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Food and Agriculture Organization of the United Nations

GLOBAL FOREST RESOURCES ASSESSMENT

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UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND

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The Forest Resources Assessment Programme

Sustainably managed forests have multiple environmental and socio-economic functions important at the global, national and local scales, and play a vital part in sustainable development. Reliable and up-to-date information on the state of forest resources - not only on area and area change, but also on such variables as growing stock, wood and non-wood products, carbon, protected areas, use of forests for recreation and other services, biological diversity and forests' contribution to national economies - is crucial to support decision-making for policies and programmes in forestry and sustainable development at all levels.

FAO, at the request of its member countries, regularly monitors the world's forests and their management and uses through the Forest Resources Assessment Programme. This country report forms part of the Global Forest Resources Assessment 2005 (FRA 2005), which is the most comprehensive assessment to date. More than 800 people have been involved, including 172 national correspondents and their colleagues, an Advisory Group, international experts, FAO staff, consultants and volunteers. Information has been collated from 229 countries and territories for three points in time: 1990, 2000 and 2005.

The reporting framework for FRA 2005 is based on the thematic elements of sustainable forest management acknowledged in intergovernmental forest-related fora and includes more than 40 variables related to the extent, condition, uses and values of forest resources. More information on the FRA 2005 process and the results - including all the country reports - is available on the FRA 2005 Web site (www.fao.org/forestry/fra2005).

The Global Forest Resources Assessment process is coordinated by the Forestry Department at FAO headquarters in Rome. The contact person for matters related to FRA 2005 is:

Mette Løyche Wilkie
Senior Forestry Officer
FAO Forestry Department
Viale delle Terme di Caracalla
Rome 00100, Italy

E-mail: Mette.LoycheWilkie@fao.org

Readers can also use the following e-mail address: fra@fao.org

Report preparation and contact person

This report has been prepared by:

Simon Gillam (officially nominated National Correspondent to FRA)
Head of Economics & Statistics
Forestry Commission
231 Corstorphine Road
Edinburgh
EH12 7AT
UK
Tel: +44 131 314 6280
Fax: +44 131 316 4344
email simon.gillam@forestry.gsi.gov.uk
email statistics@forestry.gsi.gov.uk
website www.forestry.gov.uk/statistics

Glossary & Abbreviations

ASNW	Ancient Semi-Natural Woodland
Defra	Department of the Environment, Food and Rural Affairs
FC	Forestry Commission – the government department and state forest service for GB
FS or NIFS	Forest Service (Northern Ireland)
GB	Great Britain – England, Scotland and Wales
JQ	Joint questionnaire on timber production and trade (UNECE, Eurostat, etc)
NIWT	National Inventory of Woodland & Trees (for GB)
NP	New Planting (new woodland creation, including natural colonisation)
OSNW	Other (non-ancient) Semi-Natural Woodland
PAWS	Plantations on Ancient Woodland Sites
RS	Restocking (including natural regeneration)
SSSI	Site of Special Scientific Interest
TB	UNECE Timber Bulletin questionnaire (preceded JQ)
TBFRA	Temperate & Boreal Forest Resources Assessment 2000, for UK completed in 1997-1998, with statistics mostly for 1995
UK	GB plus Northern Ireland (does not include Channel Islands or Isle of Man)

Contents

1 Table T1 – Extent of Forest and Other wooded land

1.1 FRA 2005 Categories and definitions

Category	Definition
Forest	Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds *in situ*. It does not include land that is predominantly under agricultural or urban land use.
Other wooded land	Land not classified as "Forest", spanning more than 0.5 hectares; with trees higher than 5 meters and a canopy cover of 5-10 percent, or trees able to reach these thresholds *in situ*; or with a combined cover of shrubs, bushes and trees above 10 percent. It does not include land that is predominantly under agricultural or urban land use.
Other land	All land that is not classified as "Forest" or "Other wooded land".
Other land with tree cover (Subordinated to "Other land")	Land classified as "Other land", spanning more than 0.5 hectares with a canopy cover of more than 10 percent of trees able to reach a height of 5 meters at maturity.
Inland water bodies	Inland water bodies generally include major rivers, lakes and water reservoirs.

1.2 National data

1.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Forestry Statistics 2004	H	Forest	2000	Uses GB inventory 1995-99 and other sources to extrapolate forward to 2004
TBFRA 2000	L	Other wooded land	All	Estimate of wood pastures, unchanged from TBFRA 2000
Agricultural census	H	Other land with tree cover	1990 2000	http://statistics.defra.gov.uk/esg/ Source used for orchards

1.2.2 Classification and definitions

National class	Definition
Woodland	As forest in FRA 2005, except canopy cover threshold 20% rather than 10%, and minimum area 0.1 ha rather than 0.5 ha.
Wood pasture	A priority habitat under Biodiversity Action Plan, which has trees but usually insufficient canopy cover to be classified as woodland.
Orchard	In agricultural census, area of fruit trees; mostly apples, also pears, plums and other fruit.

1.2.3 Original data

The National Inventory of Woodland & Trees 1995-99 gave total GB woodland area of 2,665,000 hectares. Annual estimates are published in Forestry Statistics and Forestry Facts &

Figures (FFF). Woodland area for Northern Ireland (83,000 ha for 2000), including estimates of private woodland, are published annually in the Forest Service Annual Report, and incorporated into Forestry Statistics. This gives:

- UK woodland area (2000) = 2,793,000 ha (Forestry Statistics 2004)
- UK woodland area (2004) = 2,817,000 ha (Forestry Statistics 2004)

Other data used for Table T1:

- Area of orchards in UK (000 ha, from June agricultural censuses, statistical notices, on Defra website and personal communication): 1990 34.5, 2000 28.0, 2003 25.3
- Area of wood pastures, 20,000 ha, used as estimate of other wooded land for TBFRA 2000; in the absence of any new information, assume that this figure can be used for all years: 1990, 2000 and 2005. No information exists for other types of other wooded land, but the areas are expected to be small.

Alternative sources, not used:

- UK woodland area (1990) = 2,624,000 ha (Global FRA 2000) – not used, as slightly revised estimate now calculated as described below.
- UK woodland area (1990) = 2,400,000 ha (Annual Abstract of Statistics, based on FFF 1989-90 and NIFS) – not used because new estimate extrapolated back from 2000 is better than this old estimate extrapolated forward from 1980.

1.3 Analysis and processing of national data

1.3.1 Calibration

No calibration required. Other land calculated as the difference between total land area from FAOSTAT and the sum of forest plus other wooded land.

1.3.2 Estimation and forecasting

Published annual estimates of woodland area are compiled by rolling forward from the inventory base, using administrative data for state woodland, sales of state woodland and new planting. At present no adjustment is made for woodland converted to another land use, because the areas are believed to be small and there is no reliable source of data. This gave the published figure for 2000.

A similar process was used to extrapolate back to 1990, as shown below. In this calculation, it is assumed that areas of broadleaved restocking were conifers before harvesting, because harvested broadleaved volumes are relatively small, and would normally be from thinning or selective felling, rather than clear-fell followed by restocking.

Broadleaved totals for 1990 were derived by starting from the broadleaved totals for 2000, then subtracting broadleaved new planting and broadleaved restocking in the years 1990 to 2000. Conifer totals for 1990 were derived by starting from the conifer totals for 2000, then subtracting conifer new planting and adding broadleaved restocking in the years 1990-2000. Below the new estimates are shown, for comparison, the original published statistics for 1990, which had been derived by extrapolating forward from the 1980 Census. The new estimates for 1990 are much higher, particularly for broadleaves, because of the 1995-99 National Inventory's better coverage and better recognition of woodland areas.

000 hectares

	UK		England		Scotland		Wales		N Ireland	
	C	**B**	**C**	**B**	**C**	**B**	**C**	**B**	**C**	**B**
Area 2000	**1662**	**1132**	**377**	**726**	**1050**	**269**	**168**	**121**	**67**	**16**
NP 1990-2000	87	96	7	44	73	45	1	4	6	3
B RS 1990-2000		41		22		15		3		1
Area 1990 (calc)	**1616**	**995**	**392**	**660**	**992**	**209**	**170**	**114**	**62**	**12**
Area 1990 (old)	1576	823	386	572	956	164	173	75	61	13

C = conifers, B = broadleaves
NP = new planting (all new woodland creation), RS = restocking

The published figure for March 2004 was extrapolated forward in a similar way to the extrapolation for 2000. However, it was affected by a reclassification of Forestry Commission open land within the forest in moving to a new GIS in 2001, when around 20,000 hectares previously included in woodland area was mapped out as open space (not counted in woodland area). The forecast for 2005 was projected forward by one year from the published area at March 2004, assuming a similar annual level of new woodland creation to 2000-2004.

1.4 Reclassification into FRA 2005 classes

The classification of Forestry Commission integral open space as woodland before 2001 seems to be closer to the FRA definition, so to adjust for the reclassification in 2001, 20,000 hectares have been added to the published woodland area in deriving the forecast for 2005.

In 1.2.2, two differences were noted between UK "woodland" and FRA "forest". The area of woodland of 0.1-0.5 ha is about 37,000 hectares, from the survey of small woods & trees in the National Inventory of Woodland & Trees 1995-99 (NIWT). The area of woodland with 10-20% canopy cover is unknown because it is outside the scope of NIWT, but is also estimated to be less than 50,000 hectares. This means that the two differences are expected to balance out approximately, so figures for 1990 and 2000 were not adjusted.

The area of (fruit) orchards in the Agricultural Census is used as an estimate of other land with tree cover. The branch responsible for these statistics was unable to confirm whether most orchards would be likely to meet the criteria for other land with tree cover, and this source does not give any breakdown by size. Any over-counting from using this source could be roughly balanced by other categories not recorded (e.g.) areas of urban trees of over 0.5 ha.

1.5 Data for National reporting table T1

FRA 2005 Categories	**Area (1000 hectares)**		
	1990	**2000**	**2005**
Forest	2611	2793	2845
Other wooded land	20	20	20
Other land	21457	21275	21223
...of which with tree cover [1)]	35	28	24
Inland water bodies	203	203	203
TOTAL	**24291**	**24291**	**24291**

1) Area of "Other land with tree cover" is included in the area reported under "Other land" and should therefore be excluded when calculating the total area for the country.

1.6 Comments to National reporting table T1

These forest areas for 1990 and 2000 are close to those reported in Global FRA 2000, but markedly higher than the TBFRA 2000 total of 2,469,000 hectares for 1995. This is because TBFRA used data from 1980 projected forward, but much better data subsequently became available from the 1995-99 National Inventory of Woodland and Trees, used for GB statistics published since 2000.

2 Table T2 – Ownership of Forest and Other wooded land

2.1 FRA 2005 Categories and definitions

Category	Definition
Private ownership	Land owned by individuals, families, private co-operatives, corporations, industries, religious and educational institutions, pension or investment funds, and other private institutions.
Public ownership	Land owned by the State (national, state and regional governments) or government-owned institutions or corporations or other public bodies including cities, municipalities, villages and communes.
Other ownership	Land that is not classified either as "Public ownership" or as "Private ownership".

2.2 National data

2.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Forestry Statistics 2004	H	All	2000	Used for state forests (FC/FS) and total
Forestry Facts & Figures 1989-90	H	Public	1990	Used for state forests, exc NI
Forestry Statistics 2004 using NIWT 1995-99	M	Public	All	Used for other public bodies and local authorities

2.2.2 Classification and definitions

National class	Definition
Forestry Commission / Forest Service	State owned woodland, from administrative data sources
Other public body	Woodland owned by other public bodies, not FC, e.g. for defence, highways, crown estate. GB estimate for 1995-99 from NIWT.
Local authority	Woodland owned by counties, districts and other local authorities. GB estimate for 1995-99 from NIWT.

2.2.3 Original data

State forests 000 hectares

	UK	England	Scotland	Wales	N Ireland
1990	956	235	533	130	58
2000	886	216	493	116	61
Other public					
1995-99	45	27	13	5	-
Local authorities					
1995-99	80	61	11	8	-

2.3 Analysis and processing of national data

2.3.1 Estimation and forecasting

Forestry Commission / Forest Service statistics are published annually, and are used here for 1990 and 2000. Figures for other public bodies (GB) and local authorities (GB) are assumed to be constant at levels recorded by 1995-99 NIWT.

2.4 Reclassification into FRA 2005 classes

FRA 2005 Public = Forestry Commission / Forest Service plus other public bodies (GB) plus local authorities (GB). The latter two categories exclude Northern Ireland (areas assumed to be negligible).
FRA 2005 Private = Total – Public.

2.5 Data for National reporting table T2

FRA 2005 Categories	Area (1000 hectares)			
	Forest		Other wooded land	
	1990	2000	1990	2000
Private ownership	1530	1782	20	20
Public ownership	1081	1011	0	0
Other ownership	0	0	0	0
TOTAL	**2611**	**2793**	**20**	**20**

3 Table T3 – Designated function of Forest and Other wooded land

3.1 FRA 2005 Categories and definitions

Types of designation

Category	Definition
Primary function	A designated function is considered to be primary when it is significantly more important than other functions. This includes areas that are legally or voluntarily set aside for specific purposes.
Total area with function	Total area where a specific function has been designated, regardless whether it is primary or not.

