |

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Table B1 cont. 50-year forecast volume by principal broadleaf tree species

| Principal species | 2013-16 | | 2017-21 | | 2022-26 | | 2027-31 | |
|------------------------|------------|---|-----------|---|------------|---|----------|---|
| | FC/NRW | Private sector volume (000m ³ obs) | FC/NRW | Private sector volume (000m ³ obs) | FC/NRW | Private sector volume (000m ³ obs) | FC/NRW | Private sector volume (000m ³ obs) |
| Wales | | | | | | | | |
| All broadleaves | 12 | 20 | 14 | 11 | 17 | 77 | 8 | 100 |
| Oak | 3 | 1 | 31 | 3 | 3 | 4 | 22 | 5 |
| Beech | 5 | 1 | 58 | 5 | 7 | 2 | 40 | 3 |
| Sycamore | 0 | 4 | 36 | 0 | 0 | 8 | 22 | 9 |
| Ash | 0 | 1 | 47 | 1 | 0 | 8 | 18 | 12 |
| Birch | 0 | 1 | 46 | 0 | 0 | 9 | 23 | 0 |
| Sweet Chestnut | 0 | 0 | 106 | 0 | 0 | 0 | 106 | 0 |
| Hazel | 0 | 0 | 45 | 0 | 0 | 4 | 24 | 0 |
| Hawthorn | 0 | 3 | 26 | 0 | 0 | 9 | 22 | 9 |
| Alder | 0 | 1 | 48 | 0 | 0 | 3 | 30 | 4 |
| Willow | 0 | 5 | 32 | 0 | 0 | 16 | 20 | 19 |
| Other broadleaves | 4 | 3 | 28 | 2 | 6 | 14 | 17 | 14 |
| Great Britain | | | | | | | | |
| All broadleaves | 147 | 225 | 7 | 111 | 137 | 808 | 2 | 1054 |
| Oak | 38 | 17 | 12 | 31 | 32 | 68 | 11 | 82 |
| Beech | 61 | 9 | 17 | 42 | 57 | 33 | 10 | 46 |
| Sycamore | 5 | 34 | 33 | 4 | 4 | 73 | 7 | 88 |
| Ash | 8 | 27 | 12 | 6 | 7 | 113 | 6 | 151 |
| Birch | 9 | 41 | 20 | 8 | 10 | 160 | 6 | 195 |
| Sweet Chestnut | 3 | 6 | 27 | 2 | 3 | 22 | 14 | 29 |
| Hazel | 0 | 7 | 20 | 0 | 0 | 40 | 7 | 55 |
| Hawthorn | 0 | 24 | 12 | 0 | 0 | 56 | 7 | 58 |
| Alder | 1 | 5 | 17 | 1 | 1 | 36 | 10 | 45 |
| Willow | 0 | 19 | 16 | 0 | 0 | 58 | 9 | 85 |
| Other broadleaves | 22 | 36 | 9 | 17 | 23 | 150 | 4 | 218 |

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Table B1 cont. 50-year forecast volume by principal broadleaf tree species

| Principal species | 2032-36 | | 2037-41 | | 2042-46 | | 2047-51 | | |
|------------------------|---|-----------------------|---|-----------------------|---|------------|---|------------|-------------|
| | FC/NRW volume (000m ³ obs) | Private sector SE% | FC/NRW volume (000m ³ obs) | Private sector SE% | FC/NRW volume (000m ³ obs) | SE% | FC/NRW volume (000m ³ obs) | SE% | |
| Wales | 14 | 115 | 6 | 153 | 10 | 243 | 10 | 227 | 10 |
| All broadleaves | 2 | 7 | 17 | 10 | 22 | 17 | 10 | 4 | 21 |
| Oak | 4 | 4 | 28 | 4 | 26 | 12 | 4 | 5 | 4 |
| Beech | 0 | 9 | 21 | 0 | 48 | 1 | 33 | 0 | 19 |
| Sycamore | 1 | 13 | 15 | 1 | 20 | 4 | 40 | 1 | 36 |
| Ash | 1 | 12 | 20 | 2 | 23 | 2 | 37 | 2 | 48 |
| Birch | 0 | 0 | 106 | 0 | 106 | 0 | 0 | 0 | 106 |
| Sweet Chestnut | 0 | 11 | 15 | 0 | 15 | 1 | 18 | 1 | 31 |
| Hazel | 0 | 10 | 20 | 0 | 18 | 0 | 12 | 0 | 18 |
| Hawthorn | 0 | 5 | 25 | 0 | 33 | 1 | 17 | 0 | 10 |
| Alder | 0 | 21 | 18 | 0 | 17 | 0 | 23 | 0 | 17 |
| Willow | 6 | 23 | 13 | 9 | 26 | 19 | 48 | 7 | 33 |
| Other broadleaves | | | | | | | | | |
| Great Britain | 128 | 1202 | 2 | 1567 | 3 | 276 | 2743 | 3 | 2580 |
| All broadleaves | 26 | 102 | 5 | 116 | 5 | 96 | 123 | 5 | 126 |
| Oak | 48 | 60 | 7 | 76 | 11 | 68 | 71 | 7 | 81 |
| Beech | 4 | 89 | 6 | 155 | 11 | 6 | 321 | 8 | 245 |
| Sycamore | 8 | 153 | 5 | 227 | 7 | 25 | 492 | 7 | 391 |
| Ash | 12 | 202 | 5 | 268 | 7 | 19 | 642 | 6 | 685 |
| Birch | 3 | 34 | 12 | 36 | 12 | 3 | 36 | 2 | 36 |
| Sweet Chestnut | 0 | 65 | 6 | 91 | 11 | 1 | 136 | 10 | 253 |
| Hazel | 0 | 74 | 6 | 88 | 5 | 0 | 100 | 7 | 100 |
| Hawthorn | 3 | 48 | 9 | 65 | 10 | 6 | 167 | 14 | 136 |
| Alder | 0 | 106 | 7 | 116 | 7 | 0 | 117 | 7 | 116 |
| Willow | 24 | 269 | 4 | 324 | 4 | 51 | 532 | 6 | 404 |
| Other broadleaves | | | | | | | | | |

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Table B1 cont. 50-year forecast volume by principal broadleaf tree species

| Principal species | 2052-56 | | | 2057-61 | | |
|------------------------|--------------------------------|----------------|-----------|--------------------------------|----------------|-----------|
| | FC/NRW | Private sector | SE% | FC/NRW | Private sector | SE% |
| | volume (000m ³ obs) | | | volume (000m ³ obs) | | |
| Wales | 28 | 198 | 11 | 28 | 139 | 12 |
| All broadleaves | 7 | 11 | 20 | 5 | 11 | 19 |
| Oak | 4 | 4 | 25 | 3 | 4 | 25 |
| Beech | 0 | 10 | 31 | 0 | 5 | 56 |
| Sycamore | 1 | 34 | 31 | 1 | 5 | 50 |
| Ash | 4 | 27 | 36 | 6 | 4 | 13 |
| Birch | 0 | 0 | 106 | 0 | 0 | 106 |
| Sweet Chestnut | 3 | 33 | 26 | 5 | 44 | 20 |
| Hazel | 0 | 11 | 18 | 0 | 11 | 18 |
| Hawthorn | 0 | 11 | 39 | 0 | 0 | 77 |
| Alder | 0 | 23 | 17 | 0 | 23 | 17 |
| Willow | 8 | 33 | 20 | 6 | 30 | 33 |
| Other broadleaves | | | | | | |
| Great Britain | 208 | 2006 | 3 | 237 | 1127 | 3 |
| All broadleaves | 56 | 129 | 5 | 53 | 133 | 4 |
| Oak | 55 | 77 | 8 | 60 | 75 | 6 |
| Beech | 5 | 142 | 13 | 4 | 33 | 38 |
| Sycamore | 10 | 345 | 9 | 9 | 36 | 18 |
| Ash | 24 | 396 | 8 | 40 | 179 | 13 |
| Birch | 3 | 36 | 12 | 3 | 36 | 12 |
| Sweet Chestnut | 4 | 153 | 11 | 6 | 120 | 10 |
| Hazel | 0 | 100 | 7 | 0 | 99 | 7 |
| Hawthorn | 16 | 121 | 13 | 28 | 39 | 5 |
| Alder | 0 | 116 | 7 | 0 | 115 | 6 |
| Willow | 35 | 381 | 7 | 35 | 259 | 5 |
| Other broadleaves | | | | | | |

A table showing the full regional breakout of the forecast by principal conifer tree species can be found in Table B2 of the accompanying spreadsheet.

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Table B3 50-year forecast of hardwood volume by country and top diameter class

| Top diameter class | 2013-16 | | | 2017-21 | | | 2022-26 | | | 2027-31 | | |
|----------------------|--------------------------------|--------------------------------|-----|--------------------------------|--------------------------------|-----|--------------------------------|--------------------------------|-----|--------------------------------|--------------------------------|-----|
| | FC/NRW | Private sector | SE% | FC/NRW | Private sector | SE% | FC/NRW | Private sector | SE% | FC/NRW | Private sector | SE% |
| | volume (000m ³ obs) | volume (000m ³ obs) | | volume (000m ³ obs) | volume (000m ³ obs) | | volume (000m ³ obs) | volume (000m ³ obs) | | volume (000m ³ obs) | volume (000m ³ obs) | |
| England | | | | | | | | | | | | |
| 7-14cm | 35 | 103 | 5 | 19 | 287 | 3 | 25 | 454 | 3 | 18 | 551 | 2 |
| 14-16cm | 9 | 4 | 9 | 5 | 12 | 7 | 7 | 26 | 5 | 4 | 52 | 3 |
| 16-18cm | 9 | 3 | 11 | 6 | 8 | 8 | 7 | 17 | 6 | 5 | 36 | 4 |
| 18-24cm | 27 | 4 | 15 | 19 | 11 | 10 | 24 | 26 | 8 | 18 | 53 | 5 |
| 24-36cm | 27 | 1 | 22 | 23 | 4 | 15 | 29 | 8 | 12 | 24 | 21 | 10 |
| 34-44cm | 11 | 0 | 50 | 10 | 0 | 39 | 11 | 1 | 19 | 9 | 4 | 19 |
| 44-54cm | 5 | 0 | 87 | 5 | 0 | 82 | 4 | 0 | 27 | 4 | 1 | 26 |
| 54+cm | 5 | 0 | - | 6 | 0 | 90 | 4 | 0 | 73 | 4 | 0 | 33 |
| Scotland | | | | | | | | | | | | |
| 7-14cm | 4 | 39 | 11 | 4 | 94 | 6 | 5 | 148 | 5 | 5 | 183 | 5 |
| 14-16cm | 1 | 4 | 19 | 1 | 7 | 15 | 1 | 8 | 9 | 1 | 16 | 7 |
| 16-18cm | 1 | 4 | 23 | 1 | 6 | 17 | 1 | 6 | 12 | 1 | 12 | 9 |
| 18-24cm | 2 | 9 | 27 | 2 | 14 | 24 | 1 | 11 | 18 | 1 | 17 | 14 |
| 24-36cm | 1 | 10 | 35 | 1 | 11 | 29 | 1 | 10 | 37 | 1 | 5 | 16 |
| 34-44cm | 0 | 6 | 47 | 0 | 4 | 40 | 0 | 4 | 44 | 1 | 1 | 29 |
| 44-54cm | 0 | 3 | 54 | 0 | 2 | 42 | 0 | 1 | 56 | 0 | 0 | 41 |
| 54+cm | 0 | 5 | 86 | 0 | 1 | 54 | 0 | 1 | 88 | 0 | 0 | 59 |
| Wales | | | | | | | | | | | | |
| 7-14cm | 5 | 16 | 14 | 2 | 39 | 9 | 5 | 64 | 8 | 3 | 76 | 7 |
| 14-16cm | 1 | 1 | 29 | 1 | 2 | 16 | 2 | 4 | 11 | 1 | 7 | 9 |
| 16-18cm | 1 | 1 | 33 | 1 | 2 | 20 | 2 | 3 | 13 | 1 | 5 | 10 |
| 18-24cm | 2 | 1 | 36 | 3 | 2 | 27 | 4 | 5 | 18 | 2 | 8 | 13 |
| 24-36cm | 2 | 0 | 43 | 2 | 0 | 38 | 2 | 1 | 26 | 3 | 3 | 21 |
| 34-44cm | 0 | 0 | 94 | 1 | 0 | 94 | 1 | 0 | 56 | 1 | 0 | 39 |
| 44-54cm | 0 | 0 | 94 | 0 | 0 | 94 | 0 | 0 | 94 | 1 | 0 | 67 |
| 54+cm | 0 | 0 | - | 0 | 0 | 94 | 0 | 0 | 94 | 1 | 0 | 94 |
| Great Britain | | | | | | | | | | | | |
| 7-14cm | 44 | 159 | 5 | 25 | 421 | 3 | 35 | 665 | 2 | 25 | 810 | 2 |
| 14-16cm | 11 | 9 | 10 | 7 | 38 | 6 | 9 | 38 | 4 | 6 | 75 | 3 |
| 16-18cm | 11 | 7 | 13 | 7 | 15 | 8 | 10 | 25 | 5 | 6 | 53 | 3 |
| 18-24cm | 31 | 14 | 18 | 23 | 26 | 13 | 30 | 42 | 7 | 21 | 79 | 5 |
| 24-36cm | 30 | 12 | 30 | 26 | 15 | 21 | 33 | 19 | 20 | 28 | 29 | 8 |
| 34-44cm | 11 | 6 | 45 | 11 | 5 | 36 | 12 | 5 | 32 | 11 | 5 | 16 |
| 44-54cm | 5 | 3 | 54 | 5 | 2 | 40 | 5 | 2 | 46 | 5 | 1 | 23 |
| 54+cm | 5 | 5 | 12 | 6 | 1 | 52 | 4 | 2 | 83 | 5 | 0 | 28 |

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Table B3 cont. 50-year forecast of hardwood volume by country and top diameter class

| Top diameter class | 2032-36 | | | 2037-41 | | | 2042-46 | | | 2047-51 | | | |
|----------------------|-----------------------------------|-----------------------------------|-----|-----------------------------------|-----------------------------------|-----|-----------------------------------|-----------------------------------|-----|-----------------------------------|-----------------------------------|-----|--|
| | FC/NRW | Private sector | SE% | FC/NRW | Private sector | SE% | FC/NRW | Private sector | SE% | FC/NRW | Private sector | SE% | |
| | volume (000m ³ obs) | volume (000m ³ obs) | | volume (000m ³ obs) | volume (000m ³ obs) | | volume (000m ³ obs) | volume (000m ³ obs) | | volume (000m ³ obs) | volume (000m ³ obs) | | |
| England | | | | | | | | | | | | | |
| 7-14cm | 24 | 539 | 3 | 37 | 489 | 3 | 46 | 462 | 3 | 35 | 341 | 3 | |
| 14-16cm | 5 | 74 | 3 | 11 | 88 | 3 | 14 | 130 | 3 | 9 | 114 | 3 | |
| 16-18cm | 5 | 59 | 3 | 10 | 81 | 3 | 14 | 143 | 4 | 8 | 119 | 3 | |
| 18-24cm | 17 | 102 | 4 | 25 | 197 | 4 | 38 | 494 | 4 | 22 | 410 | 4 | |
| 24-36cm | 25 | 40 | 7 | 25 | 138 | 7 | 40 | 490 | 5 | 22 | 491 | 5 | |
| 34-44cm | 12 | 8 | 11 | 11 | 36 | 10 | 19 | 132 | 7 | 10 | 140 | 7 | |
| 44-54cm | 5 | 2 | 14 | 5 | 11 | 15 | 9 | 31 | 15 | 5 | 30 | 16 | |
| 54+cm | 5 | 1 | 24 | 5 | 7 | 28 | 10 | 34 | 17 | 5 | 35 | 18 | |
| Scotland | | | | | | | | | | | | | |
| 7-14cm | 9 | 180 | 5 | 15 | 168 | 5 | 16 | 163 | 5 | 20 | 141 | 5 | |
| 14-16cm | 1 | 23 | 6 | 2 | 32 | 6 | 3 | 46 | 5 | 4 | 49 | 7 | |
| 16-18cm | 1 | 17 | 6 | 2 | 28 | 8 | 2 | 48 | 6 | 4 | 57 | 8 | |
| 18-24cm | 2 | 29 | 8 | 3 | 71 | 13 | 4 | 155 | 8 | 7 | 206 | 9 | |
| 24-36cm | 1 | 9 | 15 | 1 | 52 | 16 | 3 | 140 | 10 | 3 | 176 | 9 | |
| 34-44cm | 0 | 1 | 21 | 0 | 11 | 19 | 1 | 30 | 12 | 1 | 35 | 14 | |
| 44-54cm | 0 | 0 | 33 | 0 | 2 | 27 | 1 | 2 | 26 | 0 | 5 | 40 | |
| 54+cm | 0 | 0 | 45 | 0 | 2 | 49 | 1 | 2 | 32 | 0 | 5 | 40 | |
| Wales | | | | | | | | | | | | | |
| 7-14cm | 7 | 76 | 7 | 9 | 68 | 7 | 18 | 63 | 8 | 7 | 46 | 8 | |
| 14-16cm | 1 | 11 | 8 | 1 | 14 | 9 | 6 | 19 | 11 | 2 | 16 | 8 | |
| 16-18cm | 1 | 8 | 8 | 1 | 12 | 9 | 6 | 21 | 13 | 1 | 17 | 8 | |
| 18-24cm | 2 | 14 | 9 | 3 | 31 | 17 | 12 | 64 | 13 | 3 | 57 | 11 | |
| 24-36cm | 2 | 6 | 16 | 3 | 22 | 23 | 8 | 51 | 12 | 3 | 65 | 15 | |
| 34-44cm | 1 | 1 | 26 | 1 | 4 | 20 | 3 | 14 | 17 | 1 | 18 | 17 | |
| 44-54cm | 0 | 0 | 37 | 0 | 1 | 25 | 1 | 5 | 27 | 1 | 3 | 33 | |
| 54+cm | 0 | 0 | 94 | 0 | 0 | 75 | 1 | 5 | 34 | 0 | 4 | 36 | |
| Great Britain | | | | | | | | | | | | | |
| 7-14cm | 40 | 794 | 2 | 61 | 725 | 2 | 80 | 687 | 2 | 62 | 528 | 3 | |
| 14-16cm | 8 | 108 | 2 | 15 | 134 | 2 | 22 | 195 | 3 | 14 | 179 | 3 | |
| 16-18cm | 7 | 85 | 3 | 13 | 122 | 3 | 21 | 212 | 3 | 13 | 193 | 3 | |
| 18-24cm | 21 | 145 | 3 | 30 | 298 | 4 | 54 | 713 | 3 | 33 | 672 | 4 | |
| 24-36cm | 28 | 55 | 6 | 29 | 212 | 6 | 52 | 681 | 4 | 29 | 732 | 4 | |
| 34-44cm | 13 | 10 | 9 | 12 | 51 | 8 | 23 | 176 | 6 | 12 | 194 | 6 | |
| 44-54cm | 6 | 2 | 12 | 5 | 14 | 13 | 11 | 38 | 13 | 6 | 38 | 14 | |
| 54+cm | 5 | 1 | 21 | 6 | 9 | 24 | 12 | 41 | 14 | 6 | 45 | 16 | |

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Table B3 cont. 50-year forecast of hardwood volume by country and top diameter class

| Top diameter class | 2052-56 | | 2057-61 | |
|----------------------|---|-----------------------|---|-----------------------|
| | FC/NRW volume (000m ³ obs) | Private sector SE% | FC/NRW volume (000m ³ obs) | Private sector SE% |
| England | | | | |
| 7-14cm | 40 | 238 | 4 | 178 |
| 14-16cm | 10 | 96 | 3 | 72 |
| 16-18cm | 9 | 97 | 3 | 76 |
| 18-24cm | 21 | 294 | 4 | 189 |
| 24-36cm | 24 | 354 | 6 | 100 |
| 34-44cm | 14 | 113 | 7 | 19 |
| 44-54cm | 8 | 27 | 14 | 5 |
| 54+cm | 10 | 35 | 14 | 5 |
| Scotland | | | | |
| 7-14cm | 25 | 117 | 5 | 98 |
| 14-16cm | 5 | 44 | 6 | 32 |
| 16-18cm | 4 | 51 | 7 | 36 |
| 18-24cm | 7 | 178 | 9 | 107 |
| 24-36cm | 3 | 135 | 10 | 60 |
| 34-44cm | 1 | 22 | 16 | 7 |
| 44-54cm | 0 | 3 | 39 | 1 |
| 54+cm | 0 | 2 | 52 | 1 |
| Wales | | | | |
| 7-14cm | 12 | 35 | 8 | 27 |
| 14-16cm | 3 | 15 | 9 | 12 |
| 16-18cm | 2 | 16 | 10 | 14 |
| 18-24cm | 5 | 53 | 12 | 45 |
| 24-36cm | 3 | 58 | 16 | 32 |
| 34-44cm | 1 | 16 | 17 | 6 |
| 44-54cm | 1 | 2 | 25 | 2 |
| 54+cm | 0 | 3 | 28 | 2 |
| Great Britain | | | | |
| 7-14cm | 77 | 390 | 3 | 303 |
| 14-16cm | 18 | 155 | 3 | 117 |
| 16-18cm | 15 | 165 | 3 | 127 |
| 18-24cm | 33 | 525 | 4 | 342 |
| 24-36cm | 30 | 547 | 5 | 191 |
| 34-44cm | 16 | 151 | 6 | 32 |
| 44-54cm | 9 | 32 | 12 | 8 |
| 54+cm | 10 | 40 | 13 | 8 |

A table showing the full regional breakout of the forecast by top diameter class can be found in Table B4 of the accompanying spreadsheet.

