



NATIONAL INVENTORY OF WOODLAND AND TREES



ENGLAND

County Report for

DURHAM



Forestry Commission

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Woodland Surveys Branch of Forest Research was responsible for carrying out the survey and analysing the data. A large number of Forestry Commission and contract staff were involved in the survey from its inception.

Preparation of the digital cartography for Durham was carried out by Graham Bull, Woodland Survey Officer, and Woodland GIS Officers Chris Brown, Robert Beck and Esther Whitton. Data processing and analysis was carried out by Woodland Data Officers Justin Gilbert and Shona Cameron.

The authors of this Report are Steve Smith (Head of Woodland Surveys) and Justin Gilbert (Woodland Data Officer) of Forest Research.

INTRODUCTION

This report presents the results for Durham from the Forestry Commission National Inventory of Woodland and Trees (NIWT).

The Inventory consists of two separate surveys -

- The Main Woodland Survey (MWS) covering woodlands of 2 hectares and over
- The Survey of Small Woodland and Trees (SSWT) covering Small Woods, Groups of Trees, Linear Features and Individual Trees.

BACKGROUND

Since 1924 the Forestry Commission has carried out a number of national woodland surveys at intervals of between 15 and 20 years. The previous survey was carried out between 1979 and 1982. With the statistics becoming increasingly out of date the Forestry Commission decided to undertake a new survey: the *National Inventory of Woodland and Trees*.

The survey fieldwork for Great Britain was completed in July 2000. Work began in Scotland in 1994, followed by Southern England, Wales and Northern England.

SURVEY METHODS

Main Woodland Survey

In England, Woodland Surveys derived a digital map of all woodland showing Interpreted Forest Types from 1:25 000 scale aerial photography. This provided the basis for the sampling.

The digital map gives the extent of all woodland over 2 hectares and this was updated as survey work progressed. The maps on pages 4-6 show: overall woodland cover; woodland by ownership; and woodland by Interpreted Forest Type, respectively. The total area of woodland was obtained from the digital map with ground sampling undertaken to evaluate a wide range of woodland information such as species, age and stocking.

From the digital map the area of each woodland was recorded and this information was used to determine the intensity at which any selected woodland would be sampled. The overall sampling scheme was as follows:

- 2.0ha - <100ha : every fifth wood
- 100ha - <500ha : two woods in five
- 500ha and larger : all woods

1 hectare square plots were used to sample the selected woodlands on the ground. This was a change of practice from all previous Census surveys, where whole woods have been selected for survey. For each of the three bands of woodland area a different sampling grid was used with the density of the squares being reduced as the woodlands increase in size. The overall aim was to sample 1% of the woodland in each size class.

Survey of Small Woodland and Trees_

The land area of England was stratified into coastal and inland 1 km x 1 km squares and a random sample of 1 km² plots were then selected, representing around 1% of the land area. 1:25 000 scale aerial photos were then used to identify features in each sample square. Each 1 km² was then divided into 16 parts, and two of these were selected at random for field data collection. Data was collected on Small Woodlands (0.10 - <2.00 ha), Linear Features, Groups and Individual Trees. The survey did not collect information from areas of developed land of 2 hectares or more.