Designation categories

Category / Designated function	Definition
Production	Forest / Other wooded land designated for production and extraction of forest goods, including both wood and non-wood forest products.
Protection of soil and water	Forest / Other wooded land designated for protection of soil and water.
Conservation of biodiversity	Forest / Other wooded land designated for conservation of biological diversity.
Social services	Forest / Other wooded land designated for the provision of social services.
Multiple purpose	Forest / Other wooded land designated to any combination of: production of goods, protection of soil and water, conservation of biodiversity and provision of social services and where none of these alone can be considered as being significantly more important than the others.
No or unknown function	Forest / Other wooded land for which a specific function has not been designated or where designated function is unknown.

3.2 National data

3.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
UK Indicators of Sustainable Forestry A7	M	Total areas production, biodiversity		% in indicator applied to UK forest area
Woods for People	M	Total area social services		Area with public access http://www.woodsforpeople.info/
Forests' Role in Tourism (report, 2003) on FC website.	M	Primary, social services		Includes estimate of number of woodland sites used for recreation
State of Europe's Forests (MCPFE)	M	Primary biodiversity		MCPFE Protected Class 1
Forestry Commission Facts & Figures 1999-2000	M	Primary production		GB conifer area 2000; adjustments then applied
Forestry statistics databases	H	Primary production		Planting statistics, containing more detail than published in Forestry Statistics 2004.

3.2.2 Classification and definitions

National class	Definition
Management practices - timber production - conservation - unmanaged	In NIWT 1995-99, each cluster contained between 1 and 5 sample squares, each of 1 hectare, spread over an area of 40 hectares. The surveyor recorded the management practices present in the cluster. Up to 8 management practices could be recorded from a list of 10, including: • Timber production is recorded where there is deliberate management within the cluster for timber products, including coppice. • Conservation is recorded where there is active management for wildlife, which may include permitting regeneration and scrub. The opening up of streamsides and the general encouragement of diversity in storeys and species as well as obvious signs, such as bird boxes and ride management for butterflies. The encouragement of deer into a woodland will also be included. • Unmanaged is recorded where there is no obvious management practice in all or part of a cluster. Recording this management practice does not preclude the use of other practices noted in the cluster.
Woods for People: UK woodland area with public access	A new UK wide provisional dataset of accessible woodland, available on website http://www.woodsforpeople.info/. The project team approached organisations such as local authorities and NGOs to help compile a comprehensive strategic database of publicly accessible woodland. Also using the National Inventory of Woodland and Trees (NIWT), Forestry Commission estate, Woodland Grant Scheme (WGS), Northern Ireland Forest Service and Woodland Trust site data, the project has added further data on locations and areas of currently accessible woodland as well as capturing information on type of access, access infrastructure, site services etc.

3.2.3 Original data

UK Protected forest areas (as published in State of Europe's Forests - MCPFE)

Class	Description	UK area	UK interpretation
1.1	no active intervention	3,000 ha	Sites of Special Scientific Interest (SSSIs) that either have • a management agreement to manage as a National Nature Reserve (NNR) with non-intervention and scientific monitoring as the main objective, or • a designation as a Special Area of Conservation and agreed management objectives for non-intervention
1.2	minimum intervention	7,000 ha	NNRs and SSSIs that are subject to management agreements to manage to retain and restore natural characteristics
1.3	conservation through active management	135,000 ha	• Near natural woodlands in National Parks (20,000 ha): estimated as half the area of semi-natural woodland in National Parks • Habitat/Species Management areas (115,000 ha): estimated as OSNW not on SSSIs, plus PAWS where the intention is to restore them towards a more semi-natural condition, plus some planted woodlands where the conservation of native species is the main objective
2 (not included)	protection of landscapes and specific natural elements	646,000 ha	• Near-natural semi-natural woodland which are in SSSIs or protective ownership (400,000 ha): estimated from Ancient Woodland Inventories, National Inventory, grant scheme statistics and monitoring of management plans for state forests, other public bodies and voluntary organisations. • ASNW in protected landscapes (54,000 ha): includes PAWS and OSNW in National Parks, Royal Forests and Common Grazings. • Multi-purpose semi-natural woodland (192,000 ha): OSNW outside SSSIs and protected landscapes or protective ownerships.

Management practices
(in UK Indicators of Sustainable Forestry A7, based on NIWT 1995-99)
- Timber production: 83%
- Wildlife/conservation: 18.3%
- Public recreation: 23.3%
- Unmanaged: 10.7%
- Unmanaged (and no other management practice in cluster): 3.8%

(this final figure is unpublished and comes from analysis of the database)

Woods for People
UK woodland area with public access: 1,533,000 ha

Conifer Area
GB 2000 = 1,584,000 ha (Forestry Commission Facts & Figures, 1999-2000)
- of which 727,000 ha FC

GB 1990 = 1,515,000 ha (Forestry Commission Facts & Figures, 1989-1990) – not used
- of which 814,000 ha FC

Conifer new planting
1990-2000 = 87,000 ha (database source similar to Table T4)
2000-2005 = 18,000 ha (extrapolation from database source similar to Table T4)

Broadleaved restocking
1990-2000 = 41,000 ha (as in Tables T1 and T4)
2000-2005 = 13,000 ha (as in Table T4)

3.3 Analysis and processing of national data

3.3.1 Estimation and forecasting

Primary function:

Production
As an estimate of area with primary function production, take a proportion of large conifer plantations. Based on an expert view add the following categories for 2000:
- FC: just under half of forests over 100 hectares in Scotland (516,000 ha) and Northumberland (46,000), giving a total of 270,000 ha (out of total FC conifers 727,000 ha and total FC forest 825,000 ha).
- Non-FC: 80% of non-FC conifers (858,000), giving about 684,000 ha [A suggested refinement for this category would be to exclude conifers in woods smaller than 10 ha, and to take 90% Scotland and 80% England/Wales, but this has not been possible to calculate from data tables currently available].
- Northern Ireland: 80% of conifers (67,000 ha), giving about 54,000 ha.

Adding these three categories gives a total of 1,008,000 ha for 2000.

Estimation of the area in 1990 needs to combine two changes over the decade 1990-2000:

- The net increase in total conifer area from 1990 to 2000 was 46,000 ha (see estimation for Table T1). Of this, about 16,000 ha was extension to Caledonian pinewood (from workings for Table T4), leaving 30,000 net change in productive conifer plantations. Using similar assumption to above, take 80% to be primary function production, giving 24,000 ha net increase.
- Over the same period, some forests with primary function production will have changed to become multiple purpose, because of increased importance given to management for recreation and for conservation. There are no statistics on this, but estimate that it applies to 10% of FC conifers in 1990 (814,000 ha), 5% of non-FC and NI conifers in 1990 (803,000 ha), a total of 122,000 ha.

Combining these two changes gives a net decrease of 98,000 ha over the decade, implying a total of 1,106,000 ha for 1990.

Conifer new planting 2000-2005 is likely to be around 18,000 ha, of which about 8,000 ha is Scots pine in Caledonian pinewood (see Table T4), giving 10,000 ha new conifer plantations. Over the same period, broadleaved restocking (assumed to be mostly former conifer plantations) will be around 13,000 ha, giving a small net decrease in total conifer plantation area. As in the previous decade some forests with primary function production are changing to become multiple purpose. Combining these changes gives a decrease, of perhaps around 50,000 ha, to 958,000 ha for 2005.

To summarise, the estimates derived above are (thousand hectares):

	1990	**2000**	**2005**
Primary function production	1106	1008	958

Protection of soil and water

No statistics are available for areas with primary function protection of soil or water. This may be the primary function of some plantations on sandy soils, particularly in coastal areas. It may also be a function in some areas next to important public water supplies. Estimate that this could total around 5,000 hectares in all years.

Conservation of biodiversity

For conservation of biodiversity, use MCPFE protected areas (class 1) = 3,000 + 7,000 + 135,000 = 145,000 ha. Assume applies to all years (no estimates of change).

Social services

There is no good source for area with primary function social services (recreation etc). The NIWT figure for the area with management practice of public recreation (23.3% = 651,000) is not used, because it is much greater than the area with primary function recreation, as it just requires signs of some management for recreation in the 40 hectare cluster.

In many forests, visitors may not go beyond the car parks, picnic areas, waymarked walks etc, so the area with function recreation could be limited to the immediate surroundings of these facilities, unlikely to average more than 10 ha per site. Assuming 40 hectares per site on average for each of around 500 FC sites and 20 hectares per site on average for around 2500 others identified in “Forests’ Role in Tourism” (2003), this adds up to around 70,000 ha for

2000. The number of recreation sites is increasing, but there are no statistics for this, so estimate 60,000 ha for 1990 and 75,000 ha for 2005.

To this can be added new planting in community forests and similar initiatives – around 20,000 ha in the 1990s and perhaps a further 10,000 ha in the following 5 years, to give the totals shown below. Other possible areas (e.g. all Local Authority-owned woods) have not been included.

thousand hectares

	1990	2000	2005
Estimate based on number of recreation sites	60	70	75
Community forests etc	0	20	30
Total - primary function social services	60	90	105

No or unknown function
An estimate of the area with "no or unknown function" can be based on the area recorded with management practice "unmanaged". Because management practices are recorded at the level of cluster (up to 40 ha), the relevant area will consist of all clusters where this was the only practice recorded (3.8%) and an unknown proportion of the area of clusters where other practices were recorded as well (6.9%). Estimate that this adds to around 5%, or around 137,000 ha in 1995-99. This area is likely to be decreasing over time, because no new woodland created with grant aid is unmanaged, and there are incentives to bring existing woodland into management. In the absence of any statistics on trends over time, estimate the following areas with "no or unknown function".

	1990	2000	2005
No or unknown primary function	150	130	120

Multiple purpose
Multiple purpose management is now the most widespread practice in UK forestry. Estimate the area with multiple purpose by subtracting all the above estimates from the total area.

Other wooded land
For all other wooded land (wood pastures) the primary function is likely to be conservation of biodiversity, with no significant areas having other functions.

Total area with functions:

Management practices: apply % to forest area for each year, to get total areas for production and for conservation of biodiversity. Not used for social services (recreation), because of better estimate below.

Woods for People area with access = 1,533,000 ha = 54.9% of area in 2000. Apply the same % to areas for 1990 and 2005 (this will understate growth, because access has been increased through grants etc).

No source is available to estimate the total areas with function protection of soil and water. The areas in 1990 may be little more than the areas with this as primary function (e.g. stabilising sandy soil) – perhaps around 10,000 ha in total. Since then, management for soil and water protection has increasingly been recognised as important, especially for riparian woodland and other woodland in important water catchments, and also where alternatives to

clearfelling are being adopted to provide continuous cover, so that around 10% of all woodland (around 280,000 ha) may now have this function. Assume that this increase was steady from 1990 to 2005, to estimate figure for 2000.

Applying the proportions above to the total area in each year, and the assumptions for protection of soil and water, gives (thousand hectares):

	Proportion with function	**1990**	**2000**	**2005**
Total forest area		**2611**	**2793**	**2845**
Production	**.830**	2167	2318	2361
Protection of soil and water		10	190	280
Conservation of biodiversity	**.183**	478	511	521
Social services	**.549**	1433	1533	1562

3.4 Data for National reporting table T3

FRA 2005 Categories / Designated function	**Area (1000 hectares)**					
	Primary function			**Total area with function**		
	1990	**2000**	**2005**	**1990**	**2000**	**2005**
Forest						
Production	1106	1008	958	2167	2318	2361
Protection of soil and water	5	5	5	10	190	280
Conservation of biodiversity	145	145	145	478	511	521
Social services	60	90	105	1433	1533	1562
Multiple purpose	1145	1415	1512	not appl.	not appl.	not appl.
No or unknown function	150	130	120	not appl.	not appl.	not appl.
Total – Forest	**2611**	**2793**	**2845**	**not appl.**	**not appl.**	**not appl.**
Other wooded land						
Production	0	0	0	0	0	0
Protection of soil and water	0	0	0	0	0	0
Conservation of biodiversity	20	20	20	20	20	20
Social services	0	0	0	0	0	0
Multiple purpose	0	0	0	not appl.	not appl.	not appl.
No or unknown function	0	0	0	not appl.	not appl.	not appl.
Total – Other wooded land	**20**	**20**	**20**	**not appl.**	**not appl.**	**not appl.**

3.5 Comments to National reporting table T3

Within the function “social services”, forests also have a role in sustaining health and wellbeing. This function is not yet fully understood, but is not limited to recreation usage identified in this table. This is a new area for which research is under way in UK.

4 Table T4 – Characteristics of Forest and Other wooded land

4.1 FRA 2005 Categories and definitions

Category	Definition
Primary	Forest / Other wooded land of native species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed.
Modified natural	Forest / Other wooded land of naturally regenerated native species where there are clearly visible indications of human activities.
Semi-natural	Forest / Other wooded land of native species, established through planting, seeding or assisted natural regeneration.
Productive plantation	Forest / Other wooded land of introduced species, and in some cases native species, established through planting or seeding mainly for production of wood or non wood goods.
Protective plantation	Forest / Other wooded land of native or introduced species, established through planting or seeding mainly for provision of services.