Appendix C 50-year broadleaf forecast - standing volume

Table C1 50-year forecast of standing volume by principal broadleaf tree species by country

| Principal species | 2013-16 | | 2017-21 | | 2022-26 | | 2027-31 | |
|------------------------|--------------------|----------------|--------------------|----------------|--------------------|----------------|--------------------|----------------|
| | FC/NRW | Private sector | FC/NRW | Private sector | FC/NRW | Private sector | FC/NRW | Private sector |
| | volume (000m³ obs) | SE% | volume (000m³ obs) | SE% | volume (000m³ obs) | SE% | volume (000m³ obs) | SE% |
| England | | | | | | | | |
| All broadleaves | 8,864 | 181,650 | 9,320 | 199,698 | 9,788 | 220,739 | 10,298 | 241,143 |
| Oak | 3,361 | 53,599 | 3,443 | 57,144 | 3,526 | 61,142 | 3,626 | 65,032 |
| Beech | 2,853 | 20,677 | 3,004 | 22,392 | 3,149 | 24,438 | 3,289 | 26,483 |
| Sycamore | 147 | 16,953 | 148 | 18,407 | 145 | 20,109 | 147 | 21,697 |
| Ash | 407 | 31,562 | 417 | 34,349 | 427 | 37,460 | 440 | 40,360 |
| Birch | 533 | 12,480 | 600 | 14,626 | 674 | 16,980 | 753 | 19,116 |
| Sweet Chestnut | 130 | 8,104 | 140 | 8,961 | 148 | 9,996 | 156 | 11,040 |
| Hazel | 49 | 5,474 | 55 | 6,349 | 61 | 7,352 | 66 | 8,292 |
| Hawthorn | 0 | 3,074 | 0 | 3,741 | 0 | 4,593 | 0 | 5,553 |
| Alder | 70 | 7,143 | 74 | 7,740 | 78 | 8,440 | 82 | 9,080 |
| Willow | 1 | 5,247 | 1 | 6,073 | 2 | 7,149 | 2 | 8,242 |
| Other broadleaves | 1,312 | 17,259 | 1,438 | 19,812 | 1,579 | 22,939 | 1,737 | 26,063 |
| Scotland | | | | | | | | |
| All broadleaves | 4,037 | 35,046 | 4,370 | 38,492 | 4,777 | 44,670 | 5,230 | 50,041 |
| Oak | 630 | 5,806 | 653 | 6,031 | 680 | 6,630 | 718 | 7,101 |
| Beech | 145 | 5,324 | 151 | 5,655 | 157 | 6,129 | 162 | 6,584 |
| Sycamore | 49 | 5,019 | 53 | 5,429 | 56 | 6,006 | 58 | 6,491 |
| Ash | 42 | 2,884 | 44 | 3,145 | 49 | 3,481 | 57 | 3,824 |
| Birch | 1,728 | 9,402 | 1,844 | 10,738 | 1,971 | 13,319 | 2,094 | 15,480 |
| Sweet Chestnut | 0 | 1 | 0 | 1 | 0 | 2 | 0 | 2 |
| Hazel | 40 | 508 | 41 | 560 | 42 | 766 | 44 | 900 |
| Hawthorn | 0 | 313 | 0 | 387 | 0 | 475 | 0 | 567 |
| Alder | 92 | 1,974 | 102 | 2,144 | 115 | 2,551 | 135 | 2,893 |
| Willow | 0 | 986 | 0 | 1,196 | 1 | 1,499 | 1 | 1,778 |
| Other broadleaves | 1,311 | 2,772 | 1,481 | 3,147 | 1,706 | 3,748 | 1,961 | 4,350 |

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Table C1 cont. 50-year forecast of standing volume by principal broadleaf tree species by country

| Principal species | 2032-36 | | | 2037-41 | | | 2042-46 | | | 2047-51 | | |
|------------------------|---|-----------------------|---|-----------------------|---|-----------------------|---|-----------------------|---|-----------------------|---|-----------------------|
| | FC/NRW volume (000m ³ obs) | Private sector SE% | FC/NRW volume (000m ³ obs) | Private sector SE% | FC/NRW volume (000m ³ obs) | Private sector SE% | FC/NRW volume (000m ³ obs) | Private sector SE% | FC/NRW volume (000m ³ obs) | Private sector SE% | FC/NRW volume (000m ³ obs) | Private sector SE% |
| England | | | | | | | | | | | | |
| All broadleaves | 10,843 | 259,994 | 1 | 11,248 | 276,702 | 1 | 11,484 | 288,480 | 1 | 11,614 | 297,056 | 1 |
| Oak | 3,742 | 68,734 | 3 | 3,847 | 72,244 | 3 | 3,851 | 75,565 | 3 | 3,785 | 78,691 | 3 |
| Beech | 3,451 | 28,456 | 5 | 3,478 | 30,337 | 5 | 3,535 | 32,143 | 5 | 3,606 | 33,868 | 5 |
| Sycamore | 148 | 23,094 | 5 | 155 | 24,213 | 5 | 158 | 24,585 | 5 | 158 | 24,533 | 5 |
| Ash | 457 | 42,905 | 3 | 481 | 44,938 | 3 | 480 | 45,674 | 3 | 458 | 45,753 | 3 |
| Birch | 829 | 20,967 | 4 | 900 | 22,451 | 4 | 958 | 22,880 | 4 | 1,011 | 22,679 | 4 |
| Sweet Chestnut | 161 | 12,053 | 8 | 167 | 13,028 | 8 | 171 | 13,958 | 8 | 175 | 14,839 | 7 |
| Hazel | 71 | 9,122 | 4 | 76 | 9,759 | 4 | 79 | 10,075 | 4 | 82 | 9,845 | 4 |
| Hawthorn | 0 | 6,523 | 5 | 0 | 7,462 | 5 | 0 | 8,323 | 5 | 0 | 9,154 | 5 |
| Alder | 86 | 9,637 | 7 | 89 | 10,087 | 7 | 90 | 10,251 | 7 | 91 | 10,181 | 7 |
| Willow | 3 | 9,292 | 6 | 3 | 10,295 | 6 | 3 | 11,269 | 6 | 4 | 12,197 | 6 |
| Other broadleaves | 1,895 | 28,989 | 4 | 2,052 | 31,632 | 4 | 2,159 | 33,468 | 4 | 2,244 | 35,023 | 4 |
| Scotland | | | | | | | | | | | | |
| All broadleaves | 5,728 | 55,141 | 3 | 6,209 | 59,560 | 3 | 6,634 | 62,626 | 3 | 7,013 | 64,357 | 3 |
| Oak | 769 | 7,591 | 10 | 831 | 8,075 | 10 | 895 | 8,552 | 9 | 962 | 9,030 | 9 |
| Beech | 167 | 7,036 | 13 | 173 | 7,454 | 13 | 176 | 7,842 | 13 | 176 | 8,212 | 13 |
| Sycamore | 60 | 6,918 | 10 | 62 | 7,223 | 10 | 63 | 7,361 | 10 | 63 | 7,438 | 10 |
| Ash | 67 | 4,128 | 11 | 77 | 4,369 | 11 | 84 | 4,452 | 11 | 89 | 4,391 | 11 |
| Birch | 2,214 | 17,499 | 4 | 2,326 | 19,174 | 4 | 2,431 | 20,140 | 4 | 2,536 | 20,159 | 4 |
| Sweet Chestnut | 0 | 2 | 64 | 0 | 3 | 64 | 0 | 3 | 64 | 0 | 4 | 64 |
| Hazel | 46 | 1,019 | 16 | 47 | 1,105 | 15 | 49 | 1,132 | 16 | 50 | 1,135 | 16 |
| Hawthorn | 0 | 663 | 14 | 0 | 757 | 13 | 0 | 845 | 13 | 0 | 929 | 13 |
| Alder | 173 | 3,228 | 12 | 225 | 3,524 | 11 | 290 | 3,710 | 11 | 365 | 3,816 | 11 |
| Willow | 1 | 2,048 | 12 | 2 | 2,310 | 12 | 2 | 2,565 | 12 | 3 | 2,809 | 12 |
| Other broadleaves | 2,231 | 4,932 | 9 | 2,464 | 5,485 | 8 | 2,644 | 5,941 | 8 | 2,770 | 6,350 | 8 |

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Table C1 cont. 50-year forecast of standing volume by principal broadleaf tree species by country

| Principal species | 2052-56 | | | | 2057-61 | | | |
|------------------------|------------------------------------|----------------|------------------------------------|---------------|------------------------------------|----------|------------------------------------|---|
| | FC/NRW | | Private sector | | FC/NRW | | Private sector | |
| | volume ('000m ³ obs) | % | volume ('000m ³ obs) | % | volume ('000m ³ obs) | % | volume ('000m ³ obs) | % |
| England | | | | | | | | |
| All broadleaves | 11,981 | 304,997 | 1 | 12,121 | 315,057 | 1 | | |
| Oak | 3,845 | 81,622 | 3 | 3,894 | 84,353 | 3 | | |
| Beech | 3,721 | 35,508 | 5 | 3,767 | 37,053 | 5 | | |
| Sycamore | 160 | 24,441 | 5 | 161 | 24,858 | 5 | | |
| Ash | 468 | 45,541 | 4 | 478 | 46,197 | 4 | | |
| Birch | 1,057 | 22,706 | 4 | 1,073 | 23,311 | 4 | | |
| Sweet Chestnut | 180 | 15,670 | 7 | 183 | 16,448 | 7 | | |
| Hazel | 85 | 9,576 | 5 | 87 | 9,410 | 5 | | |
| Hawthorn | 0 | 9,949 | 5 | 1 | 10,701 | 5 | | |
| Alder | 92 | 10,220 | 7 | 94 | 10,376 | 7 | | |
| Willow | 4 | 13,067 | 6 | 5 | 13,876 | 6 | | |
| Other broadleaves | 2,319 | 36,406 | 4 | 2,379 | 38,174 | 4 | | |
| Scotland | | | | | | | | |
| All broadleaves | 7,341 | 65,486 | 3 | 7,590 | 67,201 | 1 | | |
| Oak | 1,033 | 9,507 | 9 | 1,123 | 9,980 | 9 | | |
| Beech | 177 | 8,538 | 13 | 177 | 8,885 | 12 | | |
| Sycamore | 60 | 7,532 | 10 | 62 | 7,697 | 10 | | |
| Ash | 92 | 4,316 | 12 | 95 | 4,339 | 12 | | |
| Birch | 2,636 | 19,853 | 4 | 2,716 | 19,828 | 4 | | |
| Sweet Chestnut | 0 | 4 | 64 | 0 | 5 | 64 | | |
| Hazel | 51 | 1,096 | 17 | 52 | 1,099 | 17 | | |
| Hawthorn | 0 | 1,008 | 13 | 0 | 1,084 | 13 | | |
| Alder | 418 | 3,784 | 11 | 407 | 3,826 | 11 | | |
| Willow | 3 | 3,037 | 12 | 4 | 3,249 | 12 | | |
| Other broadleaves | 2,870 | 6,724 | 8 | 2,954 | 7,120 | 8 | | |

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Table C1 cont. 50-year forecast of standing volume by principal broadleaf tree species by country

| Principal species | 2013-16 | | | 2017-21 | | | 2022-26 | | | 2027-31 | | |
|----------------------|-----------------------------------|-----------------------------------|----------|-----------------------------------|-----------------------------------|----------|-----------------------------------|-----------------------------------|----------|-----------------------------------|-----------------------------------|----------|
| | FC/NRW | Private sector | SE% | FC/NRW | Private sector | SE% | FC/NRW | Private sector | SE% | FC/NRW | Private sector | SE% |
| | volume (000m ³ obs) | volume (000m ³ obs) | | volume (000m ³ obs) | volume (000m ³ obs) | | volume (000m ³ obs) | volume (000m ³ obs) | | volume (000m ³ obs) | volume (000m ³ obs) | |
| Wales | 1,966 | 26,541 | 6 | 2,147 | 28,817 | 5 | 2,346 | 31,560 | 5 | 2,612 | 34,291 | 4 |
| Oak | 476 | 7,947 | 9 | 499 | 8,448 | 9 | 520 | 9,016 | 9 | 553 | 9,577 | 9 |
| Beech | 425 | 1,697 | 23 | 453 | 1,857 | 22 | 460 | 2,037 | 22 | 483 | 2,217 | 21 |
| Sycamore | 14 | 2,498 | 16 | 14 | 2,696 | 15 | 14 | 2,917 | 15 | 14 | 3,121 | 14 |
| Ash | 82 | 7,043 | 17 | 84 | 7,304 | 16 | 87 | 7,691 | 15 | 92 | 8,088 | 14 |
| Birch | 122 | 1,290 | 12 | 147 | 1,540 | 11 | 177 | 1,838 | 11 | 211 | 2,126 | 11 |
| Sweet Chestnut | 9 | 210 | 60 | 10 | 224 | 60 | 11 | 240 | 59 | 11 | 254 | 59 |
| Hazel | 7 | 1,009 | 13 | 8 | 1,182 | 12 | 10 | 1,386 | 11 | 12 | 1,586 | 10 |
| Hawthorn | 0 | 432 | 15 | 0 | 519 | 15 | 0 | 620 | 15 | 0 | 729 | 14 |
| Alder | 21 | 2,268 | 14 | 23 | 2,508 | 13 | 24 | 2,790 | 13 | 26 | 3,055 | 12 |
| Willow | 0 | 896 | 19 | 0 | 1,100 | 18 | 0 | 1,347 | 16 | 0 | 1,601 | 16 |
| Other broadleaves | 809 | 1,173 | 14 | 908 | 1,363 | 13 | 1,042 | 1,603 | 12 | 1,209 | 1,863 | 11 |
| Great Britain | 14,866 | 243,237 | 1 | 15,837 | 267,006 | 1 | 16,911 | 296,968 | 1 | 18,139 | 325,475 | 1 |
| Oak | 4,467 | 67,353 | 3 | 4,595 | 71,623 | 3 | 4,727 | 76,788 | 3 | 4,897 | 81,710 | 3 |
| Beech | 3,423 | 27,698 | 5 | 3,608 | 29,903 | 5 | 3,766 | 32,604 | 5 | 3,934 | 35,285 | 5 |
| Sycamore | 211 | 24,470 | 5 | 215 | 26,532 | 4 | 215 | 29,031 | 4 | 219 | 31,309 | 4 |
| Ash | 531 | 41,489 | 4 | 546 | 44,798 | 4 | 563 | 48,632 | 4 | 589 | 52,272 | 4 |
| Birch | 2,383 | 23,173 | 3 | 2,591 | 26,905 | 3 | 2,822 | 32,136 | 3 | 3,058 | 36,722 | 3 |
| Sweet Chestnut | 139 | 8,314 | 8 | 150 | 9,187 | 8 | 158 | 10,238 | 8 | 167 | 11,297 | 8 |
| Hazel | 96 | 6,991 | 5 | 104 | 8,091 | 5 | 113 | 9,503 | 4 | 123 | 10,777 | 4 |
| Hawthorn | 0 | 3,819 | 5 | 0 | 4,647 | 5 | 0 | 5,688 | 5 | 0 | 6,849 | 5 |
| Alder | 182 | 11,385 | 6 | 198 | 12,393 | 6 | 217 | 13,781 | 6 | 242 | 15,028 | 5 |
| Willow | 1 | 7,129 | 6 | 2 | 8,369 | 6 | 2 | 9,994 | 6 | 3 | 11,621 | 5 |
| Other broadleaves | 3,433 | 21,204 | 5 | 3,827 | 24,321 | 4 | 4,327 | 28,290 | 4 | 4,907 | 32,277 | 4 |

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Table C1 cont. 50-year forecast of standing volume by principal broadleaf tree species by country

| Principal species | 2032-36 | | | 2037-41 | | | 2042-46 | | | 2047-51 | | |
|------------------------|---------------------------------|---|----------|---------------------------------|---|----------|---------------------------------|---|----------|---------------------------------|---|----------|
| | FC/NRW volume (000m³ obs) | Private sector volume (000m³ obs) | SE% | FC/NRW volume (000m³ obs) | Private sector volume (000m³ obs) | SE% | FC/NRW volume (000m³ obs) | Private sector volume (000m³ obs) | SE% | FC/NRW volume (000m³ obs) | Private sector volume (000m³ obs) | SE% |
| Wales | | | | | | | | | | | | |
| All broadleaves | 2,892 | 36,855 | 4 | 3,153 | 39,121 | 4 | 3,316 | 40,787 | 4 | 3,429 | 42,020 | 4 |
| Oak | 585 | 10,109 | 9 | 627 | 10,609 | 9 | 640 | 11,081 | 9 | 646 | 11,528 | 9 |
| Beech | 505 | 2,394 | 21 | 529 | 2,563 | 21 | 532 | 2,722 | 20 | 529 | 2,873 | 20 |
| Sycamore | 14 | 3,299 | 14 | 14 | 3,421 | 14 | 14 | 3,421 | 14 | 11 | 3,424 | 14 |
| Ash | 98 | 8,443 | 14 | 105 | 8,743 | 14 | 103 | 8,923 | 14 | 99 | 8,999 | 13 |
| Birch | 246 | 2,383 | 11 | 280 | 2,595 | 10 | 311 | 2,704 | 11 | 341 | 2,658 | 11 |
| Sweet Chestnut | 12 | 268 | 59 | 13 | 281 | 59 | 14 | 293 | 59 | 15 | 304 | 59 |
| Hazel | 18 | 1,785 | 10 | 27 | 1,958 | 9 | 39 | 2,091 | 9 | 52 | 2,139 | 9 |
| Hawthorn | 0 | 842 | 14 | 0 | 951 | 14 | 0 | 1,055 | 14 | 0 | 1,153 | 14 |
| Alder | 27 | 3,287 | 12 | 29 | 3,475 | 12 | 29 | 3,589 | 12 | 28 | 3,671 | 12 |
| Willow | 0 | 1,859 | 15 | 0 | 2,111 | 14 | 0 | 2,361 | 14 | 1 | 2,601 | 14 |
| Other broadleaves | 1,385 | 2,114 | 10 | 1,529 | 2,346 | 10 | 1,635 | 2,476 | 10 | 1,707 | 2,610 | 10 |
| Great Britain | | | | | | | | | | | | |
| All broadleaves | 19,462 | 351,990 | 1 | 20,610 | 375,383 | 1 | 21,435 | 391,893 | 1 | 22,056 | 403,433 | 1 |
| Oak | 5,096 | 86,433 | 3 | 5,305 | 90,927 | 3 | 5,386 | 95,197 | 3 | 5,393 | 99,250 | 3 |
| Beech | 4,123 | 37,886 | 5 | 4,180 | 40,354 | 5 | 4,243 | 42,707 | 5 | 4,312 | 44,954 | 5 |
| Sycamore | 222 | 33,311 | 4 | 232 | 34,857 | 4 | 234 | 35,375 | 4 | 231 | 35,395 | 4 |
| Ash | 622 | 55,477 | 4 | 663 | 58,050 | 3 | 668 | 59,049 | 3 | 646 | 59,144 | 3 |
| Birch | 3,289 | 40,849 | 3 | 3,506 | 44,220 | 2 | 3,700 | 45,724 | 3 | 3,887 | 45,496 | 3 |
| Sweet Chestnut | 173 | 12,323 | 8 | 181 | 13,311 | 8 | 185 | 14,255 | 7 | 190 | 15,147 | 7 |
| Hazel | 135 | 11,926 | 4 | 150 | 12,823 | 4 | 167 | 13,298 | 4 | 184 | 13,120 | 4 |
| Hawthorn | 0 | 8,027 | 5 | 0 | 9,170 | 5 | 1 | 10,223 | 5 | 1 | 11,235 | 5 |
| Alder | 286 | 16,151 | 5 | 343 | 17,086 | 5 | 409 | 17,550 | 5 | 483 | 17,668 | 5 |
| Willow | 4 | 13,199 | 5 | 5 | 14,716 | 5 | 6 | 16,194 | 5 | 7 | 17,607 | 5 |
| Other broadleaves | 5,511 | 36,035 | 3 | 6,045 | 39,463 | 3 | 6,438 | 41,885 | 3 | 6,721 | 43,983 | 3 |

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Table C1 cont. 50-year forecast of standing volume by principal broadleaf tree species by country

| Principal species | 2052-56 | | | 2057-61 | | |
|--------------------------|---------------------------------|-----------------------|---------------------------------|-----------------------|---------------------------------|-----------------------|
| | FC/NRW volume (000m3 obs) | Private sector SE% | FC/NRW volume (000m3 obs) | Private sector SE% | FC/NRW volume (000m3 obs) | Private sector SE% |
| Wales | 3,611 | 43,025 | 4 | 3,763 | 44,140 | 4 |
| All broadleaves | 685 | 11,951 | 9 | 724 | 12,347 | 9 |
| Oak | 543 | 3,015 | 20 | 563 | 3,146 | 20 |
| Beech | 12 | 3,441 | 14 | 12 | 3,490 | 14 |
| Sycamore | 103 | 9,000 | 13 | 106 | 9,060 | 13 |
| Ash | 365 | 2,627 | 11 | 378 | 2,688 | 11 |
| Birch | 16 | 315 | 58 | 17 | 325 | 58 |
| Sweet Chestnut | 62 | 2,094 | 10 | 63 | 2,025 | 10 |
| Hazel | 0 | 1,246 | 14 | 0 | 1,333 | 13 |
| Hawthorn | 29 | 3,739 | 12 | 29 | 3,825 | 12 |
| Alder | 1 | 2,829 | 14 | 1 | 3,037 | 13 |
| Willow | 1,795 | 2,715 | 10 | 1,870 | 2,814 | 10 |
| Other broadleaves | 1,795 | 2,715 | 10 | 1,870 | 2,814 | 10 |
| Great Britain | 22,883 | 413,509 | 1 | 23,474 | 426,397 | 1 |
| All broadleaves | 5,563 | 103,080 | 3 | 5,741 | 106,679 | 2 |
| Oak | 4,441 | 47,060 | 5 | 4,507 | 49,083 | 4 |
| Beech | 232 | 35,414 | 4 | 235 | 36,045 | 4 |
| Sycamore | 663 | 58,856 | 4 | 678 | 59,596 | 3 |
| Ash | 4,058 | 45,186 | 3 | 4,167 | 45,827 | 3 |
| Birch | 196 | 15,989 | 7 | 199 | 16,778 | 7 |
| Sweet Chestnut | 198 | 12,766 | 4 | 202 | 12,534 | 4 |
| Hazel | 1 | 12,204 | 5 | 1 | 13,118 | 4 |
| Hawthorn | 539 | 17,743 | 5 | 530 | 18,027 | 5 |
| Alder | 8 | 18,933 | 5 | 9 | 20,163 | 4 |
| Willow | 6,983 | 45,844 | 3 | 7,204 | 48,108 | 3 |
| Other broadleaves | 6,983 | 45,844 | 3 | 7,204 | 48,108 | 3 |

A table showing the full regional breakout of the forecast of standing volume by principal conifer tree species can be found in Table C2 of the accompanying spreadsheet.

