

## 6 Table T6 – Growing stock

### 6.1 FRA 2010 Categories and definitions

Category	Definition
Growing stock	Volume over bark of all living trees more than X cm in diameter at breast height (or above buttress if these are higher). Includes the stem from ground level or stump height up to a top diameter of Y cm, and may also include branches to a minimum diameter of W cm.
Growing stock of commercial species	Growing stock (see def. above) of commercial species.

### 6.2 National data

#### 6.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Private sector growing stock model for GB (Forest Research, unpublished, 2004, 2005)	M	GS	2000, 2005	
EFISCEN data submitted for EFSOS (Forest Research, international return, 2001)	M	GS	1995-99	Used for Northern Ireland and for comparison
GB softwood availability forecasts, and actual harvesting, published in Forestry Statistics & Forestry Facts & Figures	M	GS	1992 to 2006	Used to estimate increase in over-mature volume.
Census of Woodlands & Trees 1979-82 (FC Bulletin 63 by GML Locke, 1987)	M	GS	1980	Data for 1980, to estimate 1990 by interpolation.

#### 6.2.2 Classification and definitions

National class	Definition
Growing stock	Stem volume to 7 cm minimum diameter, including stump.
Commercial species	Almost all forest tree species have some commercial use in UK, so growing stock of commercial species is taken to be the same as total growing stock.

#### 6.2.3 Original data

In this report, forecasts by Forest Research and Forest Enterprise are considered to be original data, because they are separate from the processes of estimation and forecasting carried out

for this report. However, they in turn are based on original data from NIWT and sub-compartment databases, which are then modelled to produce estimates and forecasts.

**GB: Growing stock in forests (million cubic metres)**

Common name	2000 Private comml FR fcst	2000 Private Non- comml FR fcst	1995-99 Private other over- mature comml	1995-99 Private other over- mature non- comml	2005 State comml FE fcst	2005/ 2000 State comml FR fcst	2000 State non- comm FR fcst	1980 Total comml
Sitka spruce	42.7	0.2	1.7	0.0	48.1	1.132	0.5	28.2
Scots pine	22.4	0.9	4.3	0.4	8.5	1.077	0.4	27.7
Larch	11.9	0.5	1.4	0.1	5.6	0.974	0.3	17.5
Lodgepole pine	7.4	0.0	0.1	0.0	7.0	1.189	0.1	2.6
Norway spruce	7.8	0.2	0.5	0.0	6.0	0.953	0.2	12.9
Douglas fir	6.0	0.1	0.8	0.1	2.8	1.058	0.0	6.1
Corsican pine	3.2	0.0	0.3	0.1	4.1	1.129	0.1	6.0
Other conifers	5.3	1.1	2.6	1.7	2.6	1.094	0.3	5.3
<b>Total conifers</b>	<b>106.6</b>	<b>3.0</b>	<b>11.9</b>	<b>2.2</b>	<b>84.6</b>		<b>2.1</b>	<b>106.3</b>
Oak	16.9	8.3	3.4	0.6	1.0	1.040	0.4	32.9
Beech	6.4	1.6	4.5	0.8	1.5	1.097	0.1	15.2
Birch	3.1	6.0	0.5	0.2	0.0	1.050	0.6	6.1
Ash	4.6	1.6	4.2	1.4	0.1	0.714	0.1	10.2
Sycamore	3.3	1.1	1.6	0.6	0.1	1.077	0.3	8.0
Other broadleaves	8.8	8.2	1.7	0.5	0.2	1.111	0.5	18.8
<b>Total broadleaves</b>	<b>43.1</b>	<b>26.8</b>	<b>15.8</b>	<b>4.2</b>	<b>2.9</b>		<b>2.0</b>	<b>91.2</b>
<b>TOTAL</b>	<b>149.6</b>	<b>29.8</b>	<b>27.7</b>	<b>6.4</b>	<b>87.5</b>		<b>4.0</b>	<b>197.4</b>

The 1980 total commercial, from Census of Woodland 1979-82, is assumed to exclude over-mature. It includes for state forests 60.0 conifer and 4.3 broadleaved, species split not available.

From data for European Forest Information Scenario Model (EFISCEN) (2001) for Northern Ireland state forest, total of 6.0 breaks down:

5.0 spruces, 0.5 pines, 0.4 other conifers, 0.1 broadleaves. As in FRA 2005, other NI estimated as 0.3 state non-commercial, 1.5 private commercial and 0.3 private non-commercial, roughly based on areas.