4.2 National data

4.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Protected Forest Areas in the UK, Pryor & Peterken 2001	M	Modified natural	1990	As used for TBFRA 2000.
Forestry Statistics 2004, Forestry Facts & Figures and related databases	H	Semi-natural		Broadleaved new planting and restocking, used for calculating and updating.
National Inventory 1995-99, Table 10 (MWS + SW) (unpublished)	M	Semi-natural		Scots pine pre-1920, and broadleaves planted up to 1980

4.2.2 Classification and definitions

National class	Definition
Semi-natural	As classified in the report Protected Forest Areas in the UK, Pryor & Peterken 2001. About half the area is Ancient Semi-Natural Woodland, continually wooded since the earliest reliable records. The rest is native woodland that is not obviously planted; i.e. appears to have arisen mainly through natural regeneration. This is approximately equivalent to FRA 2005 category modified natural.
Scots pine	*Pinus sylvestris*, native conifer. Makes up a large proportion of the native Caledonian pinewood in Scotland (classified as UK semi-natural = FRA modified natural), but also in extensive plantations. Some retained plantation areas that were planted before 1920 are now likely to meet the criteria for FRA 2005 semi-natural.

4.2.3 Original data

All figures in thousand hectares.

NIWT 1995-99 (adding Main Woods Survey and Small Woods Survey)

	GB	England	Scotland	Wales
Total broadleaves	971	648	206	118
Broadleaves planted up to 1980	869	578	180	110
Scots pine planted before 1920	22	5	16	0

Total broadleaves published in Forestry Statistics 2004.
Planting-year decades from unpublished NIWT table.

New Planting and Restocking, from databases for Forestry Statistics

	UK	England	Scotland	Wales	N Ireland
Broadleaved new planting					
1970-1980	11	8	3	0	0
1980-1990	21	10	9	1	1
1990-2000	96	44	45	4	3
2000-2005	55	25	26	2	2
Broadleaved restocking					
1970-1980	7	6	1	0	0
1980-1990	22	16	4	2	0
1990-2000	41	22	15	3	1
2000-2005	13	4	6	2	1

Sources for UK semi-natural (= FRA modified natural)

	UK	England	Scotland	Wales	N Ireland
Pryor & Peterken 2001 semi-natural	646	416	133	82	15
Pryor & Peterken 2001 ASNW	326	206	89	31	
Pryor & Smith 2002 ASNW	285	193	65	27	

4.3 Analysis and processing of national data

4.3.1 Estimation and forecasting

In the UK, native species include most broadleaves and Scots pine. Apart from yew and juniper (neither of which cover significant areas), all other conifers have been introduced.

The FRA category modified natural seems about equivalent to the UK category semi-natural in Pryor & Peterken 2001, for which estimates can be taken as relating approximately to 1990 (the Ancient Woodland Inventory (AWI) part was late 1980s). This gives a figure of 646,000 ha for 1990.

The later publication Pryor & Smith 2002 reported the overlap from overlaying digital maps for the Ancient Woodland Inventory and National Inventory of Woodland, reducing the total Ancient Semi-Natural Woodland (ASNW) area by 41,000 ha. However, further investigation of the discrepancies between NIWT and the ancient woodland inventories suggests that some discrepancies are due to differences in spatial registration of woods, and that some areas of ancient woodland are incorrectly omitted from the totals in Pryor & Smith (2002). In consequence, the estimates from Pryor & Peterken (2001) are now recommended for use, until better information becomes available.

The annual loss of ASNW and other semi-natural woodland has not been monitored, but relatively small areas are now thought to be lost for roads and other developments. In recent years, this is likely to have been balanced by restoration of plantations on ancient woodland sites to ASNW. So estimate no net change since 1990.

FRA modified natural	**UK**	**England**	**Scotland**	**Wales**	**N Ireland**
Estimate for 1990 and later	646	416	133	82	15

The FRA category semi-natural seems to cover various categories that do not meet the standard to be classified as UK semi-natural (= FRA modified natural):

- some former Scots pine plantations (pre-1920) – rough estimate about 50% (11,000 ha), the rest being already counted in modified natural or still being plantations;
- some broadleaved woodland planted pre-1980 – rough estimate about 5% (43,000 ha), most of the rest being already counted in modified natural and some classed as plantations;
- most broadleaved new planting and restocking since 1980 (areas shown in original data above) – rough estimate about 80% of these areas, the rest being classed as plantations.
- most Caledonian pinewood created or restocked in Scotland since 1990 (there was very little such activity before 1990). About 28,000 hectares of Caledonian pinewood was created or restocked in Scotland in 1990-98 (source Forest Industry Handbook 1998). Some of this area will have been broadleaved species, counted above, and some of the restocked area will have been included in the pre-1920 Scots pine. So, as rough estimate of impact, include 16,000 ha 1990-2000 and 8,000 ha 2000-05.

Based on these assumptions,

FRA semi-natural	**UK**	**England**	**Scotland**	**Wales**	**N Ireland**
50% of Scots pine planted by 1920	11	3	8	0	0
5% of broadleaved woodland planted by 1980	43	29	9	5	0
80% of broadleaved NP+RS 1980-90	34	21	10	2	1
= Estimate for 1990	**88**	**53**	**27**	**7**	**1**
80% of broadleaved NP+RS 1990-2000	109	52	48	6	3
Scots pine in Caledonian pinewood 1990-2000	16		16		
= Estimate for 2000	**213**	**105**	**91**	**13**	**4**
80% of broadleaved NP+RS 2000-2005	54	23	26	3	2
Scots pine in Caledonian pinewood 2000-2005	8		8		
= Estimate for 2005	**275**	**128**	**125**	**16**	**6**

No source of statistics identifies woodlands meeting the definition of “protective plantation”. However this category will include plantations whose main aim was to stabilise sandy soils (as estimated for Table T3). It will also include some shelterbelts for farms, although many of these are classified as semi-natural for FRA because of the use of native species. It will also include recent planting primarily intended to provide areas for recreation, particularly in

community forests, although again much of this is classified as semi-natural for FRA. Adding these together may total around 20,000 ha for 2000, with some increase over the period 1990 to 2005, perhaps from around 15,000 ha to around 22,000 ha.

There is no source to give a direct estimate of the productive plantation area, so it is estimated by subtracting previous categories from the total area. It shows a decrease from 2000 to 2005 because the area of new conifer plantation (10,000 ha estimated for Table T3) is exceeded by restoration of Plantations on Ancient Woodland Sites to Ancient Semi-Natural Woodland and other broadleaved restocking after harvesting conifers.

4.4 Reclassification into FRA 2005 classes

Covered in section above.

4.5 Data for National reporting table T4

FRA 2005 Categories	Area (1000 hectares)					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Primary	0	0	0	0	0	0
Modified natural	646	646	646	10	10	10
Semi-natural	88	213	275	10	10	10
Productive plantation	1862	1914	1902	0	0	0
Protective plantation	15	20	22	0	0	0
TOTAL	**2611**	**2793**	**2845**	**20**	**20**	**20**

4.6 Comments to National reporting table T4

The totals of these estimates for modified natural and semi-natural are consistent with TBFRA 2000, which estimated 772,000 ha semi-natural for 1995.

5 Table T5 – Growing stock

5.1 FRA 2005 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.
Commercial growing stock	The part of the growing stock of species that are considered as commercial or potentially commercial under current market conditions, and with a diameter at breast height of Z cm or more.

5.2 National data

5.2.1 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	All	2000, 2005	
FE commercial growing stock model for GB (FE, unpublished, 2004)	H	Commercial	2005	
EFISCEN data submitted for EFSOS (Forest Research, international return, 2001)	M			Used for Northern Ireland and for comparison
Census of Woodlands & Trees 1979-82 (FC Bulletin 63 by GML Locke, 1987)	M	Commercial	1990	Data for 1980, to estimate 1990 by interpolation.
GB softwood availability forecasts, and actual harvesting, published in Forestry Statistics & Forestry Facts & Figures	M			Used to estimate increase in over-mature volume.

5.2.2 Classification and definitions

National class	Definition
Growing stock	Stem volume to 7cm minimum diameter, including stump.
Commercial growing stock	In Forest Enterprise model (state forests), marketable volumes in plans. In Forest Research model, based on National Inventory assessment of timber quality and agreed assumptions about what would be marketable (varying by species and location).

5.2.3 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.

000 cubic metres standing

			GB	England	Scotland	Wales
A	Private sector standing volume 2000 (FR model)	Total	179462	81061	77849	20508
B		Commercial	149634	70925	65217	13492
C		Non-commercial	29828	10136	12676	7016
D	Private sector standing volume 2005 (FR model)	Total	193672	81591	91450	20631
E		Commercial	166773	72163	80616	13994
F		Non-commercial	26899	9429	10834	6636

			GB	England	Scotland	Wales
G	State sector standing volume 2000 (FR model)	Total	116275	27202	73326	15747
H		Commercial	112218	26177	70834	15207
I		Non-commercial	4057	1025	2492	540
J	State sector standing volume 2005 (FR model)	Total	127964	29077	82986	15881
K		Commercial	123940	28050	80530	15360
L		Non-commercial	4024	1047	2456	521

			GB	England	Scotland	Wales
M	Private sector over-mature standing volume (NIWT base year from revised FR model – missing from FR model results above)	Total	34114	21990	8451	3674
N		Commercial	27698	17666	8096	1936
O		Non-commercial	6416	4324	354	1738

			GB	England	Scotland	Wales
P	State sector standing volume 2005 (FE model)	Commercial	87510	22056	52032	13422

Q	State sector (Northern Ireland) growing stock of timber quality, as estimated for EFISCEN 2001	6016

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	[4600]	1150
1997-2001	4280	3250	1030
1992-1996	2500	2860	-360

Average actual harvest for 2002-2006 estimated by extrapolating latest data.

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^3.

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^3 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^3 reaches maturity each year, compared with annual harvesting of around 0.7 million m^3, so over-mature hardwood is probably increasing at about 0.7 million m^3 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.

GB standing volume (commercial) in 1980, from Census of Woodland 1979-1982

million cubic metres standing

	GB	England	Scotland	Wales
Conifers	106.3	42.8	47.7	15.8
Broadleaves	91.1	67.1	12.7	10.3
Total	197.4	110.9	60.4	26.1

Note: standards over coppice (0.8 in England) allocated to broadleaves

5.3 Analysis and processing of national data

5.3.1 Estimation and forecasting

Source row in original data shown in brackets. For increase in over-mature volume, allocate to commercial and non-commercial in same proportions as rows N:O.

Commercial growing stock (2000)

Private sector (GB) = 149.6 (B) + 27.7(N) + 2.8 (2-year increase in over-mature) = 180.1
State sector (GB) = 79.2 (FE estimate P multiplied by H/K for FR model rate of growth)
State sector (NI) = 6.0 (Q)
Private sector (NI) = 1.3 (rough estimate, based on area about 13,000 ha)

Non-commercial growing stock (2000)

Private sector (GB) = 29.8 (C) + 6.4 (O) + 0.6 (2-year increase in over-mature) = 36.8

State sector (GB) = 4.1 (I)
State sector (NI) = 0.3 (rough estimate pro-rata from GB state forests, 8,000 ha)
Private sector (NI) = 0.3 (rough estimate, based on area about 9,000 ha)

Commercial growing stock (2005)
Private sector (GB) = 166.7 (E) + 27.7 (N) + 9.7 (7-year increase in over-mature) = 204.1
State sector (GB) = 87.5 (P)
State sector (NI) = 6.6 (projected forward from Q)
Private sector (NI) = 1.5 (rough estimate, based on area about 15,000 ha)
Non-commercial growing stock (2005)
Private sector (GB) = 26.9 (F) + 6.4 (O) + 2.2 (7-year increase in over-mature) = 35.5
State sector (GB) = 4.0 (L)
State sector (NI) = 0.3 (rough estimate pro-rata from GB state forests, 8,000 ha)
Private sector (NI) = 0.3 (rough estimate, based on area about 10,000 ha)

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

- For commercial growing stock (GB), interpolate between figures for 2000 and 1980, assuming constant annual rate of change. Because of the large variation between rates of change for species, this interpolation is done by species in the calculations for Table 10 and summed, rather than using the totals here.
- For NI and non-commercial, project back at similar annual rate of change to 2000-2005.

These interpolations and extrapolations use combined state plus private, because the share of the two sectors varied over time.

million cubic metres standing

Commercial	2005	2000	1990 projected	1980
GB private + state	291.6	259.3	215.9	197.4
NI	8.1	7.3	5.9	
Total commercial	299.7	266.6	221.8	

Non-commercial	2005	2000	1990 projected
GB private + state	39.5	40.9	43.8
NI	0.6	0.6	0.6
Total non-commercial	40.1	41.5	44.4

5.4 Data for National reporting table T5

FRA 2005 Categories	Volume (million cubic meters over bark)					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Growing stock	266	308	340	1	1	1
Commercial growing stock	222	267	300	0	0	0

Specification of country threshold values	Unit	Value	Complementary information
1. Minimum diameter at breast height of trees included in Growing stock (X)	Cm	7	
2. Minimum diameter at the top end of stem (Y) for calculation of Growing stock	Cm	7	
3. Minimum diameter of branches included in Growing stock (W)	Cm	7	
4. Minimum diameter at breast height of trees in Commercial growing stock (Z)	Cm	7	
5. Volume refers to "Above ground" (AG) or "Above stump" (AS)	AG / AS	AG	
6. Have any of the above thresholds (points 1 to 4) changed since 1990	Yes/No	No	
7. If yes, then attach a separate note giving details of the change	Attachment		

5.5 Comments to National reporting table T5

Estimates of UK growing stock were compiled in 2001 for 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^3 standing, of which 236 million m^3 conifer and 117 million m^3 broadleaved. There was an error in calculation of the conifer figure for EFISCEN, which should have been 184 million m^3 to give a total of 301 million m^3.