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Table C3 Forecasts of annual standing volumes by age class at five year intervals for England

| England | FC volume (000 m ³ obs) | Private sector | | Total volume (000 m ³ obs) |
|--------------|--|------------------------------------|----------|---|
| | | volume (000 m ³ obs) | SE% | |
| 2012 | | | | |
| 0-10 years | 0 | 171 | 16 | 172 |
| 11-20 years | 48 | 4,367 | 5 | 4,415 |
| 21-40 years | 342 | 27,260 | 3 | 27,602 |
| 41-60 years | 1,878 | 33,382 | 3 | 35,260 |
| 61-80 years | 2,373 | 38,668 | 4 | 41,040 |
| 81-100 years | 842 | 41,136 | 4 | 41,978 |
| 100+ years | 3,225 | 27,305 | 6 | 30,530 |
| Total | 8,708 | 172,289 | 2 | 180,997 |
| 2016 | | | | |
| 0-10 years | 5 | 68 | 14 | 73 |
| 11-20 years | 34 | 2,974 | 5 | 3,009 |
| 21-40 years | 429 | 26,148 | 3 | 26,577 |
| 41-60 years | 1,265 | 42,621 | 3 | 43,887 |
| 61-80 years | 2,793 | 40,492 | 4 | 43,285 |
| 81-100 years | 1,183 | 46,146 | 4 | 47,329 |
| 100+ years | 3,272 | 29,072 | 6 | 32,344 |
| Total | 8,983 | 187,522 | 1 | 196,505 |
| 2021 | | | | |
| 0-10 years | 14 | 15 | 19 | 29 |
| 11-20 years | 38 | 2,249 | 5 | 2,287 |
| 21-40 years | 511 | 27,072 | 3 | 27,583 |
| 41-60 years | 777 | 52,142 | 3 | 52,919 |
| 61-80 years | 3,002 | 33,164 | 4 | 36,166 |
| 81-100 years | 1,721 | 53,356 | 4 | 55,078 |
| 100+ years | 3,442 | 40,076 | 5 | 43,518 |
| Total | 9,506 | 208,074 | 1 | 217,580 |
| 2026 | | | | |
| 0-10 years | 17 | 0 | 10 | 17 |
| 11-20 years | 35 | 1,742 | 5 | 1,778 |
| 21-40 years | 604 | 27,753 | 3 | 28,357 |
| 41-60 years | 648 | 45,138 | 3 | 45,786 |
| 61-80 years | 3,082 | 52,018 | 3 | 55,100 |
| 81-100 years | 1,972 | 46,291 | 4 | 48,263 |
| 100+ years | 3,580 | 56,218 | 4 | 59,798 |
| Total | 9,938 | 229,160 | 1 | 239,098 |
| 2031 | | | | |
| 0-10 years | 13 | 0 | 10 | 13 |
| 11-20 years | 46 | 320 | 12 | 366 |
| 21-40 years | 615 | 25,505 | 3 | 26,120 |
| 41-60 years | 720 | 50,936 | 3 | 51,656 |
| 61-80 years | 2,440 | 49,407 | 3 | 51,846 |
| 81-100 years | 2,597 | 50,627 | 4 | 53,224 |
| 100+ years | 4,075 | 72,207 | 3 | 76,282 |
| Total | 10,506 | 249,002 | 1 | 259,508 |
| 2036 | | | | |
| 0-10 years | 10 | 0 | 15 | 10 |
| 11-20 years | 37 | 32 | 5 | 70 |
| 21-40 years | 568 | 18,558 | 3 | 19,126 |
| 41-60 years | 941 | 50,327 | 3 | 51,268 |
| 61-80 years | 1,558 | 62,084 | 3 | 63,642 |
| 81-100 years | 3,250 | 50,360 | 4 | 53,610 |
| 100+ years | 4,651 | 85,811 | 3 | 90,462 |
| Total | 11,016 | 267,173 | 1 | 278,189 |
| 2041 | | | | |
| 0-10 years | 8 | 0 | 57 | 8 |
| 11-20 years | 32 | 41 | 5 | 73 |
| 21-40 years | 613 | 13,163 | 4 | 13,775 |
| 41-60 years | 1,041 | 48,255 | 3 | 49,296 |
| 61-80 years | 931 | 73,530 | 2 | 74,461 |
| 81-100 years | 3,371 | 41,311 | 4 | 44,682 |
| 100+ years | 5,360 | 106,453 | 3 | 111,813 |
| Total | 11,356 | 282,752 | 1 | 294,109 |
| 2046 | | | | |
| 0-10 years | 7 | 0 | 11 | 7 |
| 11-20 years | 32 | 41 | 6 | 73 |
| 21-40 years | 671 | 7,355 | 5 | 8,026 |
| 41-60 years | 1,245 | 41,291 | 3 | 42,536 |
| 61-80 years | 796 | 63,093 | 3 | 63,889 |
| 81-100 years | 3,367 | 64,594 | 3 | 67,961 |
| 100+ years | 5,255 | 115,684 | 3 | 120,939 |
| Total | 11,373 | 292,058 | 1 | 303,431 |
| 2051 | | | | |
| 0-10 years | 4 | 4 | 13 | 9 |
| 11-20 years | 22 | 47 | 7 | 69 |
| 21-40 years | 612 | 1,337 | 10 | 1,949 |
| 41-60 years | 1,331 | 30,844 | 3 | 32,175 |
| 61-80 years | 884 | 69,062 | 2 | 69,947 |
| 81-100 years | 2,567 | 60,952 | 3 | 63,519 |
| 100+ years | 6,309 | 138,024 | 2 | 144,332 |
| Total | 11,730 | 300,269 | 1 | 312,000 |
| 2056 | | | | |
| 0-10 years | 3 | 35 | 16 | 37 |
| 11-20 years | 20 | 173 | 6 | 193 |
| 21-40 years | 453 | 389 | 3 | 841 |
| 41-60 years | 1,404 | 15,803 | 4 | 17,207 |
| 61-80 years | 1,130 | 64,385 | 3 | 65,515 |
| 81-100 years | 1,598 | 76,150 | 3 | 77,748 |
| 100+ years | 7,375 | 151,790 | 2 | 159,166 |
| Total | 11,983 | 308,724 | 1 | 320,707 |

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Table C4 Forecasts of annual standing volumes by age class at five year intervals for Scotland

| Scotland | FC | | Private sector | | Total |
|--------------|------------------------------------|---------------|------------------------------------|---------------|-------|
| | volume (000 m ³ obs) | SE% | volume (000 m ³ obs) | SE% | |
| 2012 | | | | | |
| 0-10 years | 0 | 23 | 47 | 23 | |
| 11-20 years | 45 | 708 | 11 | 752 | |
| 21-40 years | 335 | 8,437 | 5 | 8,772 | |
| 41-60 years | 680 | 10,957 | 7 | 11,636 | |
| 61-80 years | 859 | 5,838 | 12 | 6,697 | |
| 81-100 years | 490 | 3,238 | 18 | 3,727 | |
| 100+ years | 1,466 | 3,670 | 18 | 5,136 | |
| Total | 3,875 | 32,870 | 4 | 36,745 | |
| 2016 | | | | | |
| 0-10 years | 7 | 19 | 55 | 26 | |
| 11-20 years | 39 | 742 | 7 | 781 | |
| 21-40 years | 458 | 8,536 | 4 | 8,993 | |
| 41-60 years | 643 | 13,529 | 6 | 14,172 | |
| 61-80 years | 967 | 5,420 | 12 | 6,387 | |
| 81-100 years | 551 | 3,650 | 17 | 4,202 | |
| 100+ years | 1,479 | 4,565 | 16 | 6,044 | |
| Total | 4,144 | 36,461 | 3 | 40,604 | |
| 2021 | | | | | |
| 0-10 years | 21 | 1 | 44 | 22 | |
| 11-20 years | 45 | 703 | 7 | 748 | |
| 21-40 years | 609 | 7,630 | 5 | 8,238 | |
| 41-60 years | 571 | 14,255 | 5 | 14,826 | |
| 61-80 years | 985 | 9,578 | 9 | 10,563 | |
| 81-100 years | 732 | 4,305 | 15 | 5,038 | |
| 100+ years | 1,563 | 4,975 | 16 | 6,539 | |
| Total | 4,526 | 41,448 | 3 | 45,974 | |
| 2026 | | | | | |
| 0-10 years | 28 | 1 | 34 | 29 | |
| 11-20 years | 62 | 609 | 9 | 671 | |
| 21-40 years | 775 | 7,182 | 5 | 7,957 | |
| 41-60 years | 621 | 17,333 | 5 | 17,953 | |
| 61-80 years | 1,115 | 9,756 | 8 | 10,871 | |
| 81-100 years | 759 | 5,758 | 13 | 6,517 | |
| 100+ years | 1,590 | 6,175 | 14 | 7,764 | |
| Total | 4,949 | 46,813 | 3 | 51,763 | |
| 2031 | | | | | |
| 0-10 years | 25 | 1 | 29 | 27 | |
| 11-20 years | 72 | 142 | 15 | 214 | |
| 21-40 years | 831 | 6,657 | 5 | 7,488 | |
| 41-60 years | 769 | 16,831 | 4 | 17,600 | |
| 61-80 years | 822 | 14,624 | 7 | 15,446 | |
| 81-100 years | 926 | 6,524 | 12 | 7,450 | |
| 100+ years | 1,983 | 7,336 | 13 | 9,320 | |
| Total | 5,428 | 52,116 | 3 | 57,544 | |

| Scotland | FC | | Private sector | | Total |
|--------------|------------------------------------|---------------|------------------------------------|---------------|-------|
| | volume (000 m ³ obs) | SE% | volume (000 m ³ obs) | SE% | |
| 2036 | | | | | |
| 0-10 years | 20 | 1 | 31 | 21 | |
| 11-20 years | 64 | 82 | 11 | 146 | |
| 21-40 years | 863 | 7,087 | 5 | 7,950 | |
| 41-60 years | 1,077 | 16,034 | 4 | 17,111 | |
| 61-80 years | 772 | 18,378 | 6 | 19,150 | |
| 81-100 years | 1,062 | 6,392 | 12 | 7,454 | |
| 100+ years | 2,066 | 9,055 | 12 | 11,121 | |
| Total | 5,925 | 57,028 | 3 | 62,953 | |
| 2041 | | | | | |
| 0-10 years | 15 | 1 | 9 | 16 | |
| 11-20 years | 59 | 99 | 8 | 158 | |
| 21-40 years | 921 | 5,703 | 5 | 6,624 | |
| 41-60 years | 1,281 | 13,721 | 4 | 15,001 | |
| 61-80 years | 689 | 19,708 | 5 | 20,397 | |
| 81-100 years | 1,066 | 11,553 | 9 | 12,619 | |
| 100+ years | 2,348 | 10,239 | 11 | 12,586 | |
| Total | 6,379 | 61,022 | 2 | 67,401 | |
| 2046 | | | | | |
| 0-10 years | 9 | 1 | 27 | 10 | |
| 11-20 years | 52 | 89 | 8 | 141 | |
| 21-40 years | 892 | 3,793 | 7 | 4,685 | |
| 41-60 years | 1,518 | 11,130 | 5 | 12,649 | |
| 61-80 years | 754 | 23,427 | 4 | 24,181 | |
| 81-100 years | 1,191 | 11,814 | 8 | 13,005 | |
| 100+ years | 2,373 | 13,147 | 9 | 15,520 | |
| Total | 6,790 | 63,402 | 2 | 70,191 | |
| 2051 | | | | | |
| 0-10 years | 5 | 3 | 25 | 8 | |
| 11-20 years | 47 | 107 | 4 | 154 | |
| 21-40 years | 690 | 1,234 | 8 | 1,924 | |
| 41-60 years | 1,675 | 8,210 | 5 | 9,885 | |
| 61-80 years | 921 | 22,312 | 4 | 23,233 | |
| 81-100 years | 870 | 17,601 | 6 | 18,471 | |
| 100+ years | 2,939 | 15,213 | 9 | 18,151 | |
| Total | 7,145 | 64,680 | 2 | 71,825 | |
| 2056 | | | | | |
| 0-10 years | 4 | 8 | 19 | 12 | |
| 11-20 years | 38 | 127 | 5 | 165 | |
| 21-40 years | 594 | 1,054 | 7 | 1,648 | |
| 41-60 years | 1,618 | 6,488 | 6 | 8,106 | |
| 61-80 years | 1,241 | 19,688 | 4 | 20,929 | |
| 81-100 years | 814 | 21,735 | 6 | 22,549 | |
| 100+ years | 3,149 | 16,863 | 8 | 20,012 | |
| Total | 7,458 | 65,962 | 2 | 73,420 | |

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Table C5 Forecasts of annual standing volumes by age class at five year intervals for Wales

| Wales | NRW volume (000 m ³ obs) | Private sector | | Total volume (000 m ³ obs) | SE% | Total volume (000 m ³ obs) |
|--------------|-------------------------------------|-------------------------------------|--|---------------------------------------|-----|---------------------------------------|
| | | NRW volume (000 m ³ obs) | Private sector volume (000 m ³ obs) | | | |
| 2012 | | | | | | |
| 0-10 years | 0 | 33 | 36 | 33 | | |
| 11-20 years | 24 | 674 | 13 | 699 | | |
| 21-40 years | 146 | 4,338 | 9 | 4,485 | | |
| 41-60 years | 376 | 5,238 | 10 | 5,614 | | |
| 61-80 years | 417 | 4,763 | 13 | 5,179 | | |
| 81-100 years | 216 | 5,228 | 23 | 5,444 | | |
| 100+ years | 712 | 5,128 | 17 | 5,840 | | |
| Total | 1,892 | 25,402 | 6 | 27,294 | | |
| 2016 | | | | | | |
| 0-10 years | 2 | 7 | 24 | 10 | | |
| 11-20 years | 26 | 502 | 15 | 528 | | |
| 21-40 years | 207 | 4,295 | 8 | 4,501 | | |
| 41-60 years | 239 | 6,293 | 9 | 6,532 | | |
| 61-80 years | 584 | 4,960 | 12 | 5,544 | | |
| 81-100 years | 244 | 4,659 | 13 | 4,903 | | |
| 100+ years | 715 | 6,532 | 20 | 7,246 | | |
| Total | 2,017 | 27,247 | 5 | 29,264 | | |
| 2021 | | | | | | |
| 0-10 years | 7 | 3 | 36 | 10 | | |
| 11-20 years | 42 | 251 | 12 | 292 | | |
| 21-40 years | 284 | 4,172 | 7 | 4,456 | | |
| 41-60 years | 196 | 7,037 | 9 | 7,233 | | |
| 61-80 years | 572 | 6,043 | 11 | 6,615 | | |
| 81-100 years | 305 | 4,277 | 14 | 4,582 | | |
| 100+ years | 817 | 8,082 | 16 | 8,898 | | |
| Total | 2,221 | 29,865 | 5 | 32,086 | | |
| 2026 | | | | | | |
| 0-10 years | 8 | 0 | 28 | 8 | | |
| 11-20 years | 51 | 307 | 12 | 358 | | |
| 21-40 years | 379 | 3,697 | 7 | 4,076 | | |
| 41-60 years | 227 | 7,660 | 8 | 7,886 | | |
| 61-80 years | 587 | 7,168 | 9 | 7,756 | | |
| 81-100 years | 338 | 3,863 | 15 | 4,201 | | |
| 100+ years | 845 | 9,947 | 14 | 10,792 | | |
| Total | 2,435 | 32,642 | 4 | 35,076 | | |
| 2031 | | | | | | |
| 0-10 years | 4 | 0 | 31 | 4 | | |
| 11-20 years | 18 | 99 | 26 | 117 | | |
| 21-40 years | 505 | 3,333 | 7 | 3,838 | | |
| 41-60 years | 321 | 8,512 | 8 | 8,833 | | |
| 61-80 years | 499 | 6,971 | 9 | 7,470 | | |
| 81-100 years | 426 | 5,976 | 12 | 6,402 | | |
| 100+ years | 946 | 10,429 | 13 | 11,374 | | |
| Total | 2,718 | 35,320 | 4 | 38,038 | | |
| 2036 | | | | | | |
| 0-10 years | 4 | 0 | 25 | 4 | | |
| 11-20 years | 15 | 12 | 14 | 26 | | |
| 21-40 years | 561 | 2,640 | 8 | 3,201 | | |
| 41-60 years | 471 | 8,036 | 7 | 8,506 | | |
| 61-80 years | 297 | 8,827 | 8 | 9,124 | | |
| 81-100 years | 657 | 6,092 | 12 | 6,749 | | |
| 100+ years | 999 | 12,190 | 12 | 13,189 | | |
| Total | 3,003 | 37,797 | 4 | 40,800 | | |
| 2041 | | | | | | |
| 0-10 years | 2 | 0 | 33 | 2 | | |
| 11-20 years | 9 | 11 | 13 | 20 | | |
| 21-40 years | 556 | 1,880 | 9 | 2,436 | | |
| 41-60 years | 611 | 7,341 | 7 | 7,951 | | |
| 61-80 years | 246 | 9,685 | 8 | 9,931 | | |
| 81-100 years | 636 | 7,393 | 11 | 8,030 | | |
| 100+ years | 1,187 | 13,574 | 11 | 14,761 | | |
| Total | 3,247 | 39,884 | 4 | 43,131 | | |
| 2046 | | | | | | |
| 0-10 years | 1 | 0 | 27 | 1 | | |
| 11-20 years | 15 | 12 | 13 | 27 | | |
| 21-40 years | 457 | 1,490 | 12 | 1,947 | | |
| 41-60 years | 836 | 5,529 | 7 | 6,364 | | |
| 61-80 years | 277 | 10,446 | 8 | 10,723 | | |
| 81-100 years | 649 | 8,639 | 9 | 9,288 | | |
| 100+ years | 1,054 | 15,145 | 10 | 16,200 | | |
| Total | 3,288 | 41,262 | 3 | 44,550 | | |
| 2051 | | | | | | |
| 0-10 years | 0 | 1 | 34 | 1 | | |
| 11-20 years | 14 | 11 | 14 | 25 | | |
| 21-40 years | 211 | 407 | 20 | 618 | | |
| 41-60 years | 1,101 | 4,281 | 8 | 5,382 | | |
| 61-80 years | 397 | 11,316 | 7 | 11,713 | | |
| 81-100 years | 535 | 8,410 | 9 | 8,944 | | |
| 100+ years | 1,242 | 17,993 | 9 | 19,235 | | |
| Total | 3,501 | 42,417 | 3 | 45,918 | | |
| 2056 | | | | | | |
| 0-10 years | 0 | 10 | 26 | 10 | | |
| 11-20 years | 16 | 22 | 15 | 38 | | |
| 21-40 years | 159 | 121 | 8 | 280 | | |
| 41-60 years | 1,092 | 2,507 | 10 | 3,599 | | |
| 61-80 years | 576 | 10,200 | 7 | 10,776 | | |
| 81-100 years | 314 | 10,598 | 8 | 10,913 | | |
| 100+ years | 1,501 | 19,984 | 8 | 21,485 | | |
| Total | 3,658 | 43,443 | 3 | 47,101 | | |