To estimate GB private sector increase in over-mature softwood

Average for 5-year period	FR forecast availability	Actual harvest	Difference = increased over-mature
2002-2006	5750	4360	1390
1997-2001	4280	3270	1010
1992-1996	2500	2860	-360

The FR model starts from data recorded in the 1995-99 National Inventory of Woodland & Trees for areas by species by planting year. It then applies model estimates of yield class and agreed assumptions about management practices, based on advice from regional groups, to define expected cutting regimes (rotations, thinning etc), to estimate the standing volume at the survey date and to roll it forward to 2000 and 2005.

The initial model runs in 2004 assumed that all timber to be harvested is harvested at the time predicted by the model – it does not take account of any actual variation in harvesting rates

caused by market conditions. It also excludes a proportion of over-mature standing volume. A subsequent run of the model in 2005 estimated the total private sector over-mature standing volume for a base date in 1996-2000, immediately after the National Inventory of Woodland & Trees, giving an additional 34 million m<sup>3</sup>.

For much of the period since the National Inventory actual softwood harvesting has been below availability predicted by the model, because of low timber prices, while hardwood harvesting has been depressed for many years because of the lack of suitable markets. These market trends cause over-mature volume to increase over time. Based on the comparisons of FR forecast softwood availability and actual harvesting shown above, the over-mature softwood volume seems to increase by about 1 million m<sup>3</sup> a year after the NIWT base date, but with no clear trend before the NIWT base date. There are no equivalent forecasts for hardwood, but a conservative estimate is that around 1.4 million m<sup>3</sup> reaches maturity each year, compared with annual harvesting of around 0.7 million m<sup>3</sup>, so over-mature hardwood is probably increasing at about 0.7 million m<sup>3</sup> a year.

The FE model is based on operational management data for each sub-compartment of state forest in GB. It only gives commercial volume, identified by a ‘forecastable’ flag in the data. This excludes sub-compartments that might otherwise be productive, but have been excluded because of economic considerations, management decisions and low-quality material. This incorporates the best management assessment of each woodland, and also incorporates data about actual harvesting and restocking, so should be better than statistical models for short-term forecasts of growing stock in state woodlands in GB. For this report, we prefer to use FE model results where available, but still have to use FR model for state sector rate of change and non-commercial volumes.

### 6.3 Analysis and processing of national data

#### 6.3.1 Estimation and forecasting

	2000	2005
GB private commercial	Original data	Original data
GB private non-commercial	Original data	Original data
GB private over-mature commercial	Extrapolated from 1995-99 (1998) by annual changes derived in original data	Extrapolated from 1995-99 (1998) by annual changes derived in original data
GB private over-mature non-commercial	Extrapolated from 1995-99 (1998) by annual changes derived in original data	Extrapolated from 1995-99 (1998) by annual changes derived in original data
GB state commercial	Extrapolated back from 2005 by dividing by 2005/2000 from FR forecast in original data	Original data
GB state non-commercial	Original data	Original data
Northern Ireland	State commercial from original data. Other NI split by species pro rata to GB private	Extrapolated forward from 2000 using same rate of increase as GB

For 2010, over-mature extrapolated forward using the same annual change (hectares) as in 2000-2005. All others extrapolated forward from 2005 using the same % change as 2000-2005.

The FR model is unable to project back to dates before the NIWT base date. For 1990 estimates:

- Total commercial (excluding over-mature) interpolated between 2000 and 1980.
- Over-mature extrapolated back by assuming no change in conifer and 0.7 million m<sup>3</sup> a year, as above.
- Non-commercial extrapolated back by using the same % change as 2000-2005.
- Northern Ireland extrapolated back assuming same rate of change as GB state commercial.