The new estimates for total conifers are 212 million m^3 for 2000 and 243 million m^3 for 2005, of which about 7-8 million m^3 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^3 for 1995-99 commercial conifers, and with the estimate of 190 million m^3 (of which 188 million m^3 available for wood supply) reported in TBFRA 2000 for conifers in 1995, projected forward from 1980.

The new estimates for broadleaves, including the adjustment for over-mature, are lower than previous estimates. The new estimates are 96 million m^3 for 2000 and 97 million m^3 for 2005, compared with the EFISCEN estimate of 117 million m^3 for 1995-99, and the TBFRA 2000 estimate of 127 million m^3 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.

6 Table T6 – Biomass stock

6.1 FRA 2005 Categories and definitions

Category	Definition
Above-ground biomass	All living biomass above the soil including stem, stump, branches, bark, seeds, and foliage.
Below-ground biomass	All living biomass of live roots. Fine roots of less than 2mm diameter are excluded because these often cannot be distinguished empirically from soil organic matter or litter.
Dead wood biomass	All non-living woody biomass not contained in the litter, either standing, lying on the ground, or in the soil. Dead wood includes wood lying on the surface, dead roots, and stumps larger than or equal to 10 cm in diameter or any other diameter used by the country.

6.2 National data

6.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Growing stock	M	All	All	From table T5
TBFRA 2000	M	All	All	Conversion factors for stem volume to above-ground and below-ground biomass.
"Examples of Data in the National Inventory of Woodland and Trees not Published in the Main Series of Reports" - Gilbert (2005, in press)	M	Deadwood	All	

6.2.2 Classification and definitions

National class	Definition
Standing deadwood	>15 cm diameter – dead tree or branch/limb
Lying deadwood	>15 cm diameter and >2m long
Fallen trees	> 7cm dbh

6.2.3 Original data

From Table T5, and including breakdowns using same sources, as shown in 5.6:
Growing stock (1990) = 266, of which 154 conifer and 112 broadleaved
Growing stock (2000) = 308, of which 212 conifer and 96 broadleaved
Growing stock (2005) = 340, of which 243 conifer and 97 broadleaved

Conversion factors from stemwood to biomass: 0.43 for conifers and 0.83 for broadleaves, as used in TBFRA 2000. These were based on densities of 0.33-0.45 for conifers (of which Sitka spruce 0.33) and 0.49-0.56 for broadleaves (of which oak 0.56), together with total to merchantable ratio of 1.3-1.8.

Total above ground biomass also includes shrubs and bushes in forest and OWL, explicitly identified in TBFRA 2000, and reported as 5 million ODT for UK. Although this is not mentioned in the definition for FRA 2005, FAQ guidance indicates that it should be included if an estimate is available. The same estimate of 5 million ODT is included here for each year, added to the estimates for tree biomass to give total above ground biomass.

Biomass of stump and roots per m^3 stemwood = 0.10 (0.12 for stump + roots as in TBFRA 2000, less 0.02 for stump).

For deadwood, classification of volume per hectare is given in Gilbert (2005) for each country. This was derived from survey counts of number of pieces (by type, and fallen trees by size category), multiplied by an estimate of average size per piece for each type/category. It is summarised to show the following averages: GB 2.0, England 2.7, Scotland 1.8, Wales 0.7. Multiply by woodland area of each country, and add estimate for Northern Ireland, to get a total of 5.6 million m^3 (3 million ODT) for UK.

6.3 Analysis and processing of national data

6.3.1 Calibration

Conversion factors from stemwood to biomass: same factors now used for volume to biomass in FRA 2005 (both including stump) as used in TBFRA 2000 (both excluding stump). Biomass of roots per m^3 stemwood estimated from TBFRA 2000 factor by subtracting 0.02 for stump to get 0.10.

6.3.2 Estimation and forecasting

Above ground:

1990: (154 x 0.43) + (112 x 0.83) + 5 = 164
2000: (212 x 0.43) + (96 x 0.83) + 5 = 176
2005: (243 x 0.43) + (97 x 0.83) + 5 = 190

Below ground:

All years: 0.1 x total volume
1990: 0.1 x 266 = 27
2000: 0.1 x 308 = 31
2005: 0.1 x 340 = 34

6.4 Data for National reporting table T6

FRA 2005 Categories	Biomass (million metric tonnes oven-dry weight)					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Above-ground biomass	164	176	190	1	1	1
Below-ground biomass	27	31	34	0	0	0
Dead wood biomass	3	3	3	0	0	0
TOTAL	**194**	**210**	**227**	**1**	**1**	**1**

Thresholds used by the country are the following: - see classifications & definitions

6.5 Comments to National reporting table T6

These figures for above-ground forest biomass excluding deadwood (average 1990 to 2000 = 170 million tonnes) are lower than in TBFRA 2000 (193 million tonnes, data for 1995) because of the lower figures now estimated for growing stock of broadleaves (see comment to Table T5).

Comparison of FRA 2005 (average of 1990 and 2000) with TBFRA 2000 (1995)
Million tonnes biomass (oven-dry weight)

	Total	Conifers	Broadleaves	Shrubs & bushes
FRA 2005	170	79	86	5
TBFRA 2000	193	82	106	5

Deadwood in UK forests is much lower than the default figures in FRA 2005 guidelines (which were based on semi-natural and near-natural forests), because most UK forest are plantations, and past silvicultural practices in UK tended not to leave much deadwood in plantations.

7 Table T7 – Carbon stock

7.1 FRA 2005 Categories and definitions

Category	Definition
Carbon in above-ground biomass	Carbon in all living biomass above the soil, including stem, stump, branches, bark, seeds, and foliage.
Carbon in below-ground biomass	Carbon in all living biomass of live roots. Fine roots of less than 2 mm diameter are excluded, because these often cannot be distinguished empirically from soil organic matter or litter.
Carbon in dead wood biomass	Carbon in all non-living woody biomass not contained in the litter, either standing, lying on the ground, or in the soil. Dead wood includes wood lying on the surface, dead roots, and stumps larger than or equal to 10 cm in diameter or any other diameter used by the country.
Carbon in litter	Carbon in all non-living biomass with a diameter less than a minimum diameter chose by the country for lying dead (for example 10 cm), in various states of decomposition above the mineral or organic soil. This includes the litter, fumic, and humic layers.
Soil carbon	Organic carbon in mineral and organic soils (including peat) to a specified depth chosen by the country and applied consistently through the time series.

7.2 National data

7.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
R. Milne, I, Bradley, C. Jordan and T. A.W. Brown (2004) Development of an improved version of the soil carbon inventory for the UK LULUCF GHG Inventory. & D. Mobbs).	M	Soil Carbon	1990	In: *UK Emissions by Sources and Removals by Sinks due to Land Use, Land Use Change and Forestry Activities.* Annual report (2004) for DEFRA Contract CEPG1/GA01054 (Ed. By R. Milne & D. Mobbs).
I. Bradley (2003) UK soil database for modelling soil carbon fluxes and land use for the national carbon dioxide inventory. Final project report to Defra for Project SP0511	M	Soil Carbon	1990	
R. Milne, R. W. Tomlinson, D. Mobbs and T.D. Murray (2004) Land Use Change and Forestry: The 2002 UK Greenhouse Gas Inventory and projections to 2020.	M	Soil Carbon	Projecting from 1990 to 2000 and 2005	In: UK Emissions by Sources and Removals by Sinks due to Land Use, Land Use Change and Forestry Activities. Annual report (2004) for DEFRA Contract CEPG1/GA01054 (Ed. By R. Milne & D. Mobbs).
R. Milne (2004), Centre for Ecology & Hydrology, Pers. Comm.	M	Soil Carbon	All	

Forestry Statistics 2004	H	Woodland area, for soil carbon	2000	
Forestry statistics databases	H	Area afforested, for soil carbon	All	Used to estimate 1990 area, as in Table T1 and for changes 1990-2000-2005.
R Milne, personal communications, 2004-05	M	Carbon in litter, soil carbon	All	

7.2.2 Classification and definitions

National class	Definition
Soil carbon	Soil carbon to a depth of 100 cm, as modelled by the Centre for Ecology & Hydrology (CEH).

7.2.3 Original data

Carbon in litter

From model output from Centre for Ecology & Hydrology, for carbon in UK forests – covers around 1.5 million hectares, afforested since 1920 (1900 Northern Ireland): 13 million tonnes carbon in litter (R Milne, CEH, personal communication, 2005).

Soil carbon

- Average soil carbon by country from Milne, Jordan, Bradley & Brown (2004) and Bradley (2003).
- Woodland areas by country for 1990 projected back using new planting, as done for UK totals in Table 1.
- Soil carbon change from Milne, Tomlinson, Mobbs & Murray (2004)

	SOIL CARBON	UK	England	Scotland	Wales	N Ireland
A	Average soil carbon tC/ha for woodland land cover		175.4	333.3	207.9	161.6
B	Area 1990 woodland (000 ha)	2611	1052	1201	284	74
C	Area afforested 1990-2000 (000 ha)	182	51	117	5	9
D	Area afforested 2000-2005 (000 ha)	72	26	40	2	4
E	Forest soil carbon change 1990-2000 (million tonnes) (from CEH model)	5.8	2.1	2.6	0.7	0.3
F	Forest soil carbon change 2000-2005 (million tonnes) (from CEH model)	2.8	1.0	1.4	0.3	0.2

7.3 Analysis and processing of national data

7.3.1 Estimation and forecasting

Carbon in living biomass
For carbon in living biomass, take 50% of biomass figures from Table T6, and round to nearest million tonnes.
Above ground:
1990: 0.5 x 164 = 82
2000: 0.5 x 176 = 88
2005: 0.5 x 190 = 95
Below ground:
1990: 0.5 x 27 = 13
2000: 0.5 x 31 = 15
2005: 0.5 x 34 = 17

Carbon in deadwood
For deadwood biomass, take 50% of biomass figures from Table T6, and round to nearest million tonnes.
All years: 0.5 x 3 = 1.5 (round to 2)

Carbon in litter
The area not covered by the CEH model is likely to have more carbon in litter per hectare, because it is mostly older forest. Including these other areas could increase the total from 13 MtC for the modelled area to 25-30 MtC in total (R Milne, personal communication). Use the lower end of this range (25 MtC) for all years.

Soil carbon

million tonnes

SOIL CARBON	UK	England	Scotland	Wales	N Ireland
Soil carbon 1990 = (A x B)	**656**	**185**	**400**	**59**	**12**
Existing soil carbon in area afforested 1990-2000 = (C x average for previous use)	40.5	7.9	30.1	0.9	1.6
Forest soil carbon change 1990-2000 = E	5.8	2.1	2.6	0.7	0.3
Soil carbon 2000 (million tonnes) = (sum of above)	**702.2**	**195.0**	**432.7**	**60.6**	**13.9**
Existing soil carbon in area afforested 2000-2005 = (D x average for previous use)	13.5	4.0	8.4	0.3	0.8
Forest soil carbon change 2000-2005 = F	2.8	1.0	1.4	0.3	0.2
Soil carbon 2005 (million tonnes) = (sum of above)	**718.6**	**200.0**	**442.5**	**61.2**	**14.9**

7.4 Data for National reporting table T7

FRA 2005 Categories	Carbon (Million metric tonnes)					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Carbon in above-ground biomass	82	88	95	0	0	0
Carbon in below-ground biomass	13	15	17	0	0	0
Sub-total: Carbon in living biomass	**95**	**103**	**112**	**0**	**0**	**0**
Carbon in dead wood	2	2	2	0	0	0
Carbon in litter	25	25	25	0	0	0
Sub-total: Carbon in dead wood and litter	**27**	**27**	**27**	**0**	**0**	**0**
Soil carbon to a depth of 100 cm	656	702	719	3	3	3
TOTAL CARBON	**778**	**832**	**858**	**3**	**3**	**3**

7.5 Comments to National reporting table T7

Carbon in deadwood in UK forests is much lower than the default figures in FRA 2005 guidelines (which were based on semi-natural and near-natural forests), because most UK forest are plantations, and past silvicultural practices in UK tended not to leave much deadwood in plantations.

As shown in the section on estimation and forecasting, most of the increase in forest soil carbon is not carbon sequestration, but reclassification of existing soil carbon to be forest soil carbon when the area is afforested.

8 Table T8 – Disturbances affecting health and vitality

8.1 FRA 2005 Categories and definitions

Category	Definition
Disturbance by fire	Disturbance caused by wildfire, independently whether it broke out inside or outside the forest/OWL.
Disturbance by insects	Disturbance caused by insect pests that are detrimental to tree health.
Disturbance by diseases	Disturbance caused by diseases attributable to pathogens, such as a bacteria, fungi, phytoplasma or virus.
Other disturbance	Disturbance caused by other factors than fire, insects or diseases.