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Table C6 Forecasts of annual standing volumes by age class at five year intervals for GB

| Great Britain | FC/NRW volume (000 m ³ obs) | Private sector | | Total volume (000 m ³ obs) | SE% |
|---------------|--|--|--|---------------------------------------|-----|
| | | FC/NRW volume (000 m ³ obs) | Private sector volume (000 m ³ obs) | | |
| 2012 | | | | | |
| 0-10 years | 1 | 227 | 14 | 228 | |
| 11-20 years | 117 | 5,749 | 4 | 5,866 | |
| 21-40 years | 824 | 40,035 | 2 | 40,859 | |
| 41-60 years | 2,934 | 49,577 | 3 | 52,510 | |
| 61-80 years | 3,648 | 49,269 | 4 | 52,917 | |
| 81-100 years | 1,547 | 49,602 | 4 | 51,150 | |
| 100+ years | 5,403 | 36,103 | 5 | 41,506 | |
| Total | 14,474 | 230,562 | 1 | 245,036 | |
| 2016 | | | | | |
| 0-10 years | 15 | 94 | 15 | 109 | |
| 11-20 years | 99 | 4,218 | 4 | 4,318 | |
| 21-40 years | 1,093 | 38,978 | 2 | 40,072 | |
| 41-60 years | 2,148 | 62,443 | 2 | 64,591 | |
| 61-80 years | 4,345 | 50,872 | 3 | 55,217 | |
| 81-100 years | 1,978 | 54,456 | 4 | 56,434 | |
| 100+ years | 5,465 | 40,169 | 6 | 45,634 | |
| Total | 15,143 | 251,230 | 1 | 266,373 | |
| 2021 | | | | | |
| 0-10 years | 42 | 20 | 16 | 62 | |
| 11-20 years | 125 | 3,203 | 4 | 3,328 | |
| 21-40 years | 1,404 | 38,873 | 2 | 40,278 | |
| 41-60 years | 1,544 | 73,434 | 2 | 74,978 | |
| 61-80 years | 4,558 | 48,786 | 4 | 53,344 | |
| 81-100 years | 2,758 | 61,939 | 3 | 64,697 | |
| 100+ years | 5,822 | 53,133 | 5 | 58,955 | |
| Total | 16,254 | 279,387 | 1 | 295,641 | |
| 2026 | | | | | |
| 0-10 years | 53 | 2 | 28 | 54 | |
| 11-20 years | 148 | 2,658 | 4 | 2,807 | |
| 21-40 years | 1,757 | 38,632 | 2 | 40,389 | |
| 41-60 years | 1,496 | 70,130 | 2 | 71,625 | |
| 61-80 years | 4,784 | 68,943 | 3 | 73,727 | |
| 81-100 years | 3,070 | 55,912 | 4 | 58,982 | |
| 100+ years | 6,015 | 72,339 | 4 | 78,354 | |
| Total | 17,322 | 308,615 | 1 | 325,938 | |
| 2031 | | | | | |
| 0-10 years | 43 | 2 | 25 | 44 | |
| 11-20 years | 136 | 560 | 9 | 697 | |
| 21-40 years | 1,951 | 35,495 | 2 | 37,446 | |
| 41-60 years | 1,809 | 76,280 | 2 | 78,089 | |
| 61-80 years | 3,760 | 71,002 | 3 | 74,762 | |
| 81-100 years | 3,949 | 63,127 | 3 | 67,076 | |
| 100+ years | 7,004 | 89,972 | 3 | 96,976 | |
| Total | 18,652 | 336,438 | 1 | 355,090 | |
| 2036 | | | | | |
| 0-10 years | 34 | 1 | 22 | 35 | |
| 11-20 years | 116 | 126 | 7 | 242 | |
| 21-40 years | 1,992 | 28,284 | 2 | 30,277 | |
| 41-60 years | 2,488 | 74,397 | 2 | 76,885 | |
| 61-80 years | 2,628 | 89,289 | 2 | 91,917 | |
| 81-100 years | 4,969 | 62,844 | 3 | 67,813 | |
| 100+ years | 7,717 | 107,056 | 3 | 114,773 | |
| Total | 19,944 | 361,998 | 1 | 381,942 | |
| 2041 | | | | | |
| 0-10 years | 25 | 1 | 22 | 27 | |
| 11-20 years | 100 | 151 | 6 | 251 | |
| 21-40 years | 2,090 | 20,745 | 3 | 22,835 | |
| 41-60 years | 2,933 | 69,316 | 2 | 72,249 | |
| 61-80 years | 1,866 | 102,923 | 2 | 104,789 | |
| 81-100 years | 5,073 | 60,257 | 3 | 65,330 | |
| 100+ years | 8,895 | 130,266 | 3 | 139,161 | |
| Total | 20,982 | 383,659 | 1 | 404,641 | |
| 2046 | | | | | |
| 0-10 years | 16 | 1 | 18 | 17 | |
| 11-20 years | 99 | 142 | 5 | 242 | |
| 21-40 years | 2,020 | 12,639 | 4 | 14,659 | |
| 41-60 years | 3,599 | 57,950 | 2 | 61,549 | |
| 61-80 years | 1,827 | 96,966 | 2 | 98,793 | |
| 81-100 years | 5,207 | 85,047 | 3 | 90,254 | |
| 100+ years | 8,682 | 143,976 | 3 | 152,658 | |
| Total | 21,451 | 396,722 | 1 | 418,173 | |
| 2051 | | | | | |
| 0-10 years | 9 | 8 | 12 | 17 | |
| 11-20 years | 83 | 165 | 4 | 248 | |
| 21-40 years | 1,513 | 2,977 | 6 | 4,490 | |
| 41-60 years | 4,108 | 43,334 | 3 | 47,442 | |
| 61-80 years | 2,202 | 102,691 | 2 | 104,893 | |
| 81-100 years | 3,972 | 86,962 | 3 | 90,934 | |
| 100+ years | 10,489 | 171,229 | 2 | 181,718 | |
| Total | 22,376 | 407,366 | 1 | 429,742 | |
| 2056 | | | | | |
| 0-10 years | 7 | 52 | 12 | 59 | |
| 11-20 years | 74 | 321 | 4 | 396 | |
| 21-40 years | 1,205 | 1,564 | 5 | 2,769 | |
| 41-60 years | 4,114 | 24,798 | 3 | 28,913 | |
| 61-80 years | 2,947 | 94,273 | 2 | 97,219 | |
| 81-100 years | 2,727 | 108,483 | 2 | 111,209 | |
| 100+ years | 12,025 | 188,637 | 2 | 200,663 | |
| Total | 23,099 | 418,128 | 1 | 441,228 | |

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Table C7 Forecasts of annual standing volumes by mean stand diameter class at five year intervals for England

| England | FC | Private sector | | Total |
|--------------|------------------------------------|------------------------------------|----------|------------------------------------|
| | volume (000 m ³ obs) | volume (000 m ³ obs) | SE% | volume (000 m ³ obs) |
| 2012 | | | | |
| 0-7 cm | 15 | 541 | 6 | 556 |
| 7-10 cm | 202 | 5,665 | 3 | 5,866 |
| 10-15 cm | 870 | 13,402 | 3 | 14,271 |
| 15-20 cm | 1,212 | 14,841 | 4 | 16,054 |
| 20-30 cm | 3,090 | 29,848 | 3 | 32,939 |
| 30-40 cm | 2,174 | 26,337 | 4 | 28,512 |
| 40-60 cm | 859 | 40,438 | 4 | 41,297 |
| 60-80 cm | 213 | 22,409 | 6 | 22,622 |
| 80+ cm | 72 | 18,808 | 9 | 18,879 |
| Total | 8,708 | 172,289 | 2 | 180,997 |
| 2016 | | | | |
| 0-7 cm | 9 | 991 | 5 | 1,001 |
| 7-10 cm | 203 | 6,126 | 3 | 6,329 |
| 10-15 cm | 835 | 14,739 | 3 | 15,575 |
| 15-20 cm | 1,340 | 15,656 | 3 | 16,996 |
| 20-30 cm | 3,090 | 33,420 | 3 | 36,511 |
| 30-40 cm | 2,137 | 28,310 | 4 | 30,446 |
| 40-60 cm | 1,067 | 44,023 | 4 | 45,090 |
| 60-80 cm | 221 | 23,759 | 6 | 23,980 |
| 80+ cm | 80 | 20,496 | 8 | 20,576 |
| Total | 8,983 | 187,522 | 1 | 196,505 |
| 2021 | | | | |
| 0-7 cm | 11 | 1,041 | 6 | 1,052 |
| 7-10 cm | 202 | 5,649 | 3 | 5,851 |
| 10-15 cm | 1010 | 17,666 | 3 | 18,677 |
| 15-20 cm | 1400 | 17,740 | 3 | 19,140 |
| 20-30 cm | 2946 | 36,851 | 3 | 39,797 |
| 30-40 cm | 2358 | 32,736 | 4 | 35,094 |
| 40-60 cm | 1263 | 48,296 | 3 | 49,559 |
| 60-80 cm | 227 | 25,787 | 5 | 26,014 |
| 80+ cm | 90 | 22,306 | 8 | 22,396 |
| Total | 9,506 | 208,074 | 1 | 217,580 |
| 2026 | | | | |
| 0-7 cm | 14 | 744 | 6 | 758 |
| 7-10 cm | 190 | 5,717 | 4 | 5,908 |
| 10-15 cm | 1,143 | 18,684 | 3 | 19,827 |
| 15-20 cm | 1,570 | 21,556 | 3 | 23,127 |
| 20-30 cm | 2,842 | 40,875 | 3 | 43,716 |
| 30-40 cm | 2,298 | 36,056 | 3 | 38,354 |
| 40-60 cm | 1,546 | 53,325 | 3 | 54,871 |
| 60-80 cm | 233 | 28,455 | 5 | 28,688 |
| 80+ cm | 101 | 23,749 | 8 | 23,849 |
| Total | 9,938 | 229,160 | 1 | 239,098 |
| 2032 | | | | |
| 0-7 cm | 14 | 209 | 13 | 223 |
| 7-10 cm | 190 | 4,611 | 4 | 4,801 |
| 10-15 cm | 1,143 | 17,922 | 3 | 19,065 |
| 15-20 cm | 1,570 | 25,470 | 3 | 27,040 |
| 20-30 cm | 2,842 | 46,192 | 3 | 49,034 |
| 30-40 cm | 2,298 | 41,272 | 3 | 43,570 |
| 40-60 cm | 1,546 | 56,608 | 3 | 58,154 |
| 60-80 cm | 233 | 30,627 | 5 | 30,860 |
| 80+ cm | 101 | 26,092 | 7 | 26,193 |
| Total | 9,938 | 249,002 | 1 | 258,940 |

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Table C7 cont. Forecasts of annual standing volumes by mean stand diameter class at five year intervals for England

| England | FC | Private sector | | Total |
|--------------|------------------------------------|------------------------------------|----------|------------------------------------|
| | volume (000 m ³ obs) | volume (000 m ³ obs) | SE% | volume (000 m ³ obs) |
| 2031 | | | | |
| 0-7 cm | 21 | 40 | 16 | 61 |
| 7-10 cm | 209 | 3,204 | 6 | 3,413 |
| 10-15 cm | 1,544 | 17,578 | 3 | 19,122 |
| 15-20 cm | 1,773 | 26,086 | 3 | 27,859 |
| 20-30 cm | 2,792 | 53,278 | 2 | 56,071 |
| 30-40 cm | 2,227 | 45,039 | 3 | 47,266 |
| 40-60 cm | 2,021 | 59,947 | 3 | 61,968 |
| 60-80 cm | 303 | 33,796 | 5 | 34,099 |
| 80+ cm | 125 | 28,205 | 7 | 28,331 |
| Total | 11,016 | 267,173 | 1 | 278,189 |
| 2041 | | | | |
| 0-7 cm | 24 | 36 | 14 | 61 |
| 7-10 cm | 158 | 1,705 | 10 | 1,864 |
| 10-15 cm | 1,634 | 14,890 | 3 | 16,524 |
| 15-20 cm | 1,800 | 27,689 | 3 | 29,488 |
| 20-30 cm | 2,923 | 57,977 | 2 | 60,900 |
| 30-40 cm | 2,109 | 48,929 | 3 | 51,038 |
| 40-60 cm | 2,204 | 65,269 | 3 | 67,473 |
| 60-80 cm | 365 | 35,864 | 5 | 36,229 |
| 80+ cm | 138 | 30,393 | 7 | 30,531 |
| Total | 11,356 | 282,752 | 1 | 294,109 |
| 2046 | | | | |
| 0-7 cm | 22 | 36 | 15 | 58 |
| 7-10 cm | 156 | 875 | 8 | 1,030 |
| 10-15 cm | 1,715 | 12,058 | 4 | 13,773 |
| 15-20 cm | 1,704 | 29,481 | 3 | 31,185 |
| 20-30 cm | 2,860 | 57,042 | 2 | 59,903 |
| 30-40 cm | 2,074 | 53,184 | 3 | 55,258 |
| 40-60 cm | 2,275 | 68,798 | 3 | 71,073 |
| 60-80 cm | 415 | 38,549 | 5 | 38,964 |
| 80+ cm | 153 | 32,036 | 6 | 32,189 |
| Total | 11,373 | 292,058 | 1 | 303,431 |
| 2051 | | | | |
| 0-7 cm | 22 | 32 | 15 | 53 |
| 7-10 cm | 130 | 772 | 8 | 902 |
| 10-15 cm | 1,876 | 8,744 | 5 | 10,620 |
| 15-20 cm | 1,812 | 28,901 | 3 | 30,713 |
| 20-30 cm | 2,920 | 58,042 | 2 | 60,962 |
| 30-40 cm | 2,032 | 56,633 | 3 | 58,665 |
| 40-60 cm | 2,276 | 72,525 | 3 | 74,801 |
| 60-80 cm | 493 | 40,441 | 5 | 40,934 |
| 80+ cm | 170 | 34,180 | 6 | 34,350 |
| Total | 11,730 | 300,269 | 1 | 312,000 |
| 2056 | | | | |
| 0-7 cm | 16 | 24 | 6 | 40 |
| 7-10 cm | 107 | 896 | 7 | 1,003 |
| 10-15 cm | 1,873 | 6,164 | 6 | 8,037 |
| 15-20 cm | 2,105 | 26,457 | 3 | 28,562 |
| 20-30 cm | 2,927 | 62,969 | 2 | 65,896 |
| 30-40 cm | 2,128 | 58,016 | 3 | 60,144 |
| 40-60 cm | 2,232 | 75,430 | 3 | 77,662 |
| 60-80 cm | 394 | 42,202 | 4 | 42,597 |
| 80+ cm | 200 | 36,565 | 6 | 36,765 |
| Total | 11,983 | 308,724 | 1 | 320,707 |

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Table C8 Forecasts of annual standing volumes by mean stand diameter class at five year intervals for Scotland

| Scotland | FC | Private sector | | Total |
|--------------|------------------------------------|------------------------------------|----------|------------------------------------|
| | volume (000 m ³ obs) | volume (000 m ³ obs) | SE% | volume (000 m ³ obs) |
| 2012 | | | | |
| 0-7 cm | 4 | 89 | 12 | 93 |
| 7-10 cm | 175 | 1,714 | 6 | 1,889 |
| 10-15 cm | 1,240 | 4,456 | 7 | 5,696 |
| 15-20 cm | 1,690 | 3,555 | 7 | 5,245 |
| 20-30 cm | 627 | 5,732 | 7 | 6,359 |
| 30-40 cm | 85 | 4,340 | 10 | 4,424 |
| 40-60 cm | 44 | 6,355 | 11 | 6,398 |
| 60-80 cm | 7 | 3,543 | 18 | 3,551 |
| 80+ cm | 5 | 3,087 | 22 | 3,091 |
| Total | 3,875 | 32,870 | 4 | 36,745 |
| 2016 | | | | |
| 0-7 cm | 3 | 211 | 11 | 214 |
| 7-10 cm | 213 | 1,955 | 6 | 2,168 |
| 10-15 cm | 970 | 4,816 | 6 | 5,786 |
| 15-20 cm | 2,161 | 4,513 | 8 | 6,674 |
| 20-30 cm | 650 | 6,356 | 7 | 7,006 |
| 30-40 cm | 83 | 4,577 | 9 | 4,660 |
| 40-60 cm | 48 | 7,095 | 10 | 7,143 |
| 60-80 cm | 8 | 3,370 | 18 | 3,378 |
| 80+ cm | 6 | 3,568 | 20 | 3,574 |
| Total | 4,144 | 36,461 | 3 | 40,604 |
| 2021 | | | | |
| 0-7 cm | 4 | 246 | 10 | 249 |
| 7-10 cm | 230 | 1,706 | 6 | 1,935 |
| 10-15 cm | 1,139 | 6,331 | 5 | 7,469 |
| 15-20 cm | 2,299 | 5,190 | 7 | 7,489 |
| 20-30 cm | 696 | 7,233 | 6 | 7,929 |
| 30-40 cm | 92 | 5,636 | 9 | 5,727 |
| 40-60 cm | 51 | 7,656 | 10 | 7,707 |
| 60-80 cm | 9 | 3,351 | 18 | 3,360 |
| 80+ cm | 7 | 4,425 | 18 | 4,432 |
| Total | 4,526 | 41,771 | 3 | 46,298 |
| 2026 | | | | |
| 0-7 cm | 7 | 246 | 10 | 252 |
| 7-10 cm | 234 | 1,699 | 6 | 1,933 |
| 10-15 cm | 1,243 | 6,308 | 5 | 7,552 |
| 15-20 cm | 2,574 | 5,166 | 7 | 7,740 |
| 20-30 cm | 729 | 7,150 | 6 | 7,879 |
| 30-40 cm | 92 | 5,577 | 9 | 5,669 |
| 40-60 cm | 54 | 7,579 | 10 | 7,633 |
| 60-80 cm | 9 | 3,298 | 18 | 3,308 |
| 80+ cm | 8 | 4,424 | 18 | 4,432 |
| Total | 4,949 | 41,448 | 3 | 46,397 |
| 2032 | | | | |
| 0-7 cm | 20 | 233 | 11 | 253 |
| 7-10 cm | 259 | 1,799 | 6 | 2,057 |
| 10-15 cm | 1,419 | 6,946 | 5 | 8,365 |
| 15-20 cm | 2,717 | 6,380 | 6 | 9,097 |
| 20-30 cm | 761 | 8,640 | 6 | 9,401 |
| 30-40 cm | 97 | 5,861 | 9 | 5,958 |
| 40-60 cm | 55 | 8,792 | 9 | 8,848 |
| 60-80 cm | 9 | 3,507 | 18 | 3,516 |
| 80+ cm | 9 | 4,656 | 18 | 4,664 |
| Total | 5,346 | 46,813 | 3 | 52,159 |

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Table C8 cont. Forecasts of annual standing volumes by mean stand diameter class at five year intervals for Scotland

| Scotland | FC | Private sector | | Total |
|--------------|------------------------------------|------------------------------------|----------|------------------------------------|
| | volume (000 m ³ obs) | volume (000 m ³ obs) | SE% | volume (000 m ³ obs) |
| 2036 | | | | |
| 0-7 cm | 21 | 60 | 21 | 81 |
| 7-10 cm | 255 | 1,257 | 8 | 1,512 |
| 10-15 cm | 1,628 | 7,042 | 5 | 8,670 |
| 15-20 cm | 2,997 | 9,212 | 6 | 12,209 |
| 20-30 cm | 850 | 11,785 | 5 | 12,635 |
| 30-40 cm | 95 | 7,482 | 8 | 7,577 |
| 40-60 cm | 60 | 10,082 | 8 | 10,142 |
| 60-80 cm | 8 | 4,986 | 16 | 4,994 |
| 80+ cm | 10 | 5,123 | 17 | 5,133 |
| Total | 5,925 | 57,028 | 3 | 62,953 |
| 2041 | | | | |
| 0-7 cm | 19 | 33 | 10 | 53 |
| 7-10 cm | 175 | 862 | 9 | 1,036 |
| 10-15 cm | 1,876 | 6,576 | 6 | 8,452 |
| 15-20 cm | 3,233 | 10,024 | 5 | 13,257 |
| 20-30 cm | 892 | 13,266 | 5 | 14,158 |
| 30-40 cm | 102 | 8,955 | 7 | 9,057 |
| 40-60 cm | 64 | 10,179 | 8 | 10,242 |
| 60-80 cm | 7 | 5,791 | 15 | 5,799 |
| 80+ cm | 11 | 5,337 | 17 | 5,348 |
| Total | 6,379 | 61,022 | 2 | 67,401 |
| 2046 | | | | |
| 0-7 cm | 18 | 40 | 14 | 58 |
| 7-10 cm | 175 | 458 | 13 | 633 |
| 10-15 cm | 1,955 | 5,857 | 6 | 7,812 |
| 15-20 cm | 3,497 | 10,957 | 5 | 14,454 |
| 20-30 cm | 969 | 14,059 | 5 | 15,028 |
| 30-40 cm | 97 | 9,398 | 7 | 9,494 |
| 40-60 cm | 60 | 10,931 | 8 | 10,991 |
| 60-80 cm | 8 | 6,056 | 14 | 6,063 |
| 80+ cm | 11 | 5,647 | 16 | 5,658 |
| Total | 6,790 | 63,401 | 2 | 70,191 |
| 2051 | | | | |
| 0-7 cm | 18 | 49 | 11 | 67 |
| 7-10 cm | 161 | 361 | 12 | 522 |
| 10-15 cm | 2,032 | 4,852 | 7 | 6,884 |
| 15-20 cm | 3,732 | 11,241 | 5 | 14,973 |
| 20-30 cm | 1,022 | 14,578 | 5 | 15,600 |
| 30-40 cm | 104 | 9,903 | 7 | 10,006 |
| 40-60 cm | 58 | 11,507 | 8 | 11,565 |
| 60-80 cm | 7 | 5,946 | 14 | 5,953 |
| 80+ cm | 11 | 6,243 | 16 | 6,254 |
| Total | 7,145 | 64,680 | 2 | 71,825 |
| 2056 | | | | |
| 0-7 cm | 16 | 40 | 5 | 56 |
| 7-10 cm | 139 | 427 | 11 | 566 |
| 10-15 cm | 1,863 | 3,475 | 8 | 5,338 |
| 15-20 cm | 4,120 | 11,812 | 5 | 15,932 |
| 20-30 cm | 1,075 | 15,113 | 5 | 16,188 |
| 30-40 cm | 171 | 10,336 | 7 | 10,507 |
| 40-60 cm | 56 | 11,722 | 8 | 11,778 |
| 60-80 cm | 7 | 6,378 | 14 | 6,385 |
| 80+ cm | 11 | 6,660 | 16 | 6,671 |
| Total | 7,458 | 65,962 | 2 | 73,420 |