**1990: Growing stock in forests (million cubic metres)**

Common name	GB Private comml forecast	GB Private non-comm	GB Private over-mature comm	GB Private over-mature non-comm	GB State comml	GB State non-comm	GB Total	NI	UK Total
Sitka spruce	22.4	0.1	1.7	0.0	25.4	0.5	51.7	3.0	54.7
Scots pine	16.8	1.0	4.3	0.4	11.3	0.5	35.5	0.9	36.4
Larch	9.4	0.5	1.4	0.1	7.4	0.3	19.9	0.4	20.3
Lodgepole pine	2.8	0.0	0.1	0.0	2.8	0.1	6.1	0.1	6.2
Norway spruce	6.4	0.2	0.5	0.0	6.5	0.2	14.3	0.6	14.9
Douglas fir	4.0	0.1	0.9	0.0	3.1	0.0	8.3	0.2	8.5
Corsican pine	2.9	0.0	0.4	0.1	3.4	0.1	6.9	0.0	7.0
Other conifers	4.0	1.2	2.6	1.7	3.1	0.3	12.4	0.2	12.6
<b>Total conifers</b>	<b>68.6</b>	<b>3.2</b>	<b>11.9</b>	<b>2.2</b>	<b>67.9</b>	<b>1.8</b>	<b>155.1</b>	<b>5.5</b>	<b>160.5</b>
Oak	23.2	11.3	2.5	0.4	1.2	0.7	40.0	0.4	40.4
Beech	10.3	2.4	3.2	0.6	1.0	0.2	18.4	0.1	18.6
Birch	4.2	9.3	0.3	0.2	0.1	0.9	15.3	0.2	15.5
Ash	7.4	1.8	3.0	1.1	0.2	0.1	14.0	0.1	14.1
Sycamore	5.2	1.4	1.1	0.4	0.1	0.2	8.9	0.1	9.0
Other broadleaves	12.6	8.1	1.2	0.4	0.4	0.4	23.6	0.3	23.8
<b>Total broadleaves</b>	<b>62.9</b>	<b>34.5</b>	<b>11.4</b>	<b>3.0</b>	<b>3.4</b>	<b>2.6</b>	<b>120.2</b>	<b>1.2</b>	<b>121.4</b>
<b>TOTAL</b>	<b>131.5</b>	<b>37.6</b>	<b>23.3</b>	<b>5.2</b>	<b>71.3</b>	<b>4.4</b>	<b>275.2</b>	<b>6.7</b>	<b>281.9</b>

**2000: Growing stock in forests (million cubic metres)**

Common name	GB Private comml forecast	GB Private non-comm	GB Private over-mature comm	GB Private over-mature non-comm	GB State comml	GB State non-comm	GB Total	NI	UK Total
Sitka spruce	42.7	0.2	2.0	0.0	42.5	0.5	87.9	5.0	92.8
Scots pine	22.4	0.9	4.9	0.5	7.9	0.4	37.0	0.6	37.6
Larch	11.9	0.5	1.6	0.1	5.7	0.3	20.1	0.3	20.3
Lodgepole pine	7.4	0.1	0.1	0.0	5.9	0.1	13.5	0.2	13.7
Norway spruce	7.8	0.2	0.6	0.0	6.2	0.2	15.0	0.6	15.6
Douglas fir	6.0	0.1	1.0	0.0	2.7	0.0	9.7	0.1	10.0
Corsican pine	3.3	0.0	0.4	0.1	3.6	0.1	7.4	0.0	7.5
Other conifers	5.3	1.1	3.0	1.9	2.4	0.3	13.9	0.2	14.2
<b>Total conifers</b>	<b>106.6</b>	<b>3.0</b>	<b>13.6</b>	<b>2.5</b>	<b>76.9</b>	<b>2.0</b>	<b>204.6</b>	<b>7.2</b>	<b>211.7</b>
Oak	16.9	8.3	3.6	0.6	1.0	0.4	30.8	0.3	31.2
Beech	6.4	1.6	4.8	0.9	1.3	0.1	15.2	0.1	15.3
Birch	3.1	6.0	0.5	0.3	0.0	0.6	10.5	0.1	10.5
Ash	4.6	1.6	4.5	1.6	0.1	0.1	12.4	0.1	12.4

Sycamore	3.4	1.1	1.7	0.7	0.1	0.3	7.1	0.1	7.1
Other broadleaves	8.8	8.2	1.8	0.5	0.2	0.5	20.1	0.2	20.5
Total broadleaves	43.1	26.8	16.9	4.5	2.7	2.1	96.0	1.0	97.0
<b>TOTAL</b>	149.7	29.8	30.5	7.0	79.6	4.1	300.6	8.1	308.7