8.2 National data

8.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Forest fire statistics	H	Fire	All	As reported to EU/UNECE and in Forestry Statistics 2004 Table 4.6 and UK Indicators C10.
Forest Condition Survey	H	Insects, diseases	All	As reported in UK Indicators C9.
National Inventory of Woodland 1995-99	H	Other (windblow)		As reported in UK Indicators C10.
FR monitoring (catastrophic storms)	M	Other (windblow)		As reported in UK Indicators C10.
Forestry Commission website and Information Notes	H	Diseases		Source for information about *Phytophthora* diseases

8.2.2 Classification and definitions

National class	Definition
Damage by insects, fungi	Common or abundant damage (categories 3+4) by insects, and by fungi, as measured by Forest Condition Survey and reported in UK Indicators C9. Gives area with damage present, not area suffering disturbance in year.
Windblow	Two measures available form National Inventory of Woodland 1995-99: • Blown woodland that remains uncleared and not regenerated • Woodland with signs of windblow

8.2.3 Original data

Fires on state forest, years starting April: area burned (hectares)

Year	1988	1989	1990	1991	1992	Average 88-92
Area	106	312	464	114	194	238
Year	1998	1999	2000	2001	2002	Average 98-02
Area	54	171	266	226	148	173

Forest condition survey: insect damage

% of trees surveyed showing common or abundant insect damage (cats 3 + 4)

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Beech		19.4	23.7	27.4	31.5	29.1	26.3	20.7	19.5	10.9	22.0	23.9	20.6	23.6	12.4
Norway spruce	10.3	13.7	7.7	6.4	4.9	3.7	3.3	0.6	2.6	2.7	1.6	1.7	4.7	5.2	2.9
Oak		17.9	21.3	44.2	49.9	31.1	35.6	26.4	19.4	13.1	14.5	11.7	12.0	15.4	23.1
Scots pine	2.6	3.2	2.7	0.6	2.3	2.3	2.4	2.6	0.7	1.1	1.0	0.9	0.5	0.9	1.0
Sitka spruce	15.5	16.4	12.1	7.5	8.0	6.0	5.5	2.9	5.3	8.5	2.9	4.5	4.0	7.5	4.2

Data for 1989-2000 used for chart in UK Indicators of Sustainable Forestry C9.
Data for 2001-2003 from same source, used for indicator update.

Forest condition survey: damage by fungi

% of trees surveyed showing common or abundant damage by fungi (cats 3 + 4)

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Beech		0.0	0.5	0.1	0.1	0.1	1.3	2.4	2.8	2.8	1.4	0.0	0.1	0.8	0.1
Norway spruce	0.0	1.4	0.0	0.2	0.4	1.4	1.8	3.0	2.2	2.7	2.6	2.7	2.5	2.5	5.0
Oak		0.8	0.4	0.2	2.4	0.7	0.0	0.1	0.4	0.3	0.3	0.3	0.0	0.1	0.3
Scots pine	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.2	0.5	0.7	1.0	2.7	0.6
Sitka spruce	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.1	0.6	0.1	0.1	0.1	0.2	0.0	0.0

Data for 1989-2000 used for chart in UK Indicators of Sustainable Forestry C9.
Data for 2001-2003 from same source, used for indicator update.

The greatest extent of damage by fungi in recent decades has been by Dutch elm disease *Ophiostoma ulmi* attacking English elms, principally *Ulmus procera.* An aggressive strain imported in the 1960s had killed about half the English elms in southern England by 1977, and is estimated to have killed more than 25 million elms in total. Most of this damage occurred before 1990, so does not appear in Table T8.

Other diseases

There is currently serious concern about the potential impact of two species of *Phytophthora,* destructive parasitic fungi causing various levels of damage to a number of host plants, including trees and shrubs. On trees, it produces lethal bark cankers although, occasionally, it is confined to foliar infection.

- The first case of *P. ramorum* on a tree in the UK (Southern red oak, *Quercus falcata*) was identified in 2003, with further cases in 2004. Rhododendron and viburnum are the main hosts. In 2004, a major survey of woodlands that might be susceptible did not identify any other cases.
- A new species of *Phytophthora, P. kernoviae,* was discovered in Cornwall in SW England in 2004. It has been found on a number of beech trees and oaks, all in woods heavily dominated by rhododendron, which is the principal host.

A *Phytophthora* disease of alder (*Alnus spp*) was identified in 1993, and has been monitored since 1994 at riparian sites in southern England and east Wales. The percentage of alder trees at these sites affected by *Phytophthora* has increased each year, so that by 2003 around 15% were diseased or dead. (FC Information Note, December 2004).

Forest windblow in GB (from National Inventory of Woodland 1995-99), reported in UK Indicators of Sustainable Forestry C10

- Blown woodland that remains uncleared and not regenerated = 5507 ha
- Woodland with signs of windblow = 133,704 ha

8.3 Analysis and processing of national data

8.3.1 Estimation and forecasting

For fires, data are only available for state forests. Assuming a similar % of area affected in other forests, the total could be around 500 hectares for all forests – this has been rounded up to 1 thousand hectares.

For insect damage, there is a problem of going from area showing damage (the normal basis for monitoring) to area newly affected in a year. Any figures would be speculative, and probably not comparable with figures reported for other types of damage. It is therefore preferred to adopt for the UK a much higher threshold "cause mortality or such severe dieback that the forest ecosystem changes" (the FAQ guidance leaves it open to countries to choose their own criteria). Regular monitoring data are not available on this basis, but expert advice is that on this basis the area newly affected in a year is less than 1,000 hectares on average, with pine beauty moth *Panolis flammea* being the largest outbreak. [maybe also pine looper moth *Bupalus piniarius]*. Round up to 1 thousand hectares for each year.

For damage by fungi, there is again the problem of converting from area showing damage to area newly affected in a year. If we adopt a higher threshold "cause mortality or such severe dieback that the forest ecosystem changes" (as for insects) then the figures are likely to round down to 0 thousand hectares for each year.

For other disturbance (windblow), the relevant area is the average annual area of growing stock windblown, rather than the much larger area affected by windblow. NIWT reports the area of blown woodland that remained uncleared at the survey date. To convert this to an estimate of the area blown in a year, we need an assumption about the average lag before clearance. Some may be cleared quickly, if it has good quality timber in a sizeable area with good access, but other areas may be left uncleared for years; there will also be variations between species in extent of timber deterioration over time. If we assume that the area blown remains uncleared for 1 year on average, the area blown in a year would be about the same as the area recorded by NIWT. Estimate similar level for 1990 and 2000 (5 year averages), as there were no catastrophic storms with estimated windthrown growing stock exceeding 2 million m^3 or 2000 ha in either period (the last was in October 1987).

8.4 Data for National reporting table T8

FRA-2005 Categories	Average annual area affected (1000 hectares)			
	Forests		Other wooded land	
	1990	2000	1990	2000
Disturbance by fire	1	1	0	0
Disturbance by insects	1	1	0	0
Disturbance by diseases	0	0	0	0
Other disturbance	6	6	0	0

Other disturbance = windblow in storms.

8.5 Comments to National reporting table T8

See comments (above) about thresholds.

9 Table T9 – Diversity of tree species

9.1 FRA 2005 Categories and definitions

Category	Definition
Number of native tree species	The total number of native tree species that have been identified within the country.
Number of critically endangered tree species	The number of native tree species that are classified as "Critically endangered" in the IUCN red list.
Number of endangered tree species	The number of native tree species that are classified as "Endangered" in the IUCN red list.
Number of vulnerable tree species	The number of native tree species that are classified as "Vulnerable" in the IUCN red list.

9.2 National data

9.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
2004 IUCN red list of threatened species, IUCN 2004 (website www.redlist.org)	H	All except total native		
Forestry Statistics 2004 Appendix C	M	Total native (part)		As reported for FRA 2000
Appendix to Forest Nature Conservation Guidelines (Forestry Commission, 1990)	M	Total native (part)		
Websites, as specified below	M	Total native (part)		

9.2.2 Classification and definitions

National class	Definition
Native	There is no definitive list of native species for UK. Generally, any species thought to have been introduced by the Romans (about 2000 years ago) or more recently is not considered to be native. Species established earlier are generally considered to be native, although some of them could have been introduced by earlier settlers.
Tree	There is no agreed UK definition of a tree. This report uses lists from a variety of websites, and then aims to exclude species not normally able to grow to a height of at least 5 metres.

9.2.3 Original data

From 2004 IUCN Red List of threatened species, IUCN 2004 www.redlist.org
with supplementary information from Tree Council website http://www.treecouncil.org.uk/.

		Location	Approx number
Critically endangered			
Welsh whitebeam	*Sorbus leptophylla*	Powys (Wales)	44
Ley's whitebeam	*Sorbus leyana*	Powys (Wales)	16
(a whitebeam)	*Sorbus wilmottiana*	Avon gorge (SW England)	20
Endangered			
(a whitebeam)	*Sorbus bristoliensis*	Avon gorge (SW England)	100
Vulnerable			
English whitebeam	*Sorbus anglica*	SW England & Wales	600
Arran whitebeam	*Sorbus arranensis*	Island of Arran (Scotland)	500
(a whitebeam)	*Sorbus eminens*	Avon gorge (SW England) + others	250
Arran service tree	*Sorbus pseudifennica*	Island of Arran (Scotland)	500
(a whitebeam)	*Sorbus subcuneata*	Somerset/Devon (SW England)	
(a whitebeam)	*Sorbus vexans*	Somerset/Devon (SW England)	

From JNCC website http://jncc.gov.uk/species/Plants/threatened/default.htm

Critically endangered	Service tree	*Sorbus domestica*
Vulnerable	Lesser whitebeam	*Sorbus minima*
	Woolly willow	*Salix lanata*

Add these to total native (as calculated below, although *Salix lanata* later excluded as small). Following FAQ guidance, they are not included in the totals for vulnerable and endangered, which are limited to those on IUCN lists.

Forestry Statistics 2004 Appendix C, based on report for Forest Resources Assessment 2000

Main species		***Other species***	
Native (indigenous) tree species occurring on forest and other wooded land			
Scots pine	*Pinus sylvestris*	Yew	*Taxus baccata*
Oak – sessile	*Quercus robur*	Wild cherry (gean)	*Prunus avium*
Oak – pedunculate	*Quercus petraea*	Bird cherry	*Prunus padus*
Ash	*Fraxinus excelsior*	Whitebeam	*Sorbus aria*
Downy birch	*Betula pubescens*	Elm	*Ulmus* spp
Silver birch	*Betula pendula*	Lime	*Tilia* spp
Beech	*Fagus sylvatica*	Field maple	*Acer campestre*
Rowan	*Sorbus aucuparia*	Willow	*Salix* spp
Holly	*Ilex aquifolium*	Aspen	*Populus tremula*
Hawthorn	*Crataegus monogyna*	Black poplar	*Populus nigra*
Common alder	*Alnus glutinosa*	Poplar	*Populus* spp
Hazel	*Corylus avellana*	Juniper	*Juniperis communis*
Elder	*Sambucus nigra*	Hornbeam	*Carpinus betulus*
		Crab apple	*Malus sylvestris*
		Service tree	*Sorbus torminalis*
		Whitebeams, etc	*Sorbus* spp

There is no definitive list of native species for UK. The following main sources were consulted:

- "Native trees and shrubs for wildlife" originally published in the Tree Council's magazine Tree News in September 1989, and reproduced as an Appendix to Forest Nature Conservation Guidelines (Forestry Commission, 1990).
- Guide to Native British Trees http://www.british-trees.com/guide/home.htm
- Royal Horticultural Society British native trees and larger shrubs http://www.rhs.org.uk/research/plant_groups/native_trees.asp
- Tree gallery website http://www.the-tree.org.uk/BritishTrees/TreeGallery/treegallery.htm
- Trees of Britain and Ireland http://en.wikipedia.org/wiki/Trees_of_Britain_and_Ireland
- Flora of Northern Ireland http://www.habitas.org.uk/flora/

Some of these sources did not separate out small trees and shrubs, and some sources also included some non-native species that are now naturalised or widespread. These and other sources were checked, and expert advice was consulted to limit the list to trees that are considered native to UK and able to grow to 5 metres in height (although the latter is not part of the FRA 2005 definition of trees, the height criterion is given in FAQ guidelines). The 10 species from the IUCN red list need to be added to this list, which incorporates information from the other sources listed above.