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Table C9 Forecasts of annual standing volumes by mean stand diameter class at five year intervals for Wales

| Wales | NRW | Private sector | | Total |
|--------------|------------------------------------|------------------------------------|----------|------------------------------------|
| | volume (000 m ³ obs) | volume (000 m ³ obs) | SE% | volume (000 m ³ obs) |
| 2012 | | | | |
| 0-7 cm | 4 | 75 | 26 | 79 |
| 7-10 cm | 73 | 706 | 8 | 779 |
| 10-15 cm | 327 | 2,054 | 9 | 2,381 |
| 15-20 cm | 728 | 2,090 | 12 | 2,818 |
| 20-30 cm | 463 | 4,499 | 9 | 4,962 |
| 30-40 cm | 150 | 4,555 | 11 | 4,705 |
| 40-60 cm | 106 | 5,738 | 13 | 5,844 |
| 60-80 cm | 36 | 2,889 | 17 | 2,925 |
| 80+ cm | 5 | 2,796 | 44 | 2,801 |
| Total | 1,892 | 25,402 | 6 | 27,294 |
| 2016 | | | | |
| 0-7 cm | 3 | 72 | 17 | 75 |
| 7-10 cm | 84 | 931 | 9 | 1,015 |
| 10-15 cm | 317 | 2,139 | 8 | 2,456 |
| 15-20 cm | 787 | 2,308 | 12 | 3,095 |
| 20-30 cm | 485 | 4,574 | 10 | 5,059 |
| 30-40 cm | 168 | 4,753 | 10 | 4,921 |
| 40-60 cm | 131 | 6,789 | 12 | 6,920 |
| 60-80 cm | 36 | 3,005 | 16 | 3,042 |
| 80+ cm | 5 | 2,677 | 41 | 2,682 |
| Total | 2,017 | 27,247 | 5 | 29,264 |
| 2021 | | | | |
| 0-7 cm | 3 | 74 | 16 | 77 |
| 7-10 cm | 120 | 864 | 10 | 985 |
| 10-15 cm | 397 | 2,590 | 7 | 2,987 |
| 15-20 cm | 804 | 2,509 | 12 | 3,313 |
| 20-30 cm | 490 | 4,993 | 10 | 5,483 |
| 30-40 cm | 222 | 5,572 | 10 | 5,794 |
| 40-60 cm | 140 | 7,045 | 11 | 7,185 |
| 60-80 cm | 39 | 3,420 | 16 | 3,459 |
| 80+ cm | 6 | 2,798 | 38 | 2,804 |
| Total | 2,221 | 29,865 | 5 | 32,086 |
| 2026 | | | | |
| 0-7 cm | 6 | 118 | 17 | 124 |
| 7-10 cm | 158 | 668 | 9 | 826 |
| 10-15 cm | 458 | 2,935 | 7 | 3,393 |
| 15-20 cm | 863 | 2,703 | 10 | 3,566 |
| 20-30 cm | 508 | 5,903 | 9 | 6,411 |
| 30-40 cm | 233 | 6,043 | 10 | 6,275 |
| 40-60 cm | 146 | 7,804 | 11 | 7,950 |
| 60-80 cm | 56 | 3,295 | 16 | 3,351 |
| 80+ cm | 6 | 3,172 | 34 | 3,178 |
| Total | 2,435 | 32,642 | 4 | 35,076 |
| 2031 | | | | |
| 0-7 cm | 7 | 46 | 42 | 52 |
| 7-10 cm | 174 | 629 | 11 | 804 |
| 10-15 cm | 670 | 2,868 | 7 | 3,538 |
| 15-20 cm | 888 | 3,192 | 8 | 4,080 |
| 20-30 cm | 567 | 6,714 | 9 | 7,282 |
| 30-40 cm | 233 | 6,846 | 9 | 7,078 |
| 40-60 cm | 160 | 8,088 | 11 | 8,248 |
| 60-80 cm | 13 | 3,674 | 15 | 3,687 |
| 80+ cm | 7 | 3,263 | 33 | 3,269 |
| Total | 2,718 | 35,320 | 4 | 38,038 |

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Table C9 cont. Forecasts of annual standing volumes by mean stand diameter class at five year intervals for Wales

| Wales | NRW | Private sector | | Total |
|--------------|------------------------------------|------------------------------------|----------|------------------------------------|
| | volume (000 m ³ obs) | volume (000 m ³ obs) | SE% | volume (000 m ³ obs) |
| 2036 | | | | |
| 0-7 cm | 6 | 4 | 14 | 10 |
| 7-10 cm | 161 | 487 | 13 | 648 |
| 10-15 cm | 842 | 2,358 | 7 | 3,200 |
| 15-20 cm | 924 | 3,810 | 8 | 4,734 |
| 20-30 cm | 630 | 7,316 | 8 | 7,947 |
| 30-40 cm | 222 | 7,542 | 9 | 7,764 |
| 40-60 cm | 194 | 9,032 | 10 | 9,226 |
| 60-80 cm | 18 | 3,787 | 15 | 3,805 |
| 80+ cm | 7 | 3,461 | 31 | 3,468 |
| Total | 3,003 | 37,797 | 4 | 40,800 |
| 2041 | | | | |
| 0-7 cm | 5 | 4 | 12 | 9 |
| 7-10 cm | 70 | 281 | 18 | 351 |
| 10-15 cm | 1,008 | 2,190 | 9 | 3,198 |
| 15-20 cm | 1,000 | 4,104 | 7 | 5,104 |
| 20-30 cm | 692 | 7,984 | 8 | 8,676 |
| 30-40 cm | 226 | 7,328 | 9 | 7,554 |
| 40-60 cm | 219 | 10,382 | 9 | 10,601 |
| 60-80 cm | 21 | 3,889 | 15 | 3,910 |
| 80+ cm | 7 | 3,721 | 30 | 3,729 |
| Total | 3,247 | 39,884 | 4 | 43,131 |
| 2046 | | | | |
| 0-7 cm | 5 | 4 | 13 | 9 |
| 7-10 cm | 81 | 143 | 24 | 223 |
| 10-15 cm | 1,003 | 1,900 | 10 | 2,903 |
| 15-20 cm | 993 | 4,051 | 7 | 5,044 |
| 20-30 cm | 728 | 8,510 | 8 | 9,238 |
| 30-40 cm | 207 | 7,688 | 9 | 7,895 |
| 40-60 cm | 243 | 10,941 | 9 | 11,184 |
| 60-80 cm | 21 | 4,231 | 15 | 4,251 |
| 80+ cm | 7 | 3,795 | 29 | 3,802 |
| Total | 3,288 | 41,262 | 3 | 44,550 |
| 2051 | | | | |
| 0-7 cm | 7 | 3 | 14 | 10 |
| 7-10 cm | 53 | 135 | 26 | 188 |
| 10-15 cm | 1,082 | 1,448 | 12 | 2,530 |
| 15-20 cm | 1,036 | 4,135 | 7 | 5,172 |
| 20-30 cm | 855 | 8,446 | 7 | 9,301 |
| 30-40 cm | 187 | 8,200 | 8 | 8,387 |
| 40-60 cm | 245 | 11,482 | 9 | 11,727 |
| 60-80 cm | 28 | 4,632 | 14 | 4,660 |
| 80+ cm | 8 | 3,937 | 28 | 3,944 |
| Total | 3,501 | 42,417 | 3 | 45,918 |
| 2056 | | | | |
| 0-7 cm | 7 | 4 | 14 | 11 |
| 7-10 cm | 51 | 153 | 23 | 204 |
| 10-15 cm | 1,055 | 962 | 13 | 2,017 |
| 15-20 cm | 1,138 | 4,400 | 7 | 5,537 |
| 20-30 cm | 897 | 8,253 | 7 | 9,149 |
| 30-40 cm | 238 | 8,471 | 9 | 8,709 |
| 40-60 cm | 240 | 11,750 | 8 | 11,990 |
| 60-80 cm | 25 | 5,447 | 14 | 5,473 |
| 80+ cm | 8 | 4,003 | 28 | 4,012 |
| Total | 3,658 | 43,443 | 3 | 47,101 |

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Table C10 Forecasts of annual standing volumes by mean stand diameter class at five year intervals for GB

| Great Britain | FC | Private sector | | Total |
|---------------|------------------------------------|------------------------------------|----------|------------------------------------|
| | volume (000 m ³ obs) | volume (000 m ³ obs) | SE% | volume (000 m ³ obs) |
| 2012 | | | | |
| 0-7 cm | 22 | 705 | 6 | 727 |
| 7-10 cm | 450 | 8,085 | 2 | 8,534 |
| 10-15 cm | 2,436 | 19,912 | 3 | 22,348 |
| 15-20 cm | 3,630 | 20,486 | 3 | 24,116 |
| 20-30 cm | 4,180 | 40,079 | 3 | 44,260 |
| 30-40 cm | 2,409 | 35,232 | 4 | 37,641 |
| 40-60 cm | 1,010 | 52,531 | 4 | 53,540 |
| 60-80 cm | 256 | 28,842 | 5 | 29,098 |
| 80+ cm | 81 | 24,691 | 9 | 24,772 |
| Total | 14,474 | 230,562 | 1 | 245,036 |
| 2016 | | | | |
| 0-7 cm | 16 | 1,274 | 5 | 1,290 |
| 7-10 cm | 500 | 9,012 | 2 | 9,512 |
| 10-15 cm | 2,122 | 21,694 | 3 | 23,817 |
| 15-20 cm | 4,288 | 22,477 | 3 | 26,765 |
| 20-30 cm | 4,225 | 44,351 | 3 | 48,576 |
| 30-40 cm | 2,388 | 37,640 | 3 | 40,028 |
| 40-60 cm | 1,246 | 57,907 | 3 | 59,153 |
| 60-80 cm | 266 | 30,134 | 5 | 30,400 |
| 80+ cm | 92 | 26,741 | 8 | 26,833 |
| Total | 15,143 | 251,230 | 1 | 266,373 |
| 2021 | | | | |
| 0-7 cm | 18 | 1,361 | 5 | 1,379 |
| 7-10 cm | 552 | 8,219 | 3 | 8,772 |
| 10-15 cm | 2,546 | 26,588 | 2 | 29,134 |
| 15-20 cm | 4,503 | 25,439 | 3 | 29,942 |
| 20-30 cm | 4,132 | 49,076 | 3 | 53,209 |
| 30-40 cm | 2,671 | 43,944 | 3 | 46,616 |
| 40-60 cm | 1,454 | 62,996 | 3 | 64,451 |
| 60-80 cm | 276 | 32,557 | 5 | 32,833 |
| 80+ cm | 102 | 29,529 | 7 | 29,632 |
| Total | 16,254 | 279,711 | 1 | 295,965 |
| 2026 | | | | |
| 0-7 cm | 27 | 1,095 | 5 | 1,121 |
| 7-10 cm | 582 | 8,184 | 3 | 8,767 |
| 10-15 cm | 2,844 | 28,565 | 2 | 31,410 |
| 15-20 cm | 5,008 | 30,639 | 3 | 35,647 |
| 20-30 cm | 4,079 | 55,418 | 2 | 59,497 |
| 30-40 cm | 2,622 | 47,959 | 3 | 50,582 |
| 40-60 cm | 1,747 | 69,921 | 3 | 71,668 |
| 60-80 cm | 298 | 35,257 | 5 | 35,556 |
| 80+ cm | 115 | 31,576 | 7 | 31,691 |
| Total | 17,322 | 308,615 | 1 | 325,938 |
| 2031 | | | | |
| 0-7 cm | 41 | 363 | 10 | 404 |
| 7-10 cm | 623 | 6,867 | 3 | 7,490 |
| 10-15 cm | 3,232 | 28,269 | 2 | 31,501 |
| 15-20 cm | 5,175 | 36,377 | 2 | 41,553 |
| 20-30 cm | 4,170 | 62,999 | 2 | 67,169 |
| 30-40 cm | 2,628 | 54,628 | 3 | 57,256 |
| 40-60 cm | 1,762 | 73,850 | 3 | 75,612 |
| 60-80 cm | 255 | 38,748 | 5 | 39,003 |
| 80+ cm | 116 | 34,336 | 7 | 34,452 |
| Total | 18,002 | 336,438 | 1 | 354,440 |

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Table C10 cont. Forecasts of annual standing volumes by mean stand diameter class at five year intervals for GB

| Great Britain | FC | Private sector | | Total |
|---------------|------------------------------------|------------------------------------|----------|------------------------------------|
| | volume (000 m ³ obs) | volume (000 m ³ obs) | SE% | volume (000 m ³ obs) |
| 2036 | | | | |
| 0-7 cm | 48 | 104 | 14 | 151 |
| 7-10 cm | 625 | 4,948 | 4 | 5,573 |
| 10-15 cm | 4,014 | 26,978 | 2 | 30,992 |
| 15-20 cm | 5,694 | 39,107 | 2 | 44,801 |
| 20-30 cm | 4,273 | 72,380 | 2 | 76,653 |
| 30-40 cm | 2,544 | 60,063 | 3 | 62,607 |
| 40-60 cm | 2,275 | 79,061 | 3 | 81,336 |
| 60-80 cm | 329 | 42,569 | 4 | 42,897 |
| 80+ cm | 143 | 36,789 | 7 | 36,932 |
| Total | 19,944 | 361,998 | 1 | 381,942 |
| 2041 | | | | |
| 0-7 cm | 49 | 74 | 8 | 123 |
| 7-10 cm | 403 | 2,847 | 7 | 3,251 |
| 10-15 cm | 4,517 | 23,657 | 3 | 28,174 |
| 15-20 cm | 6,032 | 41,817 | 2 | 47,849 |
| 20-30 cm | 4,507 | 79,228 | 2 | 83,735 |
| 30-40 cm | 2,437 | 65,213 | 3 | 67,650 |
| 40-60 cm | 2,486 | 85,830 | 3 | 88,316 |
| 60-80 cm | 394 | 45,544 | 4 | 45,937 |
| 80+ cm | 157 | 39,451 | 6 | 39,608 |
| Total | 20,982 | 383,659 | 1 | 404,641 |
| 2046 | | | | |
| 0-7 cm | 45 | 80 | 10 | 126 |
| 7-10 cm | 411 | 1,475 | 6 | 1,886 |
| 10-15 cm | 4,673 | 19,814 | 3 | 24,488 |
| 15-20 cm | 6,194 | 44,488 | 2 | 50,683 |
| 20-30 cm | 4,558 | 79,612 | 2 | 84,169 |
| 30-40 cm | 2,377 | 70,270 | 3 | 72,647 |
| 40-60 cm | 2,578 | 90,669 | 3 | 93,247 |
| 60-80 cm | 443 | 48,835 | 4 | 49,278 |
| 80+ cm | 171 | 41,478 | 6 | 41,649 |
| Total | 21,451 | 396,722 | 1 | 418,173 |
| 2051 | | | | |
| 0-7 cm | 46 | 84 | 9 | 130 |
| 7-10 cm | 344 | 1,268 | 6 | 1,612 |
| 10-15 cm | 4,990 | 15,044 | 4 | 20,034 |
| 15-20 cm | 6,581 | 44,277 | 2 | 50,858 |
| 20-30 cm | 4,796 | 81,066 | 2 | 85,862 |
| 30-40 cm | 2,323 | 74,736 | 3 | 77,058 |
| 40-60 cm | 2,579 | 95,514 | 3 | 98,093 |
| 60-80 cm | 529 | 51,018 | 4 | 51,547 |
| 80+ cm | 188 | 44,359 | 6 | 44,548 |
| Total | 22,376 | 407,366 | 1 | 429,742 |
| 2056 | | | | |
| 0-7 cm | 39 | 68 | 4 | 107 |
| 7-10 cm | 298 | 1,475 | 6 | 1,773 |
| 10-15 cm | 4,791 | 10,601 | 5 | 15,392 |
| 15-20 cm | 7,363 | 42,669 | 2 | 50,031 |
| 20-30 cm | 4,899 | 86,335 | 2 | 91,233 |
| 30-40 cm | 2,537 | 76,823 | 3 | 79,360 |
| 40-60 cm | 2,528 | 98,902 | 3 | 101,430 |
| 60-80 cm | 427 | 54,027 | 4 | 54,454 |
| 80+ cm | 219 | 47,228 | 6 | 47,447 |
| Total | 23,099 | 418,128 | 1 | 441,228 |

Appendix D 50 year broadleaf forecast - increment

Table D1 50-year forecast of increment by principal broadleaf tree species by country

| Principal species | 2013-16 | | | 2017-21 | | | 2022-26 | | | 2027-31 | | |
|------------------------|------------|----------------|----------|------------|----------------|----------|------------|----------------|----------|------------|----------------|----------|
| | FC/NRW | Private sector | SE% | FC/NRW | Private sector | SE% | FC/NRW | Private sector | SE% | FC/NRW | Private sector | SE% |
| | volume | volume | | volume | volume | | volume | volume | | volume | volume | |
| England | | | | | | | | | | | | |
| All broadleaves | 190 | 3,931 | 1 | 194 | 4,466 | 1 | 195 | 4,755 | 1 | 197 | 4,689 | 1 |
| Oak | 44 | 779 | 3 | 44 | 828 | 3 | 44 | 841 | 3 | 45 | 826 | 3 |
| Beech | 73 | 362 | 7 | 72 | 415 | 5 | 70 | 439 | 4 | 68 | 443 | 4 |
| Sycamore | 3 | 309 | 6 | 3 | 364 | 4 | 3 | 387 | 4 | 3 | 367 | 4 |
| Ash | 8 | 623 | 4 | 8 | 684 | 3 | 8 | 708 | 3 | 9 | 673 | 3 |
| Birch | 18 | 478 | 4 | 20 | 518 | 4 | 20 | 528 | 4 | 20 | 489 | 4 |
| Sweet Chestnut | 4 | 187 | 8 | 4 | 215 | 8 | 4 | 233 | 7 | 4 | 236 | 7 |
| Hazel | 1 | 193 | 5 | 1 | 214 | 5 | 1 | 228 | 4 | 1 | 223 | 4 |
| Hawthorn | 0 | 151 | 6 | 0 | 184 | 5 | 0 | 220 | 5 | 0 | 238 | 5 |
| Alder | 1 | 124 | 9 | 1 | 151 | 8 | 1 | 158 | 7 | 1 | 147 | 7 |
| Willow | 0 | 165 | 8 | 0 | 216 | 6 | 0 | 248 | 5 | 0 | 259 | 5 |
| Other broadleaves | 37 | 556 | 4 | 40 | 670 | 3 | 43 | 756 | 3 | 45 | 777 | 3 |
| Scotland | | | | | | | | | | | | |
| All broadleaves | 72 | 980 | 3 | 83 | 1,101 | 3 | 92 | 1,266 | 2 | 104 | 1,294 | 2 |
| Oak | 4 | 77 | 16 | 5 | 88 | 14 | 6 | 108 | 9 | 9 | 113 | 8 |
| Beech | 2 | 74 | 17 | 2 | 87 | 12 | 2 | 95 | 11 | 2 | 97 | 10 |
| Sycamore | 1 | 112 | 11 | 1 | 117 | 9 | 1 | 116 | 8 | 1 | 108 | 8 |
| Ash | 0 | 48 | 30 | 1 | 61 | 23 | 1 | 83 | 8 | 2 | 83 | 8 |
| Birch | 28 | 421 | 4 | 28 | 458 | 4 | 28 | 516 | 4 | 28 | 521 | 4 |
| Sweet Chestnut | 0 | 0 | 72 | 0 | 0 | 75 | 0 | 0 | 75 | 0 | 0 | 75 |
| Hazel | 0 | 28 | 16 | 0 | 30 | 15 | 0 | 32 | 13 | 0 | 32 | 13 |
| Hawthorn | 0 | 19 | 14 | 0 | 22 | 13 | 0 | 25 | 12 | 0 | 27 | 12 |
| Alder | 2 | 51 | 14 | 2 | 60 | 12 | 2 | 78 | 10 | 5 | 85 | 9 |
| Willow | 0 | 53 | 15 | 0 | 64 | 13 | 0 | 72 | 13 | 0 | 77 | 13 |
| Other broadleaves | 34 | 96 | 8 | 43 | 113 | 7 | 51 | 140 | 6 | 57 | 149 | 6 |