**2005: Growing stock in forests (million cubic metres)**

Common name	GB Private comml forecast	GB Private non-comm	GB Private over-mature comm	GB Private over-mature non-comm	GB State comml	GB State non-comm	GB Total	NI	UK Total
Sitka spruce	55.8	0.2	2.6	0.0	48.1	0.5	107.2	5.7	112.9
Scots pine	24.0	0.9	6.5	0.6	8.5	0.4	40.9	0.7	41.5
Larch	10.9	0.4	2.1	0.1	5.6	0.3	19.4	0.3	19.7
Lodgepole pine	9.8	0.1	0.1	0.0	7.0	0.2	17.2	0.3	17.4
Norway spruce	8.9	0.2	0.7	0.0	6.0	0.3	16.1	0.6	16.6
Douglas fir	6.1	0.1	1.3	0.0	2.8	0.0	10.3	0.1	10.5
Corsican pine	3.5	0.0	0.5	0.1	4.1	0.1	8.3	0.0	8.3
Other conifers	5.5	1.0	4.0	2.5	2.6	0.2	15.9	0.2	16.1
Total conifers	124.5	3.0	17.8	3.3	84.6	2.1	235.3	7.9	243.1
Oak	16.1	7.1	4.2	0.7	1.0	0.4	29.4	0.3	29.8
Beech	6.6	1.3	5.6	1.0	1.5	0.1	16.1	0.1	16.2
Birch	2.5	4.8	0.6	0.3	0.0	0.4	8.7	0.2	8.9
Ash	4.8	1.5	5.2	1.8	0.1	0.1	13.4	0.1	13.5
Sycamore	2.8	1.0	1.9	0.8	0.1	0.4	6.9	0.1	6.9
Other broadleaves	9.6	8.3	2.1	0.6	0.2	0.6	21.4	0.2	21.6
Total broadleaves	42.3	23.9	19.7	5.2	2.9	2.0	96.0	1.0	97.0
<b>TOTAL</b>	166.8	26.9	37.5	8.6	87.5	4.0	331.2	8.9	340.1

**2010: Growing stock in forests (million cubic metres)**

Common name	GB Private comml forecast	GB Private non-comm	GB Private over-mature comm	GB Private over-mature non-comm	GB State comml	GB State non-comm	GB Total	NI	UK Total
Sitka spruce	72.9	0.3	3.2	0.0	54.4	0.6	131.4	6.5	137.8
Scots pine	25.8	0.8	8.0	0.7	9.2	0.4	44.9	0.7	45.6
Larch	9.9	0.4	2.6	0.1	5.4	0.3	18.9	0.3	19.2
Lodgepole pine	13.1	0.1	0.1	0.0	8.3	0.2	21.8	0.3	22.1
Norway spruce	10.3	0.2	0.9	0.0	5.7	0.3	17.4	0.5	17.9
Douglas fir	6.2	0.1	1.6	0.0	3.0	0.0	10.9	0.2	11.0
Corsican pine	3.8	0.0	0.6	0.1	4.6	0.1	9.2	0.0	9.3
Other conifers	5.7	1.0	4.9	3.1	2.8	0.2	17.8	0.2	18.0
Total conifers	147.6	2.9	22.0	4.1	93.5	2.2	272.3	8.7	281.0
Oak	15.3	6.0	4.8	0.8	1.1	0.3	28.3	0.4	28.7
Beech	6.8	1.1	6.4	1.1	1.6	0.1	17.2	0.1	17.3
Birch	2.1	3.9	0.7	0.4	0.0	0.3	7.3	0.2	7.5
Ash	4.9	1.4	5.9	2.1	0.0	0.1	14.4	0.1	14.5
Sycamore	2.3	0.9	2.2	0.9	0.1	0.5	6.7	0.1	6.8
Other broadleaves	10.5	8.3	2.4	0.7	0.2	0.6	22.8	0.2	23.1
Total broadleaves	41.9	21.5	22.5	5.9	3.0	1.9	96.7	1.1	97.8
<b>TOTAL</b>	189.5	24.5	44.4	10.1	96.5	4.1	369.0	9.8	378.8

### 6.3.2 Reclassification into FRA 2010 categories

No reclassification undertaken

### 6.4 Data for Table T6

**Table 6a – Growing stock**

FRA 2010 category	Volume (million cubic meters over bark)							
	Forest				Other wooded land			
	1990	2000	2005	2010	1990	2000	2005	2010
Total growing stock	282	309	340	379	1	1	1	1
... of which coniferous	161	212	243	281	0	0	0	0
... of which broadleaved	121	97	97	98	1	1	1	1
Growing stock of commercial species	282	309	340	379	1	1	1	1