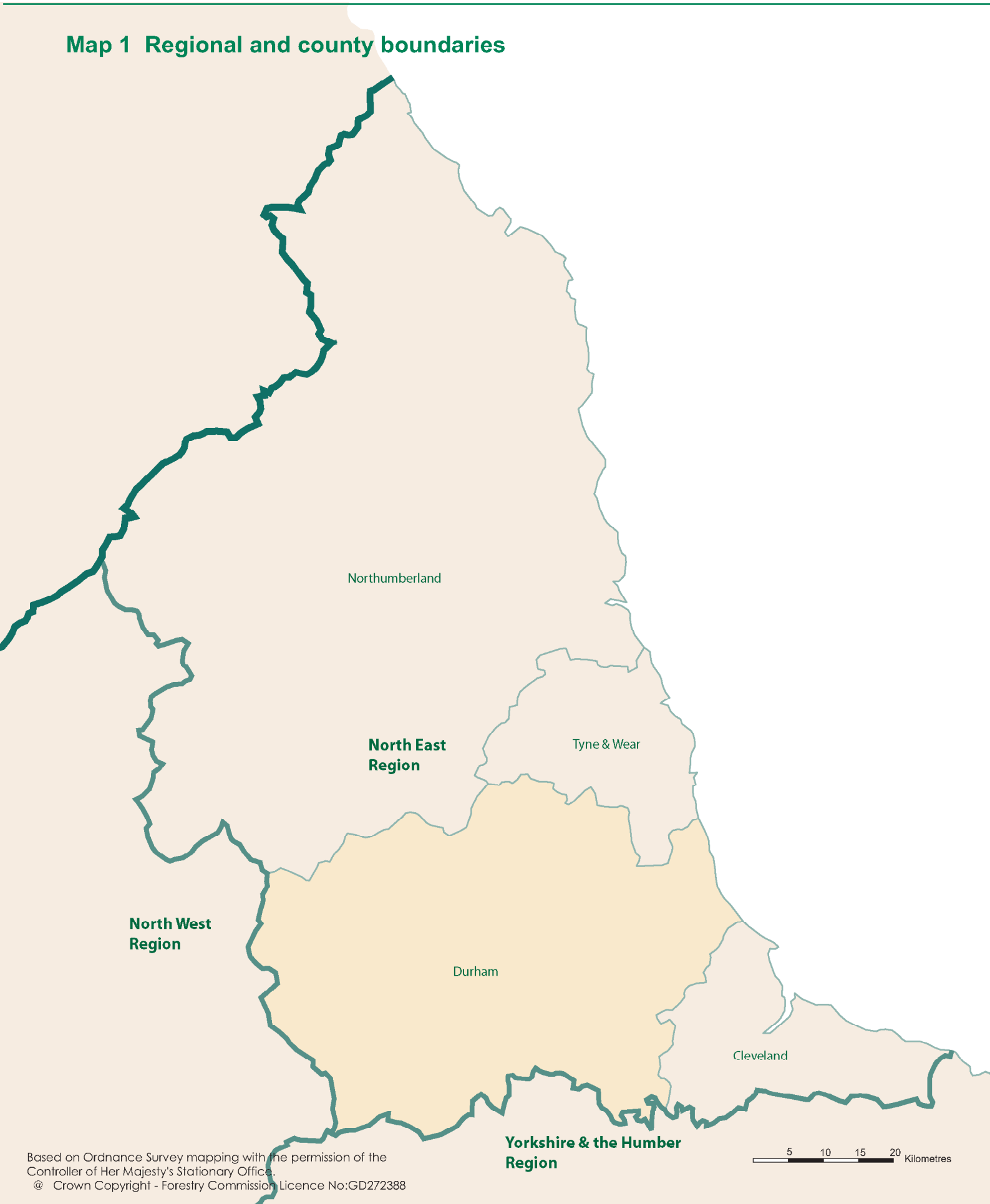
MAIN POINTS FROM THE SURVEY RESULTS

- The total area of woodland of 0.1 hectares and over in Durham is 15540 hectares. This represents 6.4% of the land area. (Table 1)
- Broadleaved woodland is the dominant forest type representing 46.2 % of all woodland. Conifer woodland represents 43.1 %, Mixed woodland 8.7 % and Open Space within woodlands 1.9 %. (Table 2)
- The main conifer species is sitka spruce covering 2584 hectares or 35 % of all conifer species. The main broadleaved species is oak covering 1813 hectares or 23.1 % of all broadleaved species. (Table 3)
- 2846 hectares or 19 % of woodland over 2 hectares is owned by or leased to the Forestry Commission, and 12258 hectares or 81 % of woodland is in Other ownership. (Table 6)
- There are a total of 905 woods over 2 ha within Durham with a mean wood area of 16.8 hectares. (Table 7a) There are a total of 291 woods from 0.1 - <2.0 hectares with a mean wood area of 1.5 hectares. (Table 14)
- There are 137.1 thousand live trees outside woodland in Durham. (Table 15)
- Woodland land cover increased by over 1606 hectares from 5.7 % to 6.4 % of the land area between 1980 and 1999. (Table 19)
- The area of broadleaves increased by 36 % between 1980 and 1999, with the relative proportion of broadleaves to conifers increasing from 43 % to 53 %. (Table 20)