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Table D1 cont. 50-year forecast of increment by principal broadleaf tree species by country

| Principal species | 2032-36 | | | 2037-41 | | | 2042-46 | | | 2047-51 | | |
|------------------------|------------------|--------------------------|----------|------------------|--------------------------|----------|------------------|--------------------------|----------|------------------|--------------------------|----------|
| | FC/NRW volume | Private sector volume | SE% | FC/NRW volume | Private sector volume | SE% | FC/NRW volume | Private sector volume | SE% | FC/NRW volume | Private sector volume | SE% |
| England | | | | | | | | | | | | |
| All broadleaves | 200 | 4,459 | 1 | 196 | 4,163 | 1 | 192 | 3,776 | 1 | 187 | 3,321 | 1 |
| Oak | 46 | 803 | 3 | 46 | 772 | 3 | 48 | 736 | 3 | 48 | 697 | 3 |
| Beech | 67 | 435 | 4 | 66 | 423 | 4 | 64 | 409 | 4 | 64 | 394 | 4 |
| Sycamore | 4 | 327 | 4 | 4 | 285 | 4 | 5 | 232 | 4 | 4 | 171 | 4 |
| Ash | 11 | 602 | 3 | 12 | 523 | 3 | 12 | 426 | 3 | 12 | 320 | 3 |
| Birch | 20 | 433 | 4 | 20 | 377 | 4 | 20 | 308 | 4 | 19 | 227 | 4 |
| Sweet Chestnut | 4 | 234 | 7 | 4 | 227 | 7 | 3 | 218 | 7 | 3 | 208 | 7 |
| Hazel | 1 | 202 | 4 | 1 | 172 | 4 | 1 | 142 | 4 | 1 | 105 | 5 |
| Hawthorn | 0 | 248 | 5 | 0 | 251 | 6 | 0 | 248 | 6 | 0 | 242 | 6 |
| Alder | 1 | 129 | 7 | 1 | 111 | 7 | 1 | 91 | 7 | 1 | 65 | 8 |
| Willow | 0 | 264 | 5 | 0 | 263 | 6 | 0 | 257 | 6 | 0 | 246 | 6 |
| Other broadleaves | 45 | 772 | 3 | 42 | 749 | 3 | 39 | 699 | 3 | 35 | 636 | 4 |
| Scotland | | | | | | | | | | | | |
| All broadleaves | 112 | 1,245 | 2 | 113 | 1,166 | 2 | 112 | 1,061 | 2 | 111 | 931 | 2 |
| Oak | 11 | 115 | 8 | 15 | 118 | 7 | 18 | 121 | 7 | 21 | 123 | 7 |
| Beech | 2 | 98 | 10 | 2 | 96 | 10 | 2 | 93 | 10 | 2 | 88 | 10 |
| Sycamore | 1 | 96 | 8 | 1 | 84 | 9 | 1 | 69 | 10 | 1 | 55 | 11 |
| Ash | 2 | 75 | 8 | 2 | 66 | 8 | 2 | 53 | 8 | 1 | 39 | 9 |
| Birch | 27 | 487 | 4 | 29 | 435 | 4 | 29 | 374 | 4 | 29 | 296 | 4 |
| Sweet Chestnut | 0 | 0 | 75 | 0 | 0 | 75 | 0 | 0 | 74 | 0 | 0 | 74 |
| Hazel | 0 | 29 | 13 | 0 | 25 | 13 | 0 | 19 | 13 | 0 | 15 | 14 |
| Hawthorn | 0 | 28 | 12 | 0 | 28 | 12 | 0 | 27 | 12 | 0 | 27 | 12 |
| Alder | 10 | 83 | 9 | 14 | 79 | 8 | 18 | 75 | 7 | 20 | 69 | 6 |
| Willow | 0 | 80 | 13 | 0 | 80 | 13 | 0 | 79 | 13 | 0 | 76 | 13 |
| Other broadleaves | 57 | 153 | 6 | 50 | 154 | 6 | 43 | 149 | 6 | 36 | 141 | 6 |

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Table D1 cont. 50-year forecast of increment by principal broadleaf tree species by country

| Principal species | 2052-56 | | | 2057-61 | | |
|------------------------|------------------|-----------------------|------------------|-----------------------|------------------|-----------------------|
| | FC/NRW volume | Private sector SE% | FC/NRW volume | Private sector SE% | FC/NRW volume | Private sector SE% |
| England | | | | | | |
| All broadleaves | 185 | 2,945 | 1 | 181 | 2,792 | 1 |
| Oak | 49 | 659 | 3 | 51 | 620 | 3 |
| Beech | 65 | 378 | 4 | 66 | 360 | 4 |
| Sycamore | 4 | 126 | 4 | 4 | 121 | 4 |
| Ash | 11 | 240 | 3 | 10 | 227 | 3 |
| Birch | 18 | 172 | 4 | 17 | 171 | 3 |
| Sweet Chestnut | 3 | 198 | 7 | 3 | 187 | 7 |
| Hazel | 1 | 71 | 5 | 1 | 57 | 5 |
| Hawthorn | 0 | 234 | 6 | 0 | 224 | 6 |
| Alder | 1 | 50 | 8 | 1 | 47 | 7 |
| Willow | 0 | 234 | 6 | 0 | 220 | 6 |
| Other broadleaves | 32 | 577 | 4 | 29 | 550 | 4 |
| Scotland | | | | | | |
| All broadleaves | 108 | 810 | 2 | 104 | 760 | 2 |
| Oak | 23 | 125 | 6 | 26 | 127 | 6 |
| Beech | 2 | 84 | 10 | 2 | 80 | 9 |
| Sycamore | 1 | 45 | 11 | 1 | 46 | 10 |
| Ash | 1 | 27 | 9 | 1 | 23 | 9 |
| Birch | 29 | 224 | 4 | 29 | 192 | 4 |
| Sweet Chestnut | 0 | 0 | 74 | 0 | 0 | 74 |
| Hazel | 0 | 10 | 14 | 0 | 9 | 19 |
| Hawthorn | 0 | 26 | 12 | 0 | 25 | 12 |
| Alder | 21 | 63 | 5 | 20 | 62 | 4 |
| Willow | 0 | 72 | 13 | 0 | 69 | 13 |
| Other broadleaves | 30 | 133 | 6 | 25 | 126 | 6 |

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Table D1 cont. 50-year forecast of increment by principal broadleaf tree species by country

| Principal species | 2013-16 | | | 2017-21 | | | 2022-26 | | | 2027-31 | | |
|------------------------|------------|----------------|----------|------------|----------------|----------|------------|----------------|----------|------------|----------------|----------|
| | FC/NRW | Private sector | SE% | FC/NRW | Private sector | SE% | FC/NRW | Private sector | SE% | FC/NRW | Private sector | SE% |
| | Volume | Volume | Volume | Volume | Volume | Volume | Volume | Volume | Volume | Volume | Volume | Volume |
| Wales | | | | | | | | | | | | |
| All broadleaves | 43 | 481 | 8 | 51 | 571 | 4 | 59 | 633 | 3 | 68 | 635 | 3 |
| Oak | 7 | 109 | 11 | 7 | 115 | 10 | 8 | 118 | 9 | 9 | 115 | 9 |
| Beech | 9 | 36 | 21 | 9 | 38 | 20 | 9 | 38 | 19 | 9 | 39 | 19 |
| Sycamore | 0 | 45 | 16 | 0 | 51 | 14 | 0 | 51 | 13 | 0 | 48 | 13 |
| Ash | 1 | 41 | 82 | 1 | 72 | 21 | 1 | 89 | 10 | 2 | 89 | 9 |
| Birch | 5 | 51 | 13 | 6 | 62 | 12 | 6 | 69 | 12 | 7 | 67 | 12 |
| Sweet Chestnut | 0 | 3 | 55 | 0 | 3 | 55 | 0 | 3 | 55 | 0 | 3 | 55 |
| Hazel | 0 | 39 | 10 | 0 | 40 | 10 | 0 | 45 | 9 | 1 | 47 | 9 |
| Hawthorn | 0 | 20 | 14 | 0 | 24 | 13 | 0 | 29 | 14 | 0 | 31 | 14 |
| Alder | 0 | 49 | 22 | 0 | 58 | 14 | 0 | 59 | 13 | 0 | 55 | 12 |
| Willow | 0 | 48 | 14 | 0 | 56 | 13 | 0 | 66 | 12 | 0 | 70 | 12 |
| Other broadleaves | 20 | 41 | 11 | 27 | 52 | 10 | 34 | 64 | 9 | 40 | 71 | 10 |
| Great Britain | | | | | | | | | | | | |
| All broadleaves | 305 | 5,392 | 1 | 328 | 6,138 | 1 | 346 | 6,654 | 1 | 369 | 6,618 | 1 |
| Oak | 55 | 966 | 3 | 56 | 1,031 | 3 | 58 | 1,067 | 3 | 63 | 1,054 | 2 |
| Beech | 85 | 471 | 6 | 84 | 540 | 4 | 81 | 573 | 4 | 79 | 579 | 4 |
| Sycamore | 4 | 467 | 5 | 4 | 532 | 4 | 4 | 555 | 4 | 4 | 523 | 4 |
| Ash | 9 | 712 | 6 | 10 | 818 | 3 | 11 | 880 | 3 | 13 | 846 | 3 |
| Birch | 51 | 950 | 3 | 54 | 1,038 | 3 | 54 | 1,113 | 3 | 55 | 1,078 | 3 |
| Sweet Chestnut | 4 | 190 | 8 | 4 | 218 | 7 | 4 | 236 | 7 | 4 | 239 | 7 |
| Hazel | 2 | 259 | 4 | 2 | 284 | 4 | 2 | 305 | 4 | 2 | 302 | 4 |
| Hawthorn | 0 | 190 | 5 | 0 | 230 | 4 | 0 | 274 | 4 | 0 | 296 | 4 |
| Alder | 4 | 224 | 8 | 3 | 269 | 6 | 4 | 295 | 5 | 6 | 287 | 5 |
| Willow | 0 | 266 | 6 | 0 | 335 | 5 | 0 | 386 | 5 | 0 | 406 | 5 |
| Other broadleaves | 91 | 693 | 3 | 111 | 835 | 3 | 128 | 960 | 3 | 142 | 998 | 3 |

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Table D1 cont. 50-year forecast of increment by principal broadleaf tree species by country

| Principal species | 2032-36 | | | 2037-41 | | | 2042-46 | | | 2047-51 | | |
|----------------------|------------|----------------|----------|------------|----------------|----------|------------|----------------|----------|------------|----------------|----------|
| | FC/NRW | Private sector | SE% | FC/NRW | Private sector | SE% | FC/NRW | Private sector | SE% | FC/NRW | Private sector | SE% |
| | volume | volume | | volume | volume | | volume | volume | | volume | volume | |
| Wales | 71 | 611 | 3 | 68 | 570 | 3 | 64 | 518 | 3 | 61 | 458 | 3 |
| All broadleaves | 10 | 111 | 9 | 11 | 107 | 9 | 12 | 103 | 9 | 13 | 98 | 9 |
| Oak | 8 | 39 | 18 | 8 | 37 | 18 | 8 | 36 | 18 | 8 | 34 | 18 |
| Beech | 0 | 43 | 13 | 0 | 37 | 13 | 0 | 29 | 13 | 0 | 21 | 13 |
| Sycamore | 2 | 80 | 9 | 2 | 71 | 9 | 2 | 60 | 9 | 2 | 47 | 9 |
| Ash | 8 | 61 | 12 | 8 | 54 | 12 | 8 | 46 | 11 | 8 | 34 | 11 |
| Birch | 0 | 3 | 55 | 0 | 3 | 55 | 0 | 2 | 55 | 0 | 2 | 55 |
| Sweet Chestnut | 2 | 49 | 9 | 2 | 44 | 9 | 3 | 39 | 9 | 4 | 32 | 9 |
| Hazel | 0 | 32 | 14 | 0 | 32 | 14 | 0 | 32 | 14 | 0 | 31 | 14 |
| Hawthorn | 0 | 48 | 12 | 0 | 41 | 13 | 0 | 34 | 13 | 0 | 28 | 12 |
| Alder | 0 | 73 | 12 | 0 | 74 | 12 | 0 | 73 | 12 | 0 | 70 | 12 |
| Willow | 40 | 72 | 10 | 35 | 71 | 10 | 31 | 66 | 10 | 27 | 61 | 10 |
| Other broadleaves | | | | | | | | | | | | |
| Great Britain | 383 | 6,314 | 1 | 377 | 5,899 | 1 | 369 | 5,356 | 1 | 359 | 4,709 | 1 |
| All broadleaves | 68 | 1,029 | 2 | 72 | 997 | 2 | 77 | 960 | 2 | 82 | 918 | 2 |
| Oak | 78 | 572 | 4 | 76 | 556 | 4 | 74 | 537 | 4 | 73 | 516 | 4 |
| Beech | 5 | 466 | 4 | 6 | 405 | 4 | 6 | 330 | 4 | 5 | 247 | 4 |
| Sycamore | 15 | 757 | 3 | 16 | 660 | 3 | 16 | 539 | 3 | 15 | 406 | 3 |
| Ash | 56 | 981 | 3 | 57 | 866 | 3 | 56 | 728 | 3 | 56 | 557 | 3 |
| Birch | 4 | 237 | 7 | 4 | 230 | 7 | 4 | 221 | 7 | 4 | 211 | 7 |
| Sweet Chestnut | 3 | 279 | 4 | 4 | 241 | 4 | 4 | 200 | 4 | 5 | 153 | 4 |
| Hazel | 0 | 308 | 5 | 0 | 312 | 5 | 0 | 307 | 5 | 0 | 299 | 5 |
| Hawthorn | 12 | 260 | 5 | 16 | 232 | 5 | 19 | 200 | 5 | 22 | 162 | 4 |
| Alder | 0 | 416 | 5 | 0 | 417 | 5 | 0 | 408 | 5 | 0 | 393 | 5 |
| Willow | 142 | 997 | 3 | 128 | 974 | 3 | 112 | 915 | 3 | 98 | 838 | 3 |
| Other broadleaves | | | | | | | | | | | | |

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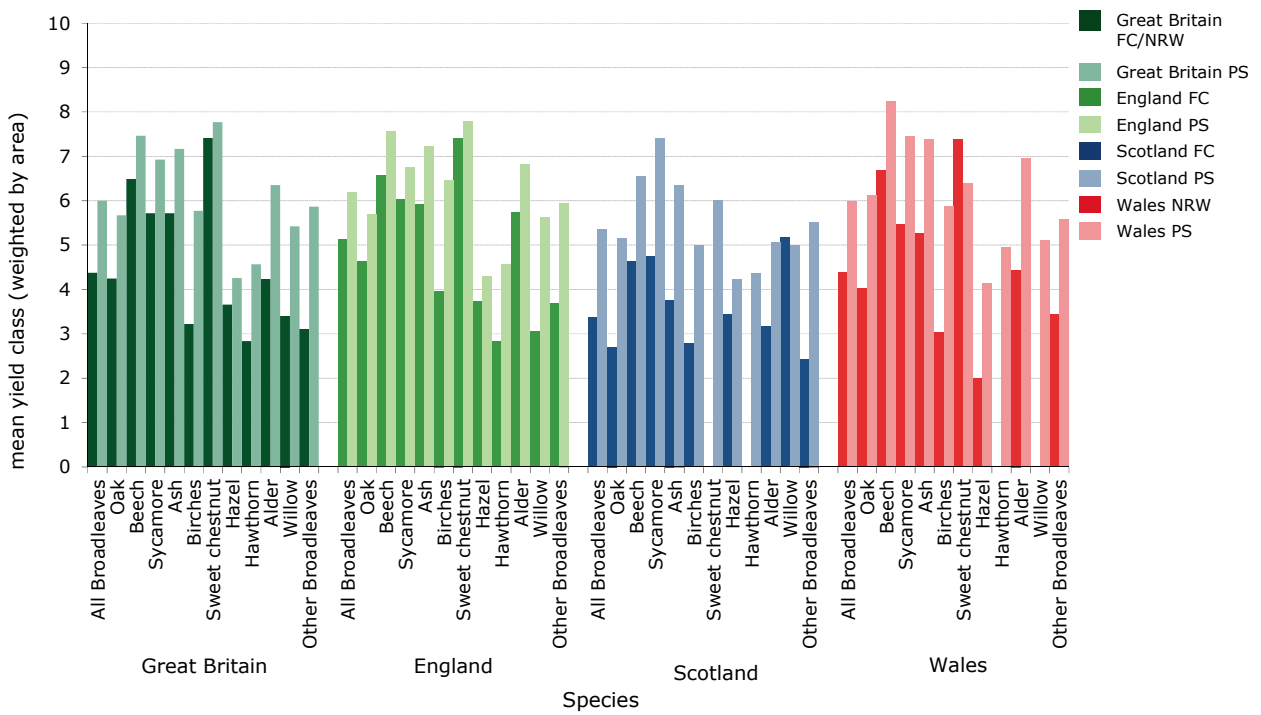
Table D1 cont. 50-year forecast of increment by principal broadleaf tree species by country

| Principal species | 2052-56 | | | 2057-61 | | |
|------------------------|------------|----------------|----------|----------------|--------------|----------------|
| | FC/NRW | Private sector | FC/NRW | Private sector | FC/NRW | Private sector |
| | volume | SE% | volume | SE% | volume | SE% |
| Wales | | | | | | |
| All broadleaves | 60 | 403 | 3 | 57 | 371 | 3 |
| Oak | 14 | 93 | 9 | 14 | 88 | 9 |
| Beech | 8 | 32 | 17 | 8 | 30 | 17 |
| Sycamore | 0 | 18 | 13 | 0 | 19 | 16 |
| Ash | 2 | 35 | 9 | 1 | 29 | 9 |
| Birch | 8 | 25 | 10 | 7 | 23 | 9 |
| Sweet Chestnut | 0 | 2 | 55 | 0 | 2 | 55 |
| Hazel | 4 | 25 | 8 | 4 | 19 | 8 |
| Hawthorn | 0 | 29 | 14 | 0 | 28 | 14 |
| Alder | 0 | 22 | 12 | 0 | 20 | 12 |
| Willow | 0 | 67 | 12 | 0 | 63 | 12 |
| Other broadleaves | 24 | 55 | 10 | 21 | 50 | 10 |
| Great Britain | | | | | | |
| All broadleaves | 352 | 4,158 | 1 | 342 | 3,922 | 1 |
| Oak | 87 | 877 | 2 | 91 | 834 | 2 |
| Beech | 75 | 494 | 4 | 76 | 470 | 4 |
| Sycamore | 5 | 189 | 4 | 5 | 186 | 4 |
| Ash | 14 | 301 | 3 | 12 | 279 | 3 |
| Birch | 55 | 421 | 3 | 53 | 386 | 2 |
| Sweet Chestnut | 4 | 200 | 7 | 4 | 189 | 7 |
| Hazel | 5 | 107 | 4 | 5 | 85 | 4 |
| Hawthorn | 0 | 289 | 5 | 0 | 277 | 5 |
| Alder | 23 | 136 | 4 | 21 | 129 | 3 |
| Willow | 0 | 373 | 5 | 0 | 353 | 4 |
| Other broadleaves | 85 | 764 | 3 | 75 | 726 | 3 |

A table showing the full regional breakout of the forecast of increment by principal conifer tree species can be found in Table D2 of the accompanying spreadsheet

Appendix E Mean yield classes for broadleaves

Figure E1 Mean yield class for principal broadleaved tree species



Appendix F Evidence of management and ease of harvesting in Private sector broadleaved sites

Figure F1 Evidence of management in England

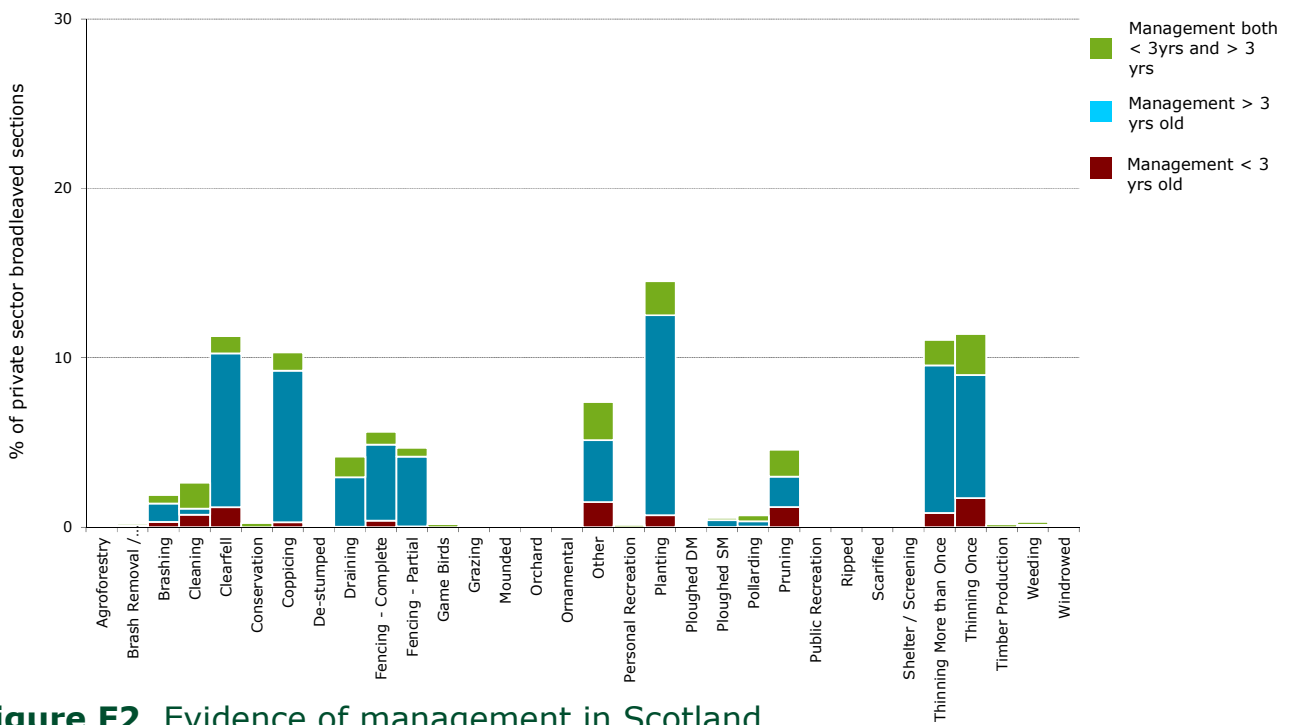
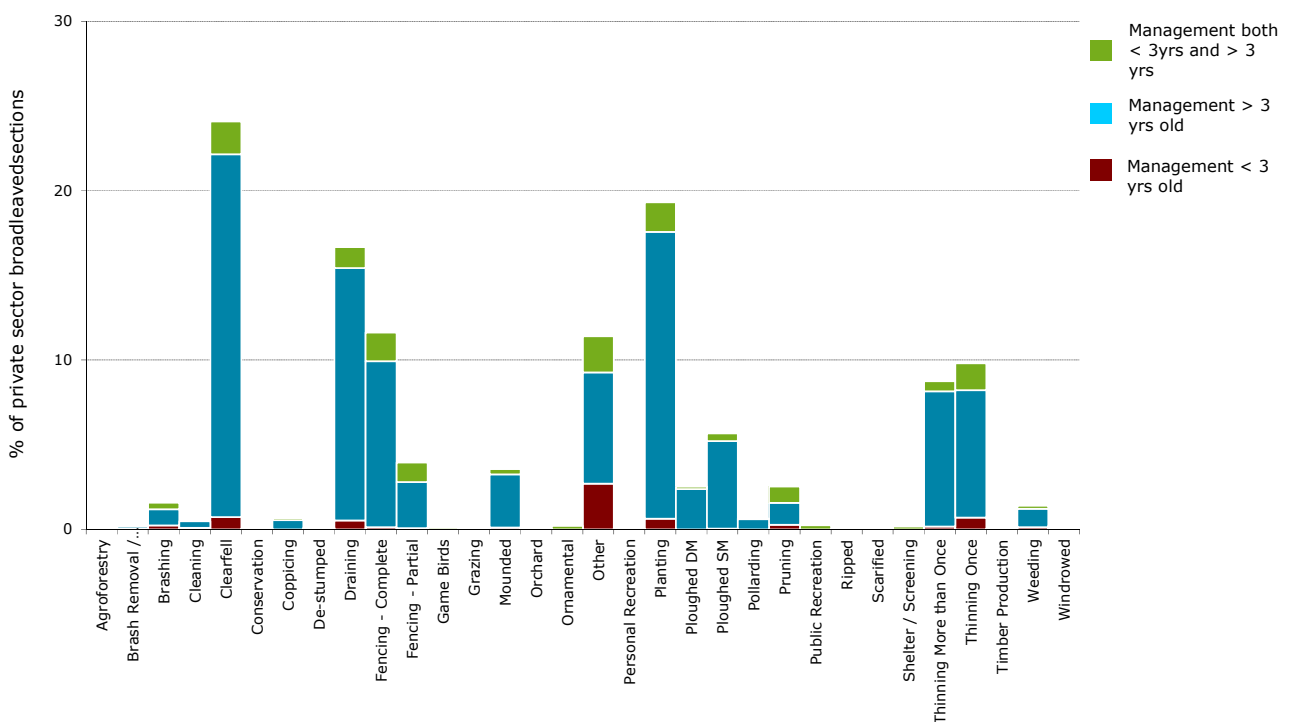