**Table 6b – Growing stock of the 10 most common species**

FRA 2010 category / Species name			Growing stock in forest (million cubic meters)		
Rank	Scientific name	Common name	1990	2000	2005
1 <sup>st</sup>	<i>Picea sitchensis</i>	Sitka spruce	55	93	113
2 <sup>nd</sup>	<i>Pinus sylvestris</i>	Scots pine	36	38	42
3 <sup>rd</sup>	<i>Quercus robur</i> / <i>Q. petraea</i>	Oak	40	31	30
4 <sup>th</sup>	<i>Larix</i> spp	Larch	20	20	20
5 <sup>th</sup>	<i>Picea abies</i>	Norway spruce	15	16	17
6 <sup>th</sup>	<i>Fagus sylvatica</i>	Beech	19	15	16
7 <sup>th</sup>	<i>Pinus contorta</i>	Lodgepole pine	6	14	17
8 <sup>th</sup>	<i>Fraxinus excelsior</i>	Ash	14	12	14
9 <sup>th</sup>	<i>Betula pubescens</i> / <i>B. pendula</i>	Birch	15	11	9
10 <sup>th</sup>	<i>Pseudotsuga menziesii</i>	Douglas fir	8	10	10
Remaining			54	49	52
<b>TOTAL</b>			<b>282</b>	<b>309</b>	<b>340</b>

Note: Rank refers to the order of importance in terms of growing stock, i.e. 1<sup>st</sup> is the species with the highest growing stock. Year 2000 is the reference year for defining the species list and the order of the species.

**Table 6c – Specification of threshold values**

Item	Value	Complementary information
Minimum diameter (cm) at breast height <sup>1</sup> of trees included in growing stock (X)	7	
Minimum diameter (cm) at the top end of stem for calculation of growing stock (Y)	7	
Minimum diameter (cm) of branches included in growing stock (W)	7	
Volume refers to “above ground” (AG) or “above stump” (AS)	AG	

<sup>1</sup> Diameter at breast height (DBH) refers to diameter over bark measured at a height of 1.30 m above ground level or 30 cm above buttresses if these are higher than 1 m.

## 6.5 Comments to Table T6

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Total growing stock		
Growing stock of broadleaved / coniferous		
Growing stock of commercial species		
Growing stock composition		If the top 10 were based on area rather than estimated growing stock, the top 10 would include Sycamore ( <i>Acer pseudoplatanus</i> ) instead of Douglas fir ( <i>Pseudotsuga menziesii</i> ). Corsican pine ( <i>Pinus nigra var maritima</i> ) is outside the top 10 on both bases.

### Other general comments to the table

Estimates of UK growing stock were compiled in 2001 for the European Forest Information Scenario Model (EFISCEN) as part of the European Forest Sector Outlook Studies (EFSOS), and reported in 2002 in the UK Indicators of Sustainable Forestry. These EFISCEN estimates were based on area statistics from NIWT 1995-99, but did not have the modelling capability that is now available in Forest Research. The EFISCEN estimates totalled 353 million m<sup>3</sup> standing, of which 236 million m<sup>3</sup> conifer and 117 million m<sup>3</sup> broadleaved. There was an error in calculation of the conifer figure for EFISCEN, which should have been 184 million m<sup>3</sup> to give a total of 301 million m<sup>3</sup>.

The new estimates for total conifers are 212 million m<sup>3</sup> for 2000 and 243 million m<sup>3</sup> for 2005, of which about 7-8 million m<sup>3</sup> are non-commercial. Given the steady increase in commercial conifer growing stock, these are reasonably consistent with the amended EFISCEN figure of 184 million m<sup>3</sup> for 1995-99 commercial conifers, and with the estimate of 190 million m<sup>3</sup> (of which 188 million m<sup>3</sup> available for wood supply) reported in TBFRA 2000 for conifers in 1995, projected forward from 1980.

The estimates for broadleaves reported in FRA 2005 and here, including the adjustment for over-mature, are lower than previous estimates. These estimates are 96 million m<sup>3</sup> for 2000 and 97 million m<sup>3</sup> for 2005, compared with the EFISCEN estimate of 117 million m<sup>3</sup> for 1995-99, and the TBFRA 2000 estimate of 127 million m<sup>3</sup> for 1995. The new estimates are thought to be more accurate, because the new model can handle a greater level of detail, but the modelling of broadleaved volume for UK is still less developed than the modelling of conifer volume, because it is less important commercially.