Common name	***Latin name***	**Common name**	***Latin name***
Field maple	*Acer campestre*	Eared willow	*Salix aurita*
Common/black alder	*Alnus glutinosa*	Goat willow	*Salix caprea*
Silver birch	*Betula pendula*	Grey willow	*Salix cinerea*
Downy birch	*Betula pubescens*	Crack willow	*Salix fragilis*
Box	*Buxus sempervirens*	Bay willow	*Salix pentandra*
Hornbeam	*Carpinus betula/us*	Almond willow	*Salix triandra*
Hazel	*Corylus avellana*	Osier	*Salix viminalis*
Midland (haw)thorn	*Crataegus laevigata*	Elder	*Sambucus nigra*
Hawthorn	*Crataegus monogyna*	Whitebeam	*Sorbus aria*
Spindle	*Euonymus europaeus*	Rowan	*Sorbus aucuparia*
Beech	*Fagus sylvatica*	French hales	*Sorbus devoniensis*
Alder buckthorn	*Frangula alnus*	Service tree	*Sorbus domestica*
Ash	*Fraxinus excelsior*	Irish whitebeam	*Sorbus hibernica*
Holly	*Ilex aquifolium*	(a whitebeam)	*Sorbus lancastriensis*
Juniper	*Juniperis communis*	Lesser whitebeam	*Sorbus minima*
Crab apple	*Malus sylvestris*	(a whitebeam)	*Sorbus porrigentiformis*
Scots pine	*Pinus sylvestris*	(a whitebeam)	*Sorbus rupicola*
Grey poplar	*Populus canescens (x?)*	Service tree	*Sorbus torminalis*
Black poplar	*Populus nigra*	Yew	*Taxus baccata*
Aspen	*Populus tremula*	Small-leaved lime	*Tilia cordata*
Wild cherry (gean)	*Prunus avium*	Large-leaved lime	*Tilia platyphyllos*
Bird cherry	*Prunus padus*	Cornish elm	*Ulmus augustifolia*
Blackthorn	*Prunus spinosa*	Smooth-leaved elm	*Ulmus carpinifolia*
Plymouth pear	*Pyrus cordata*	Coritanian elm	*Ulmus coritana*
Oak – pedunculate	*Quercus petraea*	Wych Elm	*Ulmus glabra*
Oak – sessile	*Quercus robur*	Elm	*Ulmus minor*
Common (purging) buckthorn	*Rhamnus cathartica/us*	Plot's elm	*Ulmus plotii*
White willow	*Salix alba*	English elm	*Ulmus procera*

9.3 Data for National reporting table T9

FRA 2005 Categories	Number of species (year 2000)
Native tree species	66
Critically endangered tree species	3
Endangered tree species	1
Vulnerable tree species	6

9.4 Comments to National reporting table T9

There is no overlap between the IUCN and other lists, so for overall total add 10 from IUCN Red List total to 56 from combined list.

The IUCN Red List on website includes the following that are not trees):
- Derbyshire Feather-moss (*Thamnobryum angustifolium)*
- Cornish Path Moss (*Ditrichum cornubicum*)
- Marsh Earwort (*Jamesoniella undulifolia*)

This table counts English elm *Ulmus procera* as a native species. However, a recent article in Nature (28 October 2004) indicates that it was introduced by the Romans about 2000 years ago, as a clone of the Atinian elm *Ulmus campestris*. The resulting lack of biodiversity was its downfall in the face of Dutch elm disease since 1967, and the species has now almost disappeared in the UK.

The IUCN red list used for this report does not yet incorporate information from The Vascular Plant Red Data List for Great Britain, C.M. Cheffings, L. Farrell (Eds.), JNCC, Peterborough, 2005. The 2005 classification on the JNCC website shows *Sorbus leptophylla* moved down from critically endangered to endangered, *Sorbus eminens* and *Sorbus vexans* moved up from vulnerable to endangered, and *Sorbus anglica* moved down from vulnerable to near threatened.

In addition to the native species identified in 9.2, the following species were shown in at least one of the sources and considered for inclusion, but excluded for the reason shown:
- "X" indicates a hybrid,
- "small" indicates a small tree or shrub normally growing to less than 5 metres in height, although FAQ guidance says that the height criterion should be interpreted flexibly.
- "spp" indicates a single entry for several species in TBFRA 2000, expanded in the list above.

Common name	***Latin name***	**Reason for exclusion**
Maple	*Acer platanoides*	not native
Sycamore	*Acer pseudoplatanus*	naturalised
Horse Chestnut	*Aesculus hippocastanum*	naturalised
Italian alder	*Alnus cordata*	not native
Grey alder	*Alnus incana*	not native
June berry	*Amelanchier lamarckii*	naturalised
Strawberry tree	*Arbutus unedo*	SW Ireland only
	Betula × aurata	X
	Betula × intermedia (some forms)	X

Sweet chestnut	*Castanea sativa*	naturalised
Dogwood	*Cornus sanguinea*	small
Midland hawthorn	*Crataegus oxycanthoides*	same as C laevigata
	Crataegus × media	X
Broom	*Cytisus scoparius*	small
Spurge-laurel	*Daphne laureola*	small
Fig	*Ficus carica*	naturalised
Sea buckthorn	*Hippophae rhamnoides*	small
English walnut	*Juglans regia*	naturalised
Alpine laburnum	*Laburnum alpinum*	naturalised
Laburnum	*Laburnum anagyroides*	naturalised
European larch	*Larix decidua*	naturalised
Privet	*Ligustrum vulgare*	small
Medlar	*Mespilus germanica*	naturalised
White poplar	*Populus alba*	not native
Poplar	*Populus spp*	spp
Cherry plum	*Prunus cerasifera*	naturalised
Wild plum	*Prunus domestica*	not native
Turkey oak	*Quercus cerris*	not native
Holm/holly oak	*Quercus ilex*	naturalised
	Quercus × rosacea	X
Field rose	*Rosa arvensis*	small
Dog rose	*Rosa canina*	small
Alder buckthorn	*Rhamnus frangula*	same as Frangula alnus
Rhododendron	*Rhododendron ponticum*	naturalised
Butchers-broom	*Ruscus aculeatus*	small
	Salix × alopecuroides	X
	Salix × calodendron	X
	Salix × capreola	X
	Salix × fruticosa	X
	Salix × latifolia	X
	Salix × lintonii	X
	Salix × meyeriana	X
	Salix × mollisima	X
	Salix × multinervis	X
	Salix × pontederiana	X
	Salix × reichardtii	X
	Salix × rubens	X
	Salix × rubra	X
	Salix × sericans	X
	Salix × smithiana	X
	Salix × stipularis	X
Dwarf willow	*Salix herbacea*	small
Woolly willow	*Salix lanata*	small
Dark-leaved willow	*Salix myrsinifolia*	small
Tea-leaved willow	*Salix phylicifolia*	small
Purple willow	*Salix purpurea*	small
Creeping willow	*Salix repens*	small
Willow	*Salix spp*	spp
Dwarf elder	*Sambucus ebulus*	small
	Sorbus × vagensis	X
Swedish whitebeam	*Sorbus intermedia*	naturalised
French hales	*Sorbus latifolia*	not native?
Other Sorbus	*Sorbus spp*	spp
	Tilia × europaea	X
Lime	*Tilia spp*	spp
Gorse	*Ulex europaeus*	small
Western gorse	*Ulex gallii*	small
	Ulmus × elegantissima	X
	Ulmus × hollandica	X

	Ulmus × vegeta	X
	Ulmus × viminalis	X
Elm	*Ulmus spp*	spp
Wayfaring tree	*Viburnum lantana*	small
Guelder-rose	*Viburnum opulus*	small

10 Table T10 – Growing stock composition

10.1 FRA 2005 Categories and definitions

List of species names (scientific and common names) of the ten most common species – see tables below.

10.2 National data

10.2.1 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)	M	All	2000, 2005	
FE commercial growing stock model for GB (FE, unpublished, 2004)	H	All	2005	
EFISCEN data submitted for EFSOS (Forest Research, international return, 2001)	M	All		Used for Northern Ireland and for comparison
Census of Woodlands & Trees 1979-82 (FC Bulletin 63 by GML Locke, 1987)	M	All	1990	Data for 1980, to estimate 1990 by interpolation.

10.2.2 Original data

As in Table 5, 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 fcast	2000 Private Non-comml FR fcast	1995-99 Private other over-mature comml	1995-99 Private other over-mature non-comml	2005 State comml FE fcast	2005/ 2000 State comml FR fcast	2000 State non-comm FR fcast	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
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
TOTAL	**149.6**	**29.8**	**27.7**	**6.4**	**87.5**		**4.1**	**197.4**

From data for 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.

10.3 Analysis and processing of national data

10.3.1 Estimation and forecasting

Estimate totals for 2000, as described below, with results in table below.

- GB private from original data (FR forecast);
- GB private over-mature from 1995-99, adjusted pro-rata for increases in conifer and broadleaved over-mature from then to 2000;
- GB state non-commercial from original data (FR forecast);
- GB state commercial estimated as 2005 FE forecasts divided by 2005/2000 change in FR forecasts (similar calculation as in Table T5);
- For NI, use EFISCEN figures (in original data) for breakdown of 6.0 state commercial. For 0.3 state non-commercial and 1.6 private, assume species groups break down in similar proportions to GB private.

2000: Growing stock in forests (million cubic metres)

Common name	GB Private comml FR forecast	GB Private non-comm FR forecast	GB Private over-mature comm	GB Private over-mature non-comm	GB State comml based on FE fcast	GB State non-comm FR fcast	GB Total	NI	UK Total
Sitka spruce	42.7	0.2	1.9	0.0	42.5	0.5	87.8	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	20.0	0.3	20.3
Lodgepole pine	7.4	0.0	0.1	0.0	5.9	0.1	13.5	0.2	13.7
Norway spruce	7.8	0.2	0.6	0.0	6.3	0.2	15.0	0.6	15.6
Douglas fir	6.0	0.1	0.9	0.1	2.6	0.0	9.9	0.1	10.0
Corsican pine	3.2	0.0	0.3	0.1	3.6	0.1	7.5	0.0	7.5
Other conifers	5.3	1.1	3.0	1.9	2.4	0.3	14.0	0.2	14.2
Oak	16.9	8.3	3.7	0.6	1.0	0.4	30.9	0.3	31.2
Beech	6.4	1.6	4.8	0.9	1.4	0.1	15.2	0.1	15.3
Birch	3.1	6.0	0.5	0.2	0.0	0.6	10.4	0.1	10.5
Ash	4.6	1.6	4.5	1.5	0.1	0.1	12.4	0.0	12.4
Sycamore	3.3	1.1	1.7	0.6	0.1	0.3	7.1	0.0	7.1
Other broadleaves	8.8	8.2	1.8	0.6	0.2	0.5	20.1	0.4	20.5
TOTAL by species	**149.6**	**29.8**	**30.3**	**7.1**	**79.7**	**4.1**	**300.8**	**7.9**	**308.7**
TOTAL (Table 5)	**149.6**	**29.8**	**30.5**	**7.0**	**79.2**	**4.1**	**300.2**	**7.9**	**308.1**

To estimate for 1990:

- For GB commercial, interpolate between 1980 and 2000, assuming constant annual rate of change for each species. The figure for 2000 is the total of the three commercial columns in the table above.
- For GB non-commercial and NI, extrapolate back from 2000. The figure for 2000 is the total of the three commercial columns in the table above. Assume conifer volume same as in 2000, and broadleaved volume is 2.8 higher (as in Table 5) allocated pro rata.
- For NI, extrapolate back from 2000, by assuming1990 conifer volume 20% lower than 2000 and no change in broadleaves, in line with average annual change assumptions for 2000-2005 in Table 5.

Growing stock in forests (million cubic metres)

Common name	1980 GB comml	2000 GB Comml	1990 GB comml	2000 GB Non-comm	1990 GB Non-comm	1990 NI	1990 UK Total
Sitka spruce	28.2	87.1	49.6	0.7	0.7	4.0	54.3
Scots pine	27.7	35.2	31.2	1.8	1.8	0.5	33.5
Larch	17.5	19.2	18.3	0.9	0.9	0.3	19.5
Lodgepole pine	2.6	13.4	5.9	0.1	0.1	0.1	6.1
Norway spruce	12.9	14.7	13.8	0.4	0.4	0.5	14.7
Douglas fir	6.1	9.5	7.6	0.2	0.2	0.1	7.9
Corsican pine	6.0	7.1	6.5	0.2	0.2	0.0	6.7
Other conifers	5.3	10.7	7.5	3.3	3.3	0.1	10.9
Oak	32.9	21.6	26.7	9.3	10.1	0.3	37.1
Beech	15.2	12.6	13.8	2.6	2.8	0.1	16.7
Birch	6.1	3.6	4.7	6.8	7.4	0.1	12.2
Ash	10.2	9.2	9.7	3.2	3.5	0.0	13.2
Sycamore	8.0	5.1	6.4	2.0	2.2	0.0	8.6
Other broadleaves	18.8	10.8	14.2	9.3	10.1	0.4	24.7
TOTAL by species	**197.4**	**259.6**	**215.9**	**41.0**	**43.8**	**6.5**	**266.2**
TOTAL (Table 5)		**259.3**		**40.9**			

Select ten most common species, based on total UK growing stock 2000, estimated above.

10.4 Data for National reporting table T10

FRA 2005 Categories / Species name (Scientific name and common name)	Growing Stock in Forests (million cubic meters)	
	1990	2000
Picea sitchensis (Sitka spruce)	54	93
Pinus sylvestris (Scots pine)	34	38
Quercus robur / Q petraea (Oak)	37	31
Larix spp (Larch)	19	20
Picea abies (Norway spruce)	15	16
Fagus sylvatica (Beech)	17	15
Pinus contorta (Lodgepole pine)	6	14
Fraxinus excelsior (Ash)	13	12
Betula pubescens / B pendula (Birch)	12	11
Pseudotsuga menziesii (Douglas fir)	8	10
Remainder of species	51	49
TOTAL	**266**	**308**

10.5 Comments to National reporting table T10

If the top 10 were based on area rather than estimated growing stock, the top 10 would include Sycamore (*Acer pseudoplatanus*) instead of Douglas fir (*Pseudotsuga menziesii*). Corsican pine (*Pinus nigra var maritima)* is outside the top 10 on both bases.

11 Table T11 – Wood removal

11.1 FRA 2005 Categories and definitions

Category	Definition
Industrial wood removal	The wood removed (volume of roundwood over bark) for production of goods and services other than energy production (woodfuel).
Woodfuel removal	The wood removed for energy production purposes, regardless whether for industrial, commercial or domestic use.