Figure F2 Evidence of management in Scotland



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Figure F3 Evidence of management in Wales

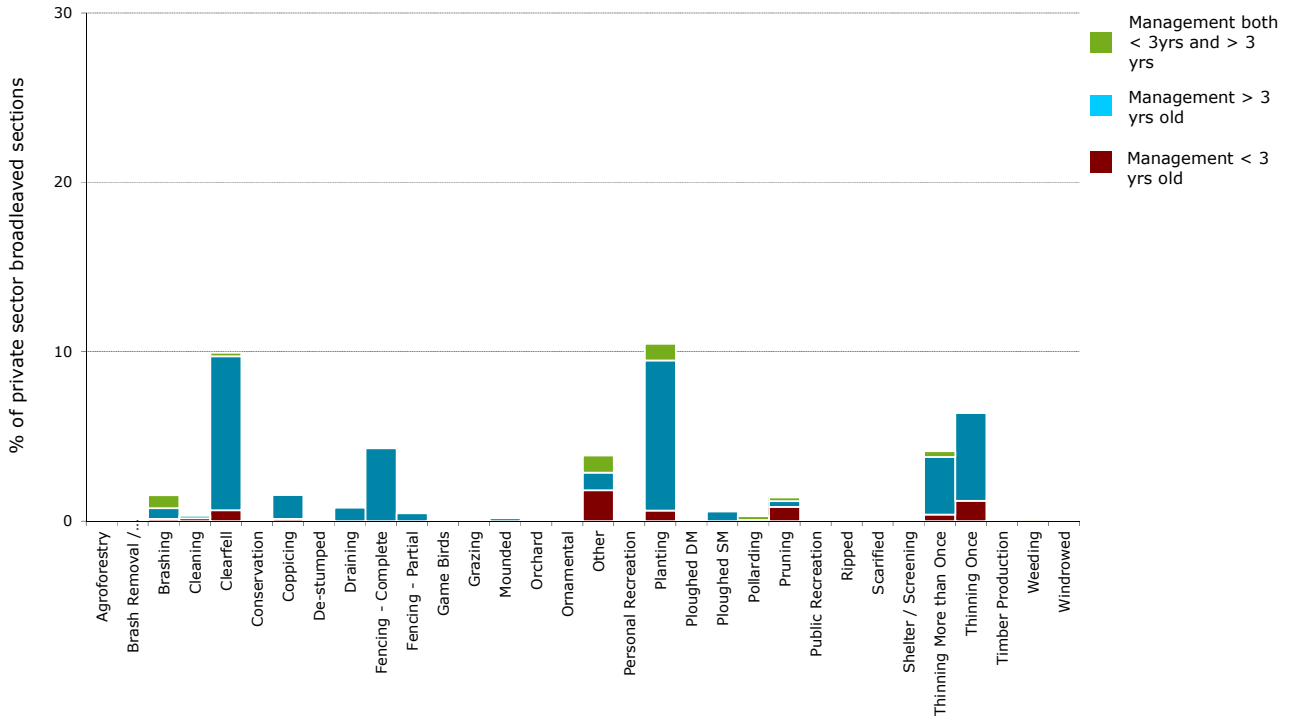
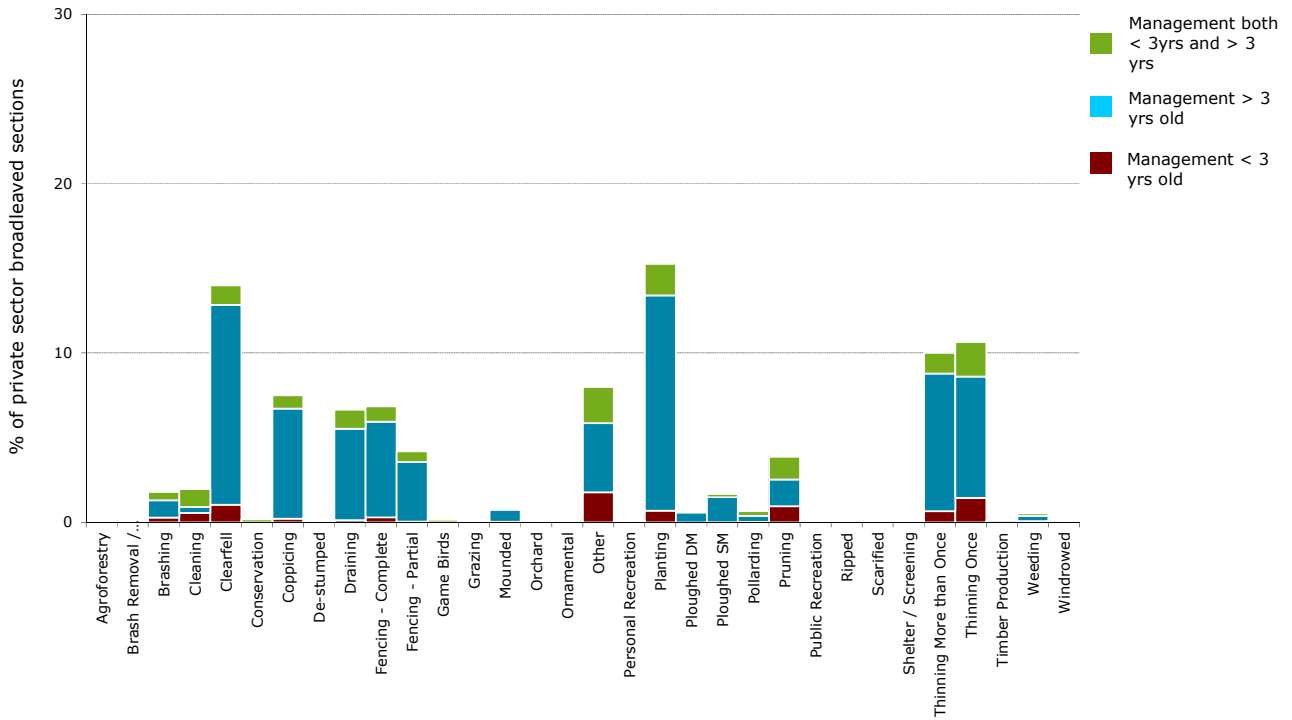


Figure F4 Evidence of management in GB



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Figure F5 Evidence of thinning

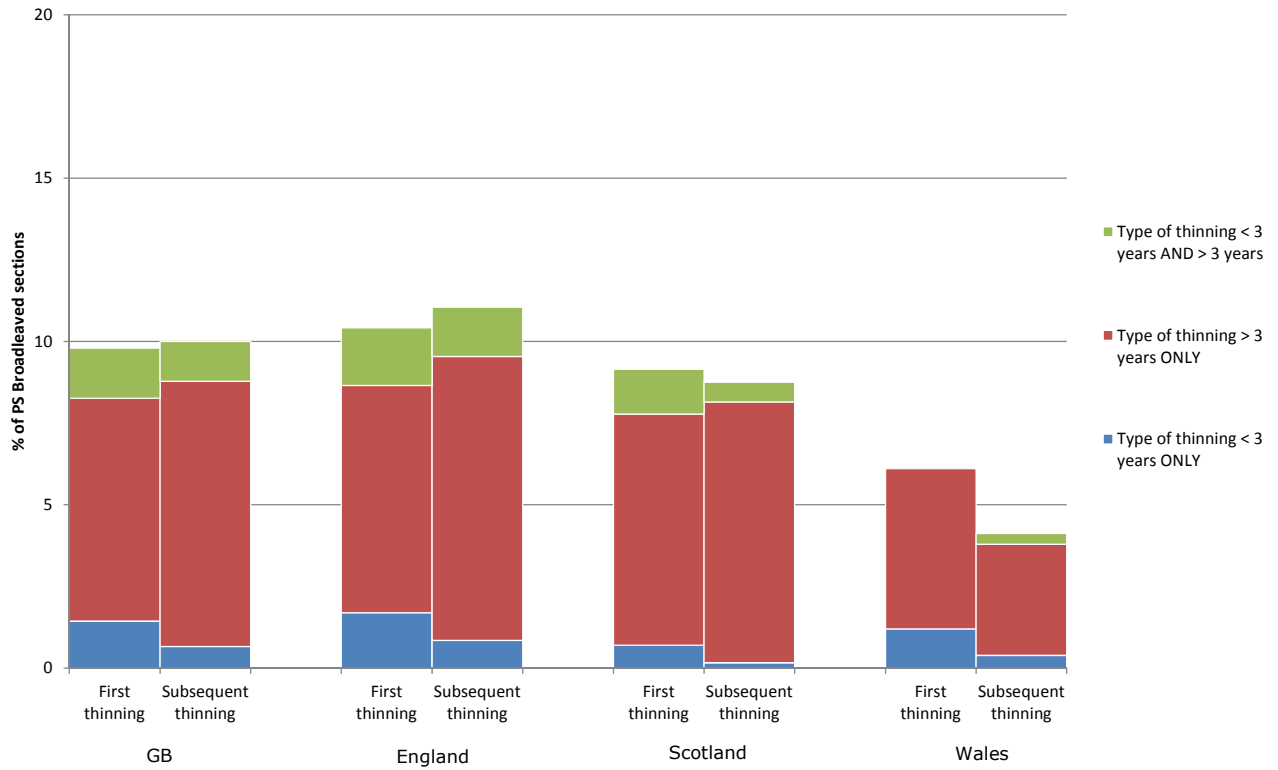
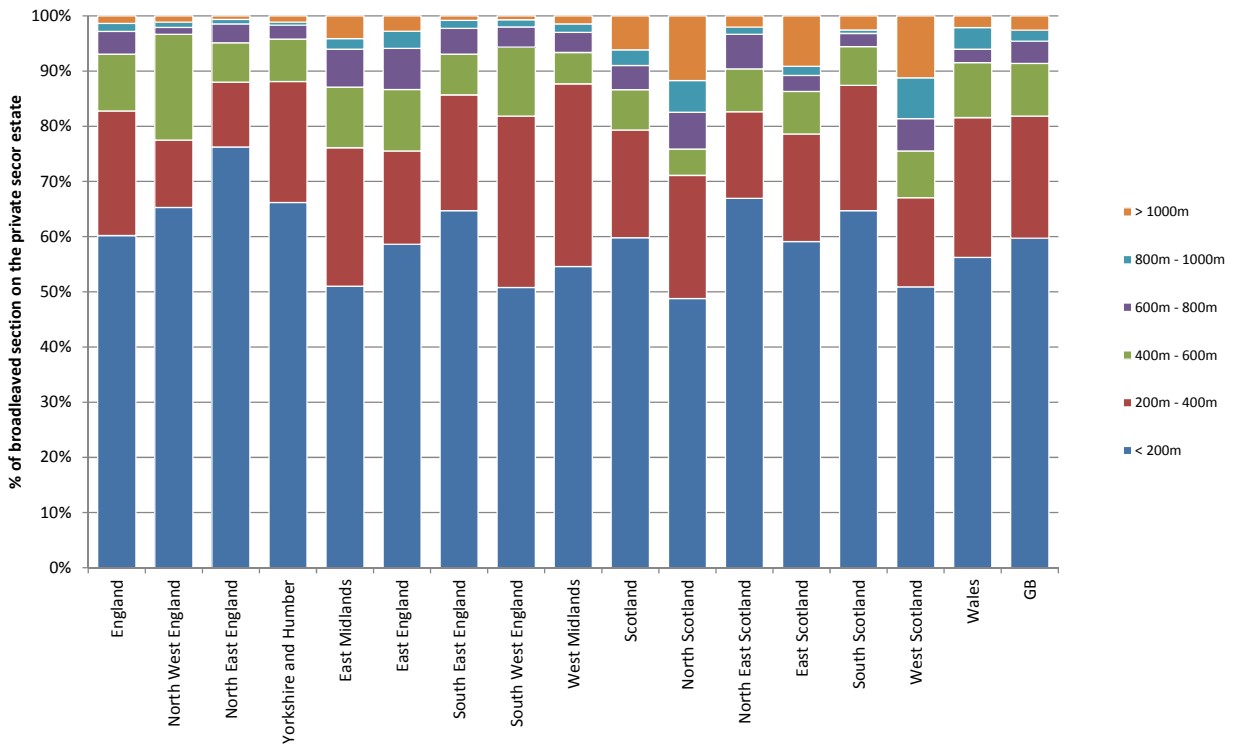


Figure F6 Distance to road



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Figure F7 Road or ride in survey square

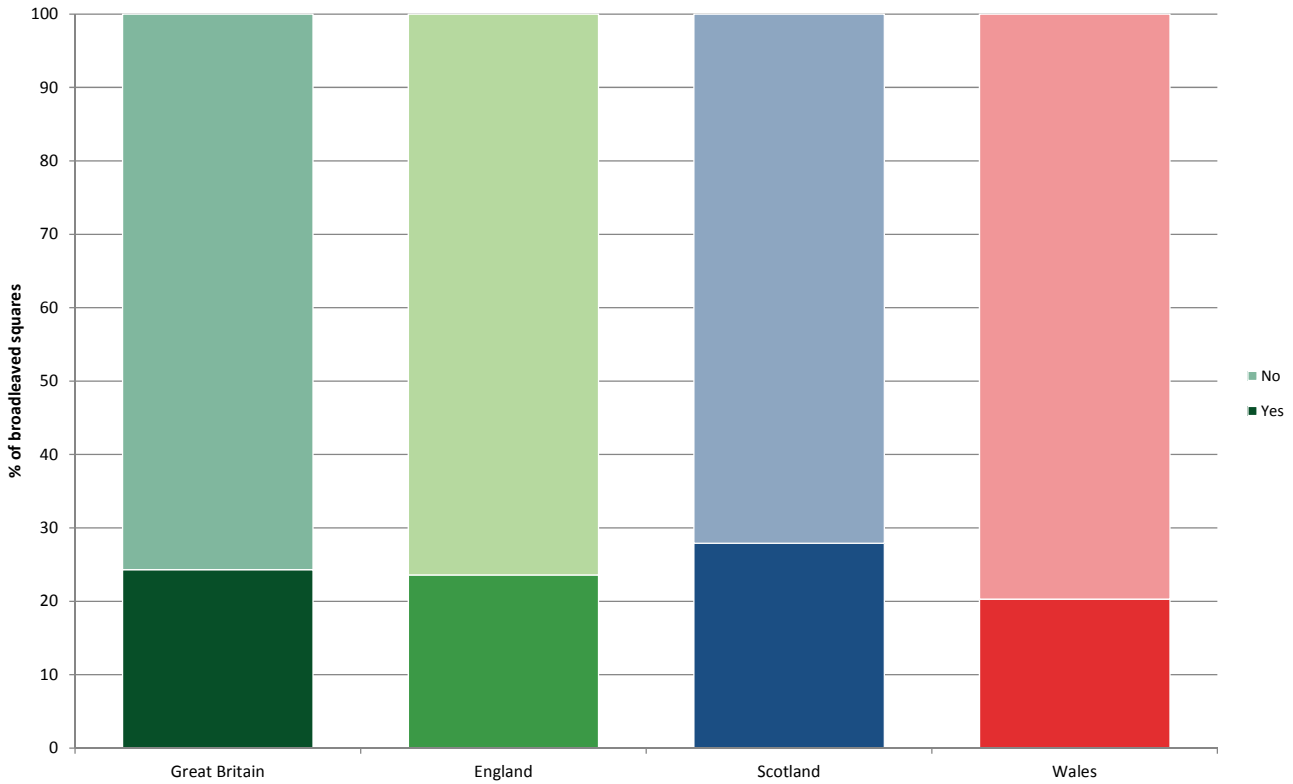
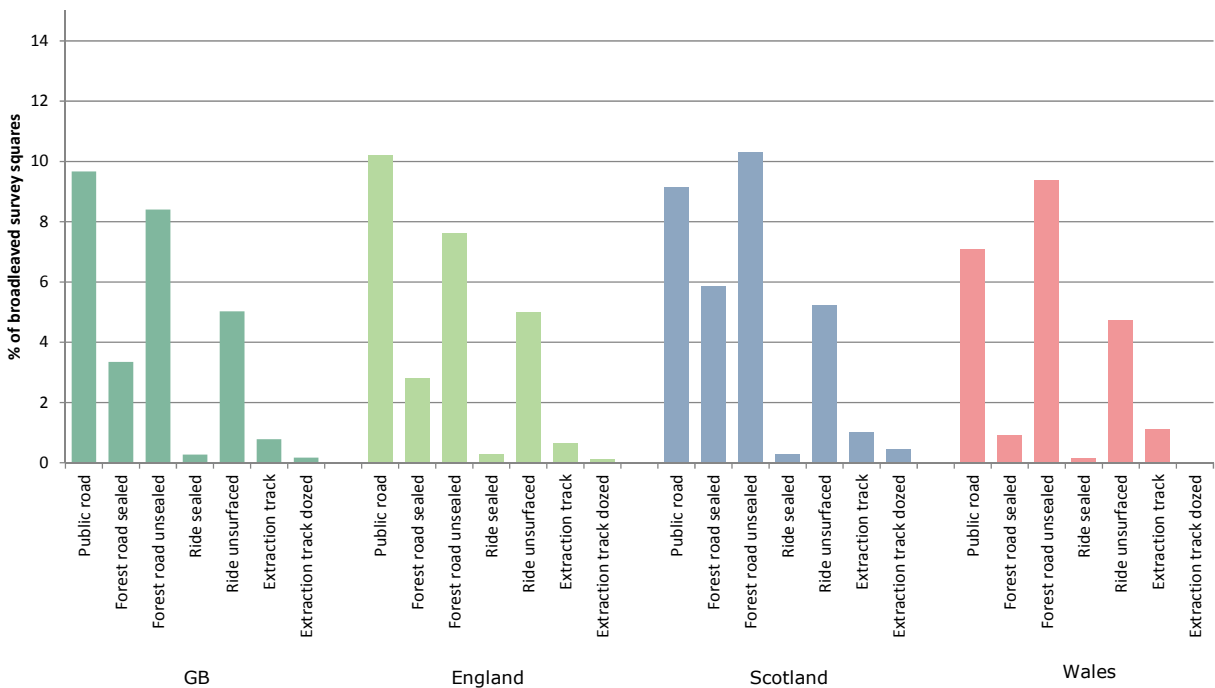
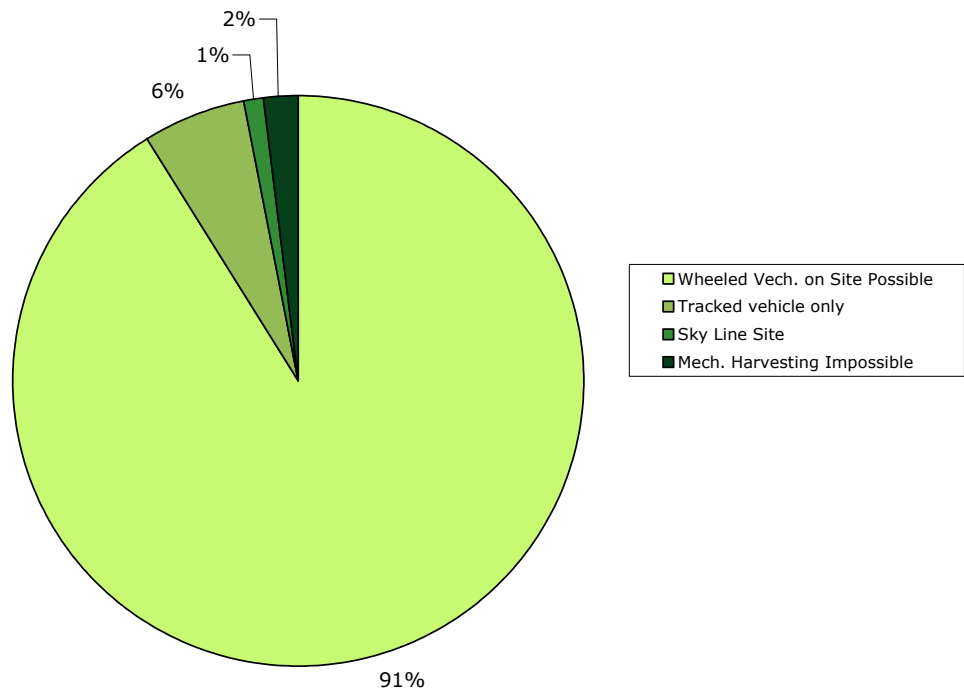