INVENTORY REPORTS

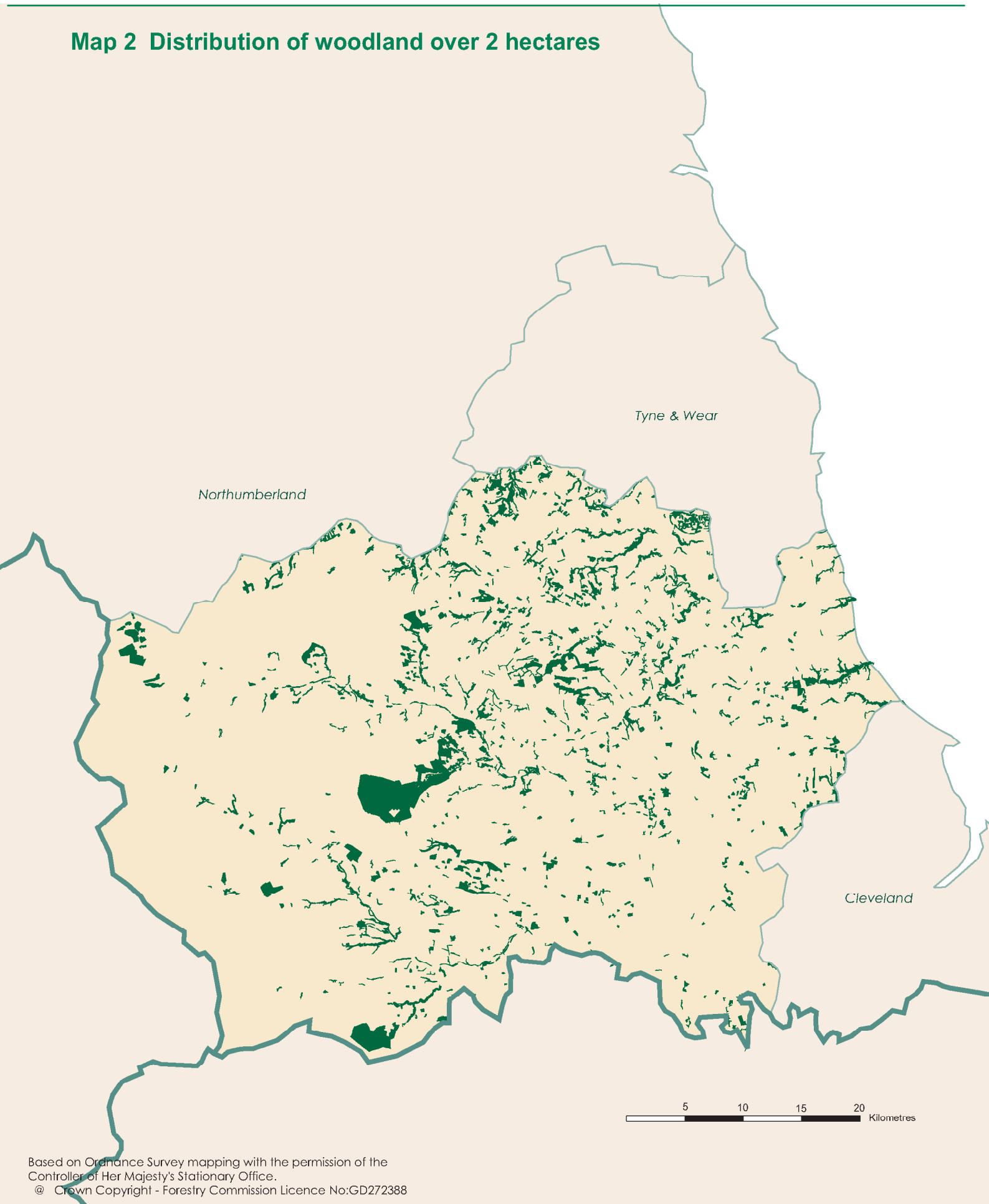
As well as this report for Durham, reports are available for the other counties in the region as shown on the map opposite. Also available are region and county reports for England as well as a report for the country as a whole. Wales and Scotland are also covered by reports.