11.2 National data

11.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
JQ1 (and previous TB1) international returns	M	All	All	

11.2.2 Classification and definitions

National class	Definition
Removals	Removals of timber, mostly estimated from reported deliveries to wood processing industries

11.2.3 Original data

Total removals = industrial roundwood + fuelwood

Removals 1988-1992 (000 m3 underbark)

	1988	1989	1990	1991	1992	1992 r
Total removals	5792	6273	6275	6352	6383	6546
Softwood removals	4806	5143	5291	5376	5699	5859
Hardwood removal	986	1131	984	976	684	687
of which						
Fuelwood	197	229	229	229	229	232
Softwood fuelwood	79	98	98	98	98	100
Hardwood fuelwood	118	131	131	131	131	132

Source: 1988 to 1992 from TB1 database in 1998; 1992r from current JQ1 database

Removals 1998-2002 (000 m3 underbark)

	1998	1999	2000	2001	2002	Ave 98-02
Total removals	7320	7538	7586	7712	7596	7550
Softwood removals	6698	6949	7014	7150	7053	6973
Hardwood removal	622	589	572	562	543	578
of which						
Fuelwood	233	234	234	234	233	234
Softwood fuelwood	101	101	101	101	101	101
Hardwood fuelwood	132	133	133	133	132	133

Source: current JQ1 database

11.3 Analysis and processing of national data

11.3.1 Estimation and forecasting

Scaling up 1988-2002 by ratio of 1992r to original 1992
Scaling up both periods from underbark to overbark

	1988 to 1992 ave	**1992r/ 1992**	**Overbark/ underbark**	**1988 to 1992 overbark**		**1998 to 2002 overbark**
Total removals	6215			7152		8471
Softwood removals	5263	1.028	1.120	6060		7810
Hardwood removal	952	1.004	1.143	1092		661
of which						
Fuelwood	223			255		265
Softwood fuelwood	94	1.018	1.120	107		113
Hardwood fuelwood	129	1.006	1.143	148		152

Compared with 1998-2002 average, total deliveries in 2003 provisionally show 3% increase (with no change in fuelwood). Project this forward to show 5% increase in total by 2005.

11.4 Data for National reporting table T11

FRA 2005 Categories	**Volume in 1000 cubic meters of roundwood over bark**					
	Forest			**Other wooded land**		
	1990	**2000**	**2005**	**1990**	**2000**	**2005**
Industrial roundwood	6897	8206	8630	0	0	0
Woodfuel	255	265	265	0	0	0
TOTAL for Country	**7152**	**8471**	**8895**	**0**	**0**	**0**

12 Table T12 – Value of wood removal

12.1 FRA 2005 Categories and definitions

Category	Definition
Value of industrial wood removal	Value of the wood removed for production of goods and services other than energy production (woodfuel).
Value of woodfuel removal	Value of the wood removed for energy production purposes, regardless whether for industrial, commercial or domestic use.

12.2 National data

12.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Economic Accounts for Forestry	M	All	All	UK working sheets for 1998 and 2002, for unit values
UNECE Joint Questionnaire JQ1	M	All	All	For volumes, as in T11

12.2.2 Classification and definitions

National class	Definition

12.2.3 Original data

Average unit values for sales from Forestry Commission direct working
(Financial years ending March, £/m^3)

£/m^3 underbark	1988-89	1989-90	1990-91	1991-92	1992-93	Average 88-89 to 92-93
C Sawlogs	35.55	36.79	38.33	32.94	31.93	35.11
C pulpwood	14.83	16.74	22.92	23.20	22.72	20.08
C chipwood	16.22	15.15	17.33	18.59	17.11	16.88
Firewood	12.64	12.77	12.89	13.01	13.11	12.88

Source: working sheets for Economic Accounts for Forestry, 1998

£/m^3 standing volume	1998-99	1999-2000	2000-01	2001-02	2002-03	Average 98-99 to 02-03
Sawlogs	26.17	23.98	23.86	22.87	21.84	23.74
Pulpwood + chipwood	19.11	17.17	16.58	16.49	15.99	17.07
Firewood	11.02	11.96	10.88	18.05	12.28	12.84

Source: working sheets for Economic Accounts for Forestry, 2002 + personal communication

12.3 Analysis and processing of national data

12.3.1 Estimation and forecasting

For each category, the estimation uses the average unit values shown above (for sales from Forestry Commission direct working) and applies them to the total volumes used for Table T11. This means that everything is valued at a felled roadside price, regardless of how it was harvested.

Estimation for 1990

	Ave 1988-1992 ob	Unit value £	Total value £m	Total value $m
Total removals	7152		178.1	343
Softwood removals	6060			
Hardwood removal	1092			
Fuelwood	255	11.50	2.9	6
Softwood fuelwood	107			
Hardwood fuelwood	148			
Sawlogs	4082	31.35	127.9	247
Softwood sawlogs	3512			
Hardwood sawlogs	570			
All others	2815	16.79	47.3	91
All others softwood	2441			
All others hardwood	374			

Sources:

- Volumes as for Table T11 (+ sawlogs from same source)
- Unit values from Forestry Commission sales (averages over 5 financial years), divided by 1.12 to convert from underbark to overbark unit values.
- All others based on weighted average of pulpwood and chipwood.
- Exchange rate £/$: 1990=0.5187 (from FAO)

Estimation for 2000

	Ave 1998-2002 ub	Overbark/ underbark	Ave 1998-2002 ob	Unit value £	Total value £m	Total value $m
Total removals	7550				195.4	292
Softwood removals	6973					
Hardwood removal	578					
Fuelwood	234		265	14.27	3.8	6
Softwood fuelwood	101	1.120	113			
Hardwood fuelwood	133	1.143	152			
Sawlogs	4325		4849	26.38	127.9	191
Softwood sawlogs	4146	1.120	4644			
Hardwood sawlogs	179	1.143	205			
All others	2991		3357	18.97	63.7	95
All others softwood	2726	1.120	3053			
All others hardwood	266	1.143	304			

Sources:

- Underbark volumes from current JQ1 database (as for Table T11 + sawlogs)
- Unit values from Forestry Commission sales (averages over 5 financial years) divided by 0.9 to convert standing to felled overbark unit values.

- All others based on total of pulpwood and chipwood.
- Exchange rate £/$: 2000=0.6702 (from FAO)

Forecast for 2005
Unit values for 2002-03 (in £) were 4-8% below the 5-year average centred on 2000. There is some evidence that prices bottomed out in 2003, so perhaps there may be an overall fall of around 5% in unit values from 2000 to 2005. This may balance the increase in volume (forecast in T11), giving no change in total value (in £). For 2005, the FAQ guidance says to use the end-2003 $/£ exchange rate of 0.5603, a fall of 16.4% from the end-2000 rate of 0.6702; to adjust for this, increase $ values by 20% compared with 2000.

12.4 Data for National reporting table T12

FRA 2005 Categories	Value of roundwood removal (1000 USD)					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Industrial roundwood	337000	286000	343000	0	0	0
Woodfuel	6000	6000	7000	0	0	0
TOTAL for Country	**343000**	**292000**	**350000**	**0**	**0**	**0**

12.5 Comments to National reporting table T12

Unit values for FC sales relate mainly to softwood – quantities of hardwood sold by FC are too small to derive reliable unit prices. The estimation assumes that the average hardwood price for each category is the same as this FC (mainly softwood) price. Unit values for other long timber (special poles, fencing, mining timber) are also reported by FC, but the quantities are too small to derive a reliable price to use in the above calculations.

The conversion to US $ uses end-year exchange rates, as specified in the FRA guidelines. These rates are (£/$): 1990=0.5187; 2000=0.6702. It would be more appropriate to use average £/$ rates for these years, but end-year rates have been used for consistency with reporting by other countries. Another possibility (not adopted) would be to convert £ values for each year of the 5-year average to $ using the exchange rate for that year, and then average the $ values for the 5 years.

The $/£ exchange rate now (August 2005) is similar to the level at end-2003 that was used in Table T12.

13 Table T13 – Non-wood forest product removal

13.1 FRA 2005 Categories and definitions

The following categories of non-wood forest products have been defined:

Category
Plant products / raw material
1. Food
2. Fodder
3. Raw material for medicine and aromatic products
4. Raw material for colorants and dyes
5. Raw material for utensils, handicrafts & construction
6. Ornamental plants
7. Exudates
8. Other plant products
Animal products / raw material
9. Living animals
10. Hides, skins and trophies
11. Wild honey and bee-wax
12. Bush meat
13. Raw material for medicine
14. Raw material for colorants
15. Other edible animal products
16. Other non-edible animal products

13.2 National data

13.2.1 Data sources

References to sources of information	**Quality (H/M/L)**	**Variable(s)**	**Year(s)**	**Additional comments**
Jenny Wong (personal communication, 2004)	M/L	All others	All	Compilation for FRA 2005, using sources identified below
Roger Hay, British Christmas Tree Growers Association (personal communication, 2005)	M	Christmas trees	All	
Forestry Statistics 2004	M	Christmas trees	96/97 to 03/04	Data for state forest service sales only.
TBFRA 2000	M	Christmas trees	1995	Use for 1990 and 2000

The estimates provided by Jenny Wong (personal communication, 2004) were based on an assessment of the following sources:

- Dyke A. and Primrose D. (2002) Non-timber forest product study. Scottish Forest Industries Cluster.
- Murray M. and Simcox H. (2003) Use of wild living resources in the United Kingdom – A review. UK Committee for IUCN.
- Prendergast H.D.V. and Sanderson H. (2004) Britain's wild harvest. Royal Botanic Gardens, Kew.
- Sanderson H. and Prendergast H.D.V. (2002) Commercial uses of wild and traditionally managed plants in England and Scotland. Royal Botanic Gardens, Kew.

- Wong J. and Dickinson B. (2003) Current status and development potential of woodland and hedgerow, Wild Resources Limited, Bangor.

13.2.2 Classification and definitions

National class	Definition
Venison	Meat from deer. The data used here are from deer culls, so exclude farmed deer.
Christmas trees	All conifers sold as Christmas trees. Most are from Christmas tree plantations managed by specialist Christmas tree growers and state forest services, not from general woodland.

13.2.3 Original data

The estimates from Wong 2004 (personal communication), which are shown below or included directly in table T13, can generally be taken as relating to the year 2000, except where other dates are stated.

Plant products – food (Commercial collection only)

FOOD	Product	Weight (tonnes)
Commercial	Nettles	2.5
	Bilberries	4.0
	Elderflowers	100.0
	Mushrooms	50.0
	Oak leaves	5.0
	Sloes	0.9
TOTAL		162.4

Plant products – colorants and dyes

The only information available is for oak tan bark for a tannery in Devon (SW England).

Plant products – utensils, handicrafts and construction

Figures should include coppice and other wood for greenwood working as well as twigs for bessoms and rushes etc for basket weaving. There are few figures for the volume of this market but it is likely to be reasonably large. This is currently left blank in the table.

Ornamental plants

The first estimate includes any material collected for ornamental use i.e. foliage and moss for use by florists and horticultural products (hanging baskets, wreaths etc.).

A separate estimate is given for Christmas trees:

- A study by Interviewing Research Ltd for BCTGA in 1997 (published 1998) estimated 6 million trees sold, of which 1-1.5 million imported.
- The latest estimate for 2004 (from BCTGA) is 7.5 million trees sold (including around 1 million imports).
- BCTGA estimate that UK production in 1990 was around 2.5 million trees.
- The 1995 estimate for TBFRA 2000 (3 million trees) is consistent with these BCTGA figures.

- Figures for sales of Christmas trees by state forest services (FC and FS) are reported in Forestry Statistics 2004, table 2.14. They average around 160,000 trees for 1996-1998, and around 70,000 trees since 2000. These figures are not used here to estimate trends in quantities sold, because they only make up a small part of the total market.
- To convert number of trees to tonnes, in absence of any other data, assume about 40 trees / tonne (based on single sample measurement in 2004, of 5ft (1.5m) Norway Spruce freshly cut). BCTGA confirm that this is a reasonable average weight.

Other plant products
The estimate is for tree seed.

Honey
Annual honey production estimated at 4000 tonnes per year for 2000 and 6000 tonnes for 2003-4. Beeswax represents 1.5% of the honey harvest [Carreck & Williams (1999) http://www.beefarmers.co.uk/files/vofbeesreport.pdf]. An educated guess puts the amount of honey harvested from forests and trees (in hedgerows) at around 3% of the total harvest. The advent of Verroa in 1995 severely affected honey production and the increase from 2000 to date probably represents recovery as bee farmers adjust to Verroa losses and control measures. Harvests in 1990 were likely to be higher than 2000.

Venison (deer - FRA category bush meat)
Estimated figures derived from data for deer culls:
1990: 800 tonnes, 2000: 2600 tonnes, 2005: 3500 tonnes
It is assumed that all culled deer are dependent on woodland for at least some of the year. These estimates for venison are comparable with the separate estimate for 1995 in TBFRA 2000 (850 tonnes).

Other wild game from woodlands such as woodcock and wood pigeon are taken in relatively large numbers but contribute little to the overall weight produced and their meat is very low value. Since they would contribute little to the figures for venison they have been omitted. Reared woodland game i.e. pheasant have been excluded.