Figure F8 Type of road or ride



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Figure F9 Relative difficulty of harvesting at broadleaved sites in GB



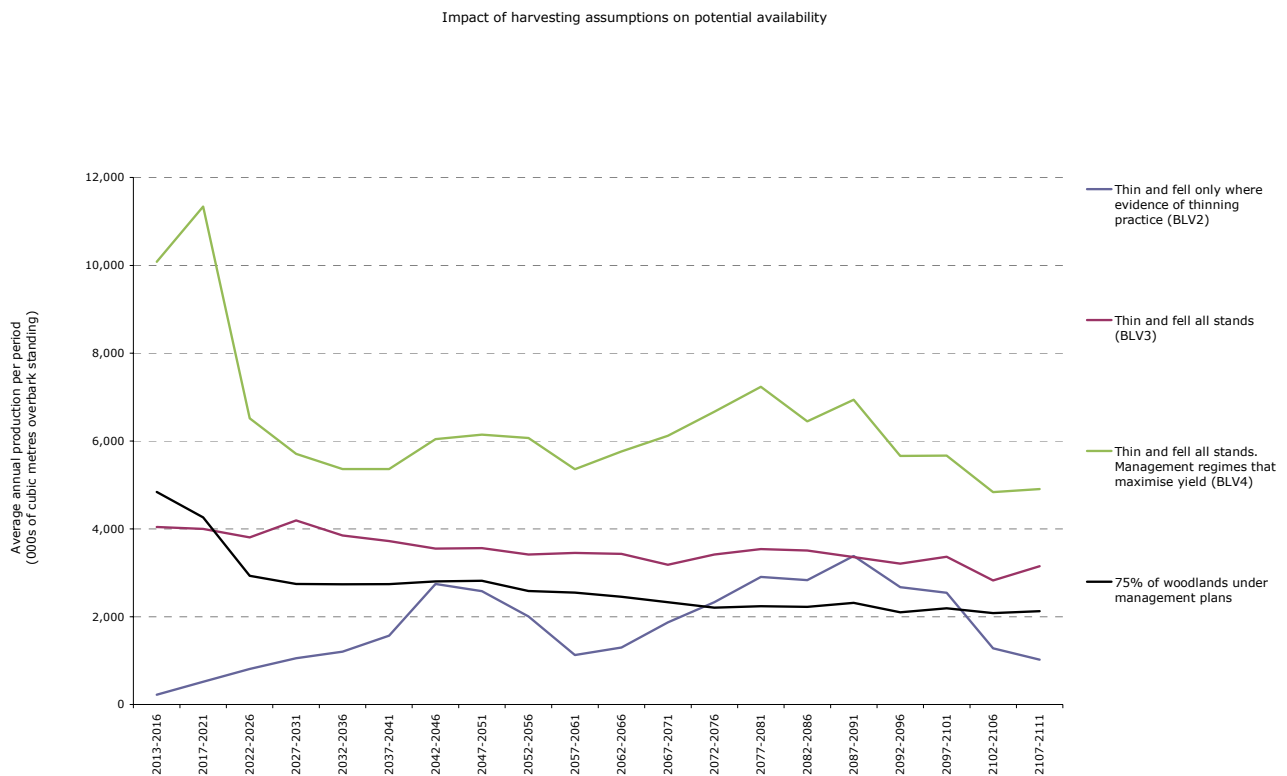
Appendix G Square distribution

Table G1 Square distribution by country and region

| Country / region | Number of squares surveyed | Number of Private sector squares surveyed | Number of Private sector squares with coniferous trees surveyed | Number of Private sector squares with broadleaved trees surveyed |
|-------------------------------|----------------------------|---|---|--|
| England | 4,655 | 3,711 | 2,148 | 3,455 |
| North West England | 423 | 343 | 215 | 302 |
| North East England | 320 | 159 | 123 | 128 |
| Yorkshire and the Humber | 679 | 533 | 298 | 476 |
| East Midlands | 343 | 289 | 133 | 277 |
| East England | 559 | 414 | 222 | 389 |
| South East England and London | 1,148 | 979 | 591 | 941 |
| South West England | 869 | 722 | 396 | 689 |
| West Midlands | 314 | 272 | 170 | 253 |
| Scotland | 4,041 | 2,730 | 2,241 | 1,549 |
| North Scotland | 525 | 384 | 310 | 198 |
| North East Scotland | 661 | 486 | 418 | 301 |
| East Scotland | 376 | 310 | 247 | 222 |
| South Scotland | 1,394 | 898 | 776 | 481 |
| West Scotland | 1,085 | 652 | 490 | 347 |
| Wales | 898 | 578 | 309 | 466 |
| GB | 9,594 | 7,019 | 4,698 | 5,470 |

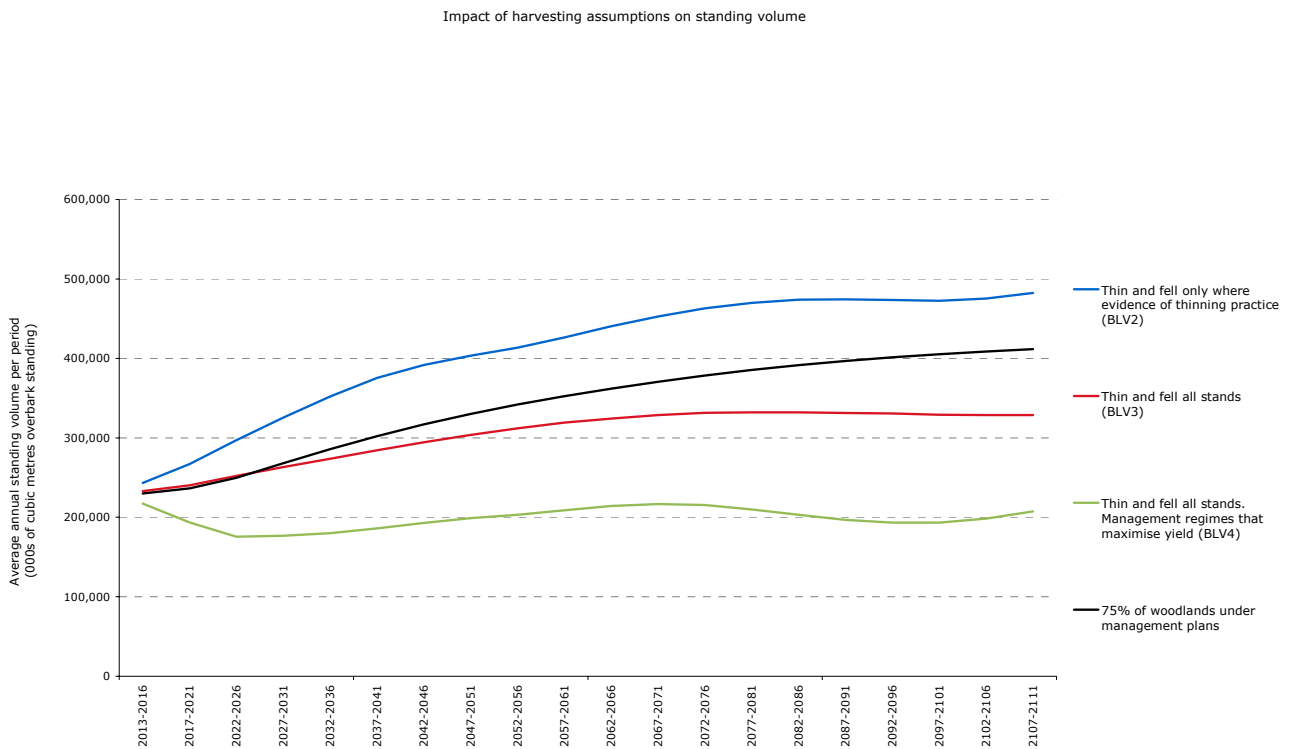
Appendix H 100-year hardwood forecast

Figure H1 Impact of harvesting assumptions on potential availability



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Figure H2 100 year impact of harvesting assumptions on standing volume



Appendix I Full biological potential

Table I1 50-year forecast of hardwood timber availability under unrestricted biological potential

| Forecast period | FC | Private sector | | Total |
|----------------------|-------------|----------------|-----|---------------|
| | (000m3 obs) | (000m3 obs) | SE% | (000m3 obs) |
| England | | | | |
| 2013-16 | 126 | 7,421 | 2 | 7,547 |
| 2017-21 | 92 | 8,116 | 2 | 8,207 |
| 2022-26 | 110 | 4,613 | 2 | 4,723 |
| 2027-31 | 86 | 4,101 | 3 | 4,187 |
| 2032-36 | 99 | 3,856 | 4 | 3,955 |
| 3037-41 | 129 | 3,691 | 3 | 3,820 |
| 2042-46 | 189 | 4,445 | 2 | 4,634 |
| 2047-51 | 116 | 4,203 | 3 | 4,319 |
| 2052-56 | 134 | 4,241 | 3 | 4,375 |
| 2057-61 | 146 | 3,607 | 3 | 3,753 |
| Scotland | | | | |
| 2013-16 | 9 | 1,530 | 4 | 1,538 |
| 2017-21 | 9 | 1,934 | 4 | 1,942 |
| 2022-26 | 10 | 1,248 | 5 | 1,258 |
| 2027-31 | 10 | 1,023 | 7 | 1,034 |
| 2032-36 | 15 | 1,074 | 6 | 1,088 |
| 3037-41 | 24 | 1,139 | 6 | 1,163 |
| 2042-46 | 31 | 1,084 | 4 | 1,115 |
| 2047-51 | 40 | 1,345 | 6 | 1,385 |
| 2052-56 | 45 | 1,277 | 6 | 1,323 |
| 2057-61 | 64 | 1,179 | 4 | 1,243 |
| Wales | | | | |
| 2013-16 | 12 | 1,132 | 6 | 1,144 |
| 2017-21 | 11 | 1,290 | 6 | 1,301 |
| 2022-26 | 17 | 654 | 8 | 671 |
| 2027-31 | 12 | 583 | 10 | 595 |
| 2032-36 | 14 | 435 | 7 | 450 |
| 3037-41 | 19 | 535 | 10 | 554 |
| 2042-46 | 56 | 512 | 7 | 568 |
| 2047-51 | 19 | 598 | 8 | 616 |
| 2052-56 | 28 | 550 | 8 | 578 |
| 2057-61 | 28 | 571 | 9 | 599 |
| Great Britain | | | | |
| 2013-16 | 147 | 10,082 | 2 | 10,230 |
| 2017-21 | 111 | 11,339 | 2 | 11,451 |
| 2022-26 | 137 | 6,515 | 2 | 6,652 |
| 2027-31 | 108 | 5,708 | 3 | 5,816 |
| 2032-36 | 128 | 5,365 | 3 | 5,493 |
| 3037-41 | 172 | 5,365 | 2 | 5,536 |
| 2042-46 | 276 | 6,042 | 2 | 6,317 |
| 2047-51 | 175 | 6,146 | 2 | 6,320 |
| 2052-56 | 208 | 6,068 | 2 | 6,276 |
| 2057-61 | 237 | 5,357 | 2 | 5,594 |

Glossary

| | |
|--|--|
| Actual production | Timber actually felled and removed from the forest. The Forestry Commission keeps records of actual production for its estate, while estimates for the Private sector come from receipts reported by timber processors. These figures are available from Forestry Commission Statistics |
| Age class | A grouping of trees into specific age ranges, for classification purposes. |
| Area (forest/woodland) | Forest and woodland area can be defined in net or gross terms. Net area is the land actually covered by trees (in the National Forest Inventory that is to the drip line of the canopy). Gross area includes both the area covered by trees and the open spaces (<0.5 hectares) within (e.g. rides, glades, ponds). |
| Availability | A term to describe what timber could potentially be available for harvesting within a forest area. |
| Biological potential | A term applied to forecast scenarios with the objective of maximising timber production. It typically involves felling stands in the year of maximum MAI and Management table thinning. It may not take account of factors that constrain thinning and felling (e.g. wind risk or pest attack). The forecast results set out in this report involve constraints on thinning and times of felling to take account of wind risk. |
| Broadleaves | Trees and shrubs that belong to the angiosperm division of the plant kingdom (as distinct from the gymnosperm division that includes conifers). Most in the UK have laminar leaves and are deciduous. Sometimes referred to as 'hardwoods'. |
| Clearfelling | Cutting down of an area of woodland (if it is within a larger area of woodland it is typically a felling greater than 0.25 hectare). Sometimes a scatter or small clumps of trees may be left standing within the felled area. |
| Conifers | Trees and shrubs that belong to the gymnosperm division of the plant kingdom (as distinct from the angiosperm division that includes broadleaves). Conifers mostly have needles or scale-like leaves and are usually evergreen. Sometimes referred to as 'softwoods'. |
| Cumulative volume production | The total volume of timber that is forecast to be produced over the entire forecast period, including any overdue timber |
| DAMS (detailed aspect methodology score) | A measure of exposure at a particular location. Can be used as a proxy indicator of the risk of catastrophic wind damage to a stand of trees. May be used to influence decisions on thinning and timing of clearfelling where wind is a risk factor. |
| DBH (diameter at breast height) | The diameter of a tree (overbark) at breast height, which is usually defined as 1.3 metres along the axis of the stem from the ground. |
| Design plan | A holistic spatial and temporal plan covering the main aspects of long-term woodland management such as felling and restocking. |
| Dothistroma Needle Blight | An important disease of conifers (especially pines) which causes premature needle defoliation, resulting in loss of yield and, in severe cases, tree death. Also known as Red Band needle blight. |
| FC estate (Forestry Commission estate) | Forests, woodlands, open land and other property managed by the Forestry Commission. |
| Felling plan | A spatial and temporal plan of harvesting activity within a woodland. |
| Forest | Land predominately covered in trees (defined as land under stands of trees with a canopy cover of at least 20%, or the ability to achieve this, |

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| | and with a minimum area of 0.5 hectare and minimum width of 20 metres), whether in large tracts (generally called forests) or smaller areas known by a variety of terms (including woods, copses, spinneys or shelterbelts). |
| Forestry Commission | The government department responsible for the regulation of forestry, implementing forestry policy and management of state forests in England, Scotland and (until 31 March 2013) Wales. Forestry policy is devolved, with the exception of common issues, addressed on a GB or UK basis, such as international forestry, plant health and forestry standards. |
| Great Britain (GB) | England, Scotland and Wales. |
| High forest | Woodland which is not managed as coppice or pollards and which may or may not be managed for timber. |
| Increment | The increase in volume of a tree or a stand over a year or annualised over a specified period measured either in m ³ obs per year or in m ³ obs per hectare per year. See also Mean annual increment (MAI). |
| Like-for-like restock | Replacement of felled trees by species with similar productivity. Usually taken to mean, after a period of two years, replacement of felled trees with trees of the same species and yield class. |
| Maximising productivity | The management of woodland to maximise volume production by thinning at the MTI. |
| Mensuration | The science of measuring time and distance, used in forestry to mean the measurement of standing and felled timber. |
| Maximum MAI (maximum mean annual increment) (MMAI) | The age at which a stand reaches the maximum average rate of volume increment which it can achieve. Felling the stand at this age will ensure that the stand reaches its highest average production per annum for its lifespan, thus optimising the stand in terms of volume production over the long term. |
| Mean annual increment (MAI) | The average annual rate of volume production from year of planting to a given year, expressed in m ³ obs per hectare per year. In even-aged stands it is calculated by dividing cumulative volume production by age. |
| MTT (management table thinning) | A sequence of thinnings prescribed by Forestry Commission yield tables over the life of a forest stand. Management table thinning refers to the pattern of thinning recommended in these yield tables. In standard yield tables the thinnings are set to an intensity which aims to maximise diameter increment whilst also maintaining maximum cumulative volume production |
| MTI (marginal thinning intensity) | The maximum sustainable intensity of thinning defined as 70% of yield class per hectare per year (m ³ obs /ha/year). |
| National Forest Inventory | An inventory run by the Forestry Commission, set up in 2009, to provide a record of key information about GB forests and woodlands. |
| Natural Resources Wales (NRW) | The body responsible for advising the Welsh Government on the environment, created on 1 April 2013. NRW is responsible for the functions previously undertaken by the Environment Agency in Wales, the Countryside Council for Wales and Forestry Commission Wales. The woodland referred to in this report as "NRW" relates to the woodland previously managed by FC Wales |
| Overbark | Used as a definition when the volume of wood includes the bark. |
| Overbark standing (OBS) | Timber is defined in this report as the volume of stemwood to 7 cm top diameter in m ³ overbark standing (obs), including stump (above ground) and usable branchwood (of minimum 3 m in length and 7 cm top diameter). |

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| Overdue | Timber contained in stands that are beyond the felling age prescribed by the harvesting scenario at the start of the forecast |
| Phytophthora ramorum | Fungus-like pathogens that can cause extensive damage and mortality to trees and other plants. |
| Planned production | The volumes and assortments published in the removals forecast, reflecting the cumulative impact of managing the FC estate (as of 31 March 2011) in accordance with approved forest design and thinning plans. |
| Potential production | A forecast which will not necessarily transpire. As the private sector estate forecast makes assumptions about future levels of harvest, and the assumptions may not transpire, this forecast is one of potential production. |
| Private sector estate | Forests and woodlands in the UK not owned or managed by the Forestry Commission or Natural Resources Wales. In the context of the National Forest Inventory, 'Private sector' is used for convenience although it includes land owned or managed by bodies such as local authorities and charities. |
| Production forecast | A forecast of softwood volume production based on a firm plan of harvesting |
| Restocking plan | A spatial and temporal plan covering replacement planting in harvested areas. |
| Softwood | The wood of coniferous trees or the conifers themselves. |
| Stand | A relatively uniform collection of trees (from either artificial or natural regeneration), composed, for example, of a single species or a single age class. |
| Standard error (SE) | The measure of the margin of error associated with an estimate as a result of sampling from a population with statistical variability. Larger standard errors indicate less precision in the estimate. Standard errors in this report are quoted in relative terms (i.e. as percentages of the value of the estimate). |
| Standing volume | The live stemwood and useable branchwood of trees (up to 7 cm top diameter). It excludes roots, below ground stump material, small branches, foliage and deadwood. For Private sector woodland only, it also excludes standing volume in trees in woodlands of less than 0.5 hectares. Usually expressed as m ³ overbark standing (m ³ obs). |
| Stem wood | The woody material forming the above ground main growing shoot(s) of a tree or stand of trees. The stem includes all woody volume above ground with a diameter greater than 7 cm overbark. Stemwood includes wood in major branches where there is at least 3 m of 'straight' length to 7 cm top diameter. |
| Stocked area | The area stocked with living trees. The stocked areas in this report are quoted in gross terms for the FC/NRW estate and in net terms for the Private sector estate (see definitions of Area above) |
| Sustainable (forest management) | The stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity and vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions at local, national and global levels, and that does not cause damage to other ecosystems. |
| Terminal height | The top height of a stand at which risk of wind damage is expected to reach a level necessitating clearfelling. |
| Thinning | The removal of a proportion of trees in a forest after canopy closure, usually to promote growth and greater value in the remaining trees. |

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| Timber | The woody product from felled trees, which is destined for construction material, pulp or paper industries. |
| Top diameter | The diameter of the smaller (top) end of a log, often used to define different categories of wood products (e.g. sawlogs, roundwood, pulp) and merchantable timber. |
| Top height | The mean total height of the 100 largest dbh trees per hectare. |
| UK (United Kingdom) | Great Britain plus Northern Ireland. |
| Volume per hectare | The woody volume of trees (measured in m ³ obs /ha). |
| Windthrow/windblow | Uprooting of trees by the wind. Windthrow can be endemic – i.e. that caused by frequently recurring peak winds – or catastrophic – an infrequent occurrence associated with exceptionally strong winds where large areas/numbers of trees are blown down |
| Yield class (YC) | An index used in the UK of the potential productivity of even-aged stands of trees based on maximum MAI. It reflects the potential productivity of the site for the tree species growing on it. |

NFI national reports and papers

The principal themes reported on for the 2011 woodland profile and future forecasts are:

- GB 2011 preliminary estimates of broadleaved species
- GB 2011 standing coniferous timber volume
- UK 25-year forecast of softwood availability
- GB 25-year forecast of coniferous standing volume and increment
- Biomass in live woodland trees in Britain
- Carbon in live woodland trees in Britain

Each theme has a series of associated reports, papers and data, tailored for different audiences and uses.

The principal themes reported on for the 2012 woodland profile and future forecasts are:

- 50-year forecast of softwood timber availability
- 50-year forecast of hardwood timber availability

All the documents and data can be found on the NFI website www.forestry.gov.uk/inventory.

Official Statistics

This is an Official Statistics publication. More information about Official Statistics and the UK Statistics Authority is available at www.statisticsauthority.gov.uk

National Forest Inventory Statistician: Alan Brewer