Map 1 Regional and county boundaries



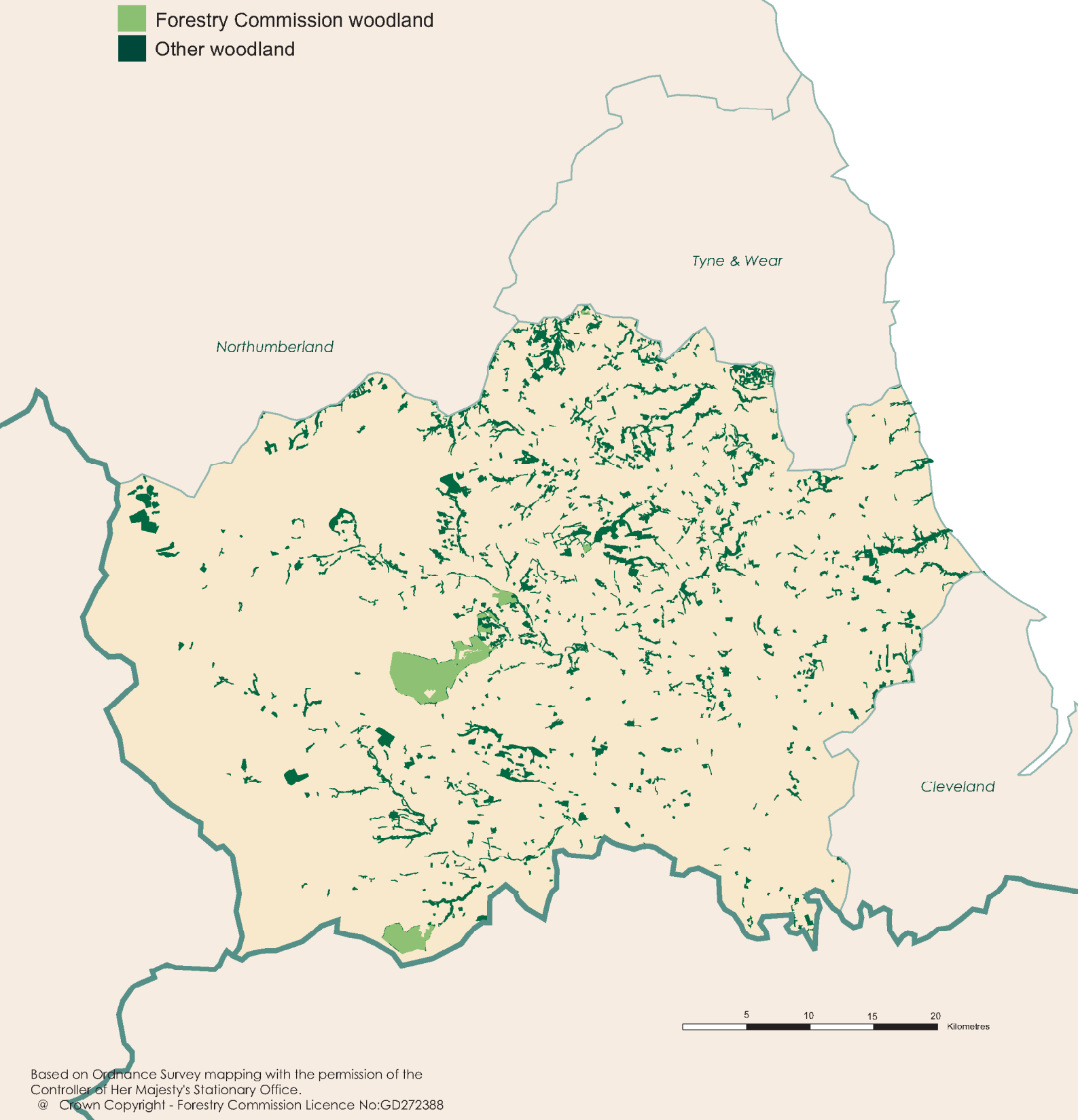
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Map 2 Distribution of woodland over 2 hectares