13.3 Analysis and processing of national data

13.3.1 Estimation and forecasting

For Christmas trees (dividing number of trees by 40 to get tonnes):
- For 1990, use BCTGA estimate of 2.5 million trees UK production;
- For 2000, interpolate between BCTGA estimates of total sold (6 million 1997, 7.5 million 2004) and subtract 1-1.5 million for imports, to get estimate of 5.5 million UK production;
- For 2005, use BCTGA estimate of total sold in 2004 (7.5 million) and subtract 1 million for imports, to get estimate of 6.5 million UK production;

For honey, the commentary in original data indicates that harvests in 1990 were likely to be higher than 2000: assume 200 tonnes.

For venison (classified as bush meat), original data give estimates for all years.

For all other categories, assume constant.

13.4 Data for National reporting table T13

FRA 2005 Categories	Scale factor	Unit	NWFP removal		
			1990	2000	2005
Plant products / raw material					
1. Food		tonnes	162	162	162
2. Fodder					
3. Raw material for medicine and aromatic products		tonnes	15	15	15
4. Raw material for colorants and dyes		tonnes	14	14	14
5. Raw material for utensils, handicrafts & construction					
6. Ornamental plants		tonnes	45	45	45
6a Christmas trees		tonnes	62500	137500	162500
7. Exudates					
8. Other plant products		tonnes	13	13	13
Animal products / raw material					
9. Living animals			0	0	0
10. Hides, skins and trophies					
11. Wild honey and bee-wax		tonnes	200	122	183
12. Bush meat		tonnes	800	2600	3500
13. Raw material for medicine					
14. Raw material for colorants					
15. Other edible animal products					
16. Other non-edible animal products					

13.5 Comments to National reporting table T13

In addition to the commercial collection of plant food products shown in the first row, there is believed to be substantial non-commercial collection of food products, particularly blackberries (*Rubus*) and wild mushrooms. One local rural survey estimated that on average each person collects 2.2kg of blackberries; applying this to the 2 million total rural population in UK gives a speculative estimate for blackberries of 4400 tonnes.

No estimate is available for non-commercial collection of wild mushrooms. In a recent survey in Scotland about 4% of those interviewed said they had collected mushrooms at some time in the last 5 years, compared with about 13% who had picked berries at some time.

Annex to table T13 – Most important species by NWFP category

FRA 2005 Category	Most important species
Plant products / raw materials	
1. Food	Mushrooms (*Boletus, Chantrelle* etc.) Berries (*Vaccinium, Rubus*) Flowers (*Sambucus nigra*)
2. Fodder	Occasional use in hard winters (*Corylus avellana, Ilex, Salix* etc.)
3. Raw material for medicine and aromatic products	Yew clippings (*Taxus baccata*)
4. Raw material for colorants and dyes	Oak tan bark (*Quercus petraea* & *Q. robur*)
5. Raw material for utensils, handicrafts & construction	Willow (*Salix* spp.)
6. Ornamental plants	Moss (*Hypnum jutlandicum, Sphagnum, Hylocomium splendens, Pleurozium schreberi* etc.)
7. Exudates	Birch sap (*Betula* spp.)
8. Other plant products	
Animal products / raw material	
9. Living animals	
10. Hides, skins and trophies	
11. Wild honey and bee-wax	Honey derived from hedgerow trees such as hawthorn, lime etc. and understorey wildflowers
12. Bush meat	Red deer
13. Raw material for medicine	
14. Raw material for colorants	
15. Other edible animal products	
16. Other non-edible animal products	

14 Table T14 – Value of non-wood forest product removal

14.1 FRA 2005 Categories and definitions

The following categories of non-wood forest products have been defined:

Category
Plant products / raw material
1. Food
2. Fodder
3. Raw material for medicine and aromatic products
4. Raw material for colorants and dyes
5. Raw material for utensils, handicrafts & construction
6. Ornamental plants
7. Exudates
8. Other plant products
Animal products / raw material
9. Living animals
10. Hides, skins and trophies
11. Wild honey and bee-wax
12. Bush meat
13. Raw material for medicine
14. Raw material for colorants
15. Other edible animal products
16. Other non-edible animal products

14.2 National data

14.2.1 Data sources

References to sources of information	**Quality (H/M/L)**	**Variable(s)**	**Year(s)**	**Additional comments**
As Table T13				

14.2.2 Classification and definitions

National class	**Definition**
As Table T13	

14.2.3 Original data

Plant products - Food

Commercial collection only, from sources in T13.

FOOD	Product	Weight (tonnes)	Unit price (£ kg^{-1})	Total value £
Commercial	Nettles	2.5	9	22,500
	Bilberries	4.0	4.0	16,000
	Elderflowers	100.0	2.6	260,000
	Mushrooms	50.0	7.5	375,000
	Oak leaves	5.0	?	
	Sloes	0.9	0.27	243
TOTAL		162.4		677,743

A price of £7.90/kg for bilberries is given in the sources quoted above, but seems to be a retail price. In the above table this has been adjusted down by 50% to £4.00/kg as an estimated wholesale price.

Christmas trees
Typical retail and wholesale prices in 2004, for a 6ft (1.8m) tree, estimated by BCTGA:

	Retail	Wholesale
Norway spruce	£12 - £20	£4 - £6
Firs	£22 - £35	£6 - £12
Pine	£23 - £30	£5 - £8

Between 1998 and 2004 there has been an increase in sales of higher value trees in preference to Norway spruce. BCTGA estimate that in 1998 70% of the trees sold were Norway spruce and that in 2004 70% were firs.

The quantities and values of sales by state forest services (FC + FS), from Forestry Statistics 2004 are shown below. The state forest services sell direct to the public through forest visitor centres and other sites, so their unit values are also largely based on retail sales.
1997: 165,000 trees, value £1.2 million: average = £7.22
2000: 80,000 trees, value £1.4 million: average = £17.45
2003: 71,000 trees, value £1.3 million: average = £17.92

Honey
Average wholesale price of UK sourced honey: £4.40 per kg in 2000 and £4.00 per kg in 2004.

Venison (deer - FRA category bush meat)
The estimated wholesale value for total deer cull, including that not sold:
1990: £0.8 million, 2000: £2.6 million, 2005: £3.5 million (all valued at £1/kg).
These estimates for venison suggest a lower value for 1995 that the separate estimate of £3.5 million in TBFRA 2000.

14.3 Analysis and processing of national data

14.3.1 Estimation and forecasting

Christmas trees
The values for this table should be based on estimated wholesale prices. For 2005, a weighted average of the wholesale prices in original data gives an estimate of around £8 per tree. For 2000, the weighted average should have a higher proportion of Norway spruce, to give an estimate around £6.50 per tree. For 1990 any estimate is more speculative – perhaps around £5 per tree, as the proportion of Norway spruce was higher, and general inflation in the decade 1990-2000 totalled around 35%.

For products other than Christmas trees, venison and honey, no information was available about changes in values, so their total $ values for 2005 were assumed to be the same as in 2000.

14.4 Reclassification into FRA 2005 classes

The conversion to US $ uses end-year exchange rates, as specified in the FRA guidelines. These rates are (£/$): 1990=0.5187; 2000=0.6702; 2003 (use for 2005) 0.5603. Calculations for the main products are shown below.

For plant products - food (commercial collection only):
2000: £677,743 / 0.6702 = $1.0 million

For Christmas trees:
1990: 2.5 million trees x £5.00 / 0.5187 = $24 million
2000: 5.5 million trees x £6.50 / 0.6702 = $53 million
2005: 6.5 million trees x £8.00 / 0.5603 = $93 million

For honey:
2000: 122,000 kg x £4.40 / 0.6702 = $0.8 million
2005: 183,000 kg x £4.00 / 0.5603 = $1.3 million

For venison:
1990: £0.8 million / 0.5187 = $1.5 million
2000: £2.6 million / 0.6702 = $3.9 million
2005: £3.5 million / 0.5603 = $6.2 million

14.5 Data for National reporting table T14

FRA 2005 Categories	**Value of the of NWFP removed (1000 USD)**		
	1990	**2000**	**2005**
Plant products / raw material			
1. Food		1000	1000
2. Fodder		-	
3. Raw material for medicine and aromatic products		8	8
4. Raw material for colorants and dyes		?	
5. Raw material for utensils, handicrafts & construction			
6. Ornamental plants		6200	6200
6a Christmas trees	24000	53000	93000
7. Exudates			
8. Other plant products		225	225
Animal products / raw material			
9. Living animals			
10. Hides, skins and trophies			
11. Wild honey and bee-wax		800	1300
12. Bush meat	1500	3900	6200
13. Raw material for medicine			
14. Raw material for colorants			
15. Other edible animal products			
16. Other non-edible animal products			
TOTAL			

The total value of products identified in the table is around $65 million for 2000, mostly for Christmas trees. This omits non-commercial gathering of food products: it is limited to the commercial collection shown in original data.

Although there are more gaps for 1990 and 2005, the equivalent totals are likely to be around $30 million for 1990 and over $100 million for 2005. Most of the increase is for sales of Christmas trees.

14.6 Comments to National reporting table T14

Most figures represent prices paid to picker by manufacturer or wholesaler. Mark up to retail prices is usually ~100% and much higher for value added processing.

In addition to the value shown for commercial use of plant products, the speculative estimate for blackberries footnoted for Table 13, if valued at around £3/kg (the typical wholesale market price in 2004), would give additional total value of around £13 million. It could be argued that non-commercial collection should be valued at the (higher) retail price, because that is the price the individuals would otherwise have to pay. This is excluded from the table, because the estimate is speculative, and we have no estimates (even speculative) for other food products.

The price for tan bark is not known.

15 Table T15 – Employment in forestry

15.1 FRA 2005 Categories and definitions

Category	Definition
Primary production of goods	Employment in activities related to primary production of goods, like industrial roundwood, woodfuel and non-wood forest products.
Provision of services	Employment in activities directly related to services from forests and woodlands.
Unspecified forestry activities	Employment in unspecified forestry activities.

15.2 National data

15.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Forest Employment Surveys 1998/99, 1993/94 and 1988/89	M	All	All	

15.2.2 Classification and definitions

National class	Definition
Establishment	All activities involved in planting or assisting natural regeneration.
Maintenance	All activities involved in forest management, between establishment and harvesting.
Harvesting / extraction	All activities involved in harvesting and extraction to roadside, including production of timber from thinning operations, but excluding construction of forest roads.
Forest nurseries	Private sector and state nurseries that grow trees from seed.
Roads	Forest road/bridge construction or maintenance.
Other forest	Includes recreation and wildlife management.

15.2.3 Original data

GB employment FTEs

National class	1988/89	1993/94	1998/99
Establishment	4320	2770	2529
Maintenance	2245	3725	3364
Harvesting / extraction	10715	9290	4770
Forest nurseries	545	580	624
Roads		630	407
Other forest	1725	1735	982
Total forest	19550	18730	12676

15.3 Analysis and processing of national data

15.3.1 Estimation and forecasting

Estimate for 1990 = weighted average of 1988/89 and 1993/94
Estimate for 2000 = extrapolation from 1998/99, using annual rate of change
All figures increased by 3% to expand from GB to UK, then rounded to nearest thousand.

15.4 Reclassification into FRA 2005 classes

Primary production of goods = harvesting/extraction
Provision of services = other forest
Unspecified forestry activities = all other categories

15.5 Data for National reporting table T15

FRA 2005 Categories	**Employment (1000 person-years)**	
	1990	**2000**
Primary production of goods	10	4
Provision of services	2	1
Unspecified forestry activities	7	7
TOTAL	**19**	**12**

15.6 Comments to National reporting table T15

Excludes timber haulage, processing and non-forest (office work related to forestry, research, etc).

These figures include self-employment, because:
(a) the source used did not distinguish employees from self-employed, and
(b) the FRA definition of self-employed seems to be much more limited than the UK definition (e.g. FRA considers self-employed contractors to be employed), so any adjustment from totals on UK definition to employment on FRA definition would be relatively small.

16 Thematic reporting tables

The United Kingdom, as a member of the Ministerial Conference for the Protection of Forest in Europe (MCPFE), reports on Criteria and Indicators issues to this regional process. In order to avoid double reporting, the UK has not provided an additional report for FRA 2005 by thematic areas.

References

Forestry Commission websites:

- For UK/GB forestry statistics see www.forestry.gov.uk/statistics
- For UK Indicators of Sustainable Forestry see www.forestry.gov.uk/sfindicators
- For 1995-99 National Inventory of Woodland see www.forestry.gov.uk/inventory

Forestry Commission publications: (available through www.forestry.gov.uk/statistics)

- Forestry Statistics 2004, November 2004
- Forestry Facts & Figures 2004, September 2004 (and previous editions)
- British Timber Statistics 2003, August 2004
- Forest Employment Survey 1998-99, January 2001 (and previous reports)

International returns

- Annual FAO/UNECE/EU Joint Questionnaire (JQ) on Timber & Trade (formerly Timber Bulletin (TB) questionnaire), published by UNECE http://www.unece.org/trade/timber/
- Temperate & Boreal Forest Resources Assessment (TBFRA) 2000, UK return completed 1997-1998, published by UNECE on http://www.unece.org/trade/timber/
- EFISCEN study 2001 as part of European Forest Sector Outlook Studies (EFSOS) – see http://www.unece.org/trade/timber/
- State of Europe's Forests 2003 for Ministerial Conference on the Protection of Forests in Europe (MCPFE) http://www.mcpfe.org/publications/pdf/forests_2003.pdf
- Annual EU Economic Accounts for Forestry, published by Eurostat through New Cronos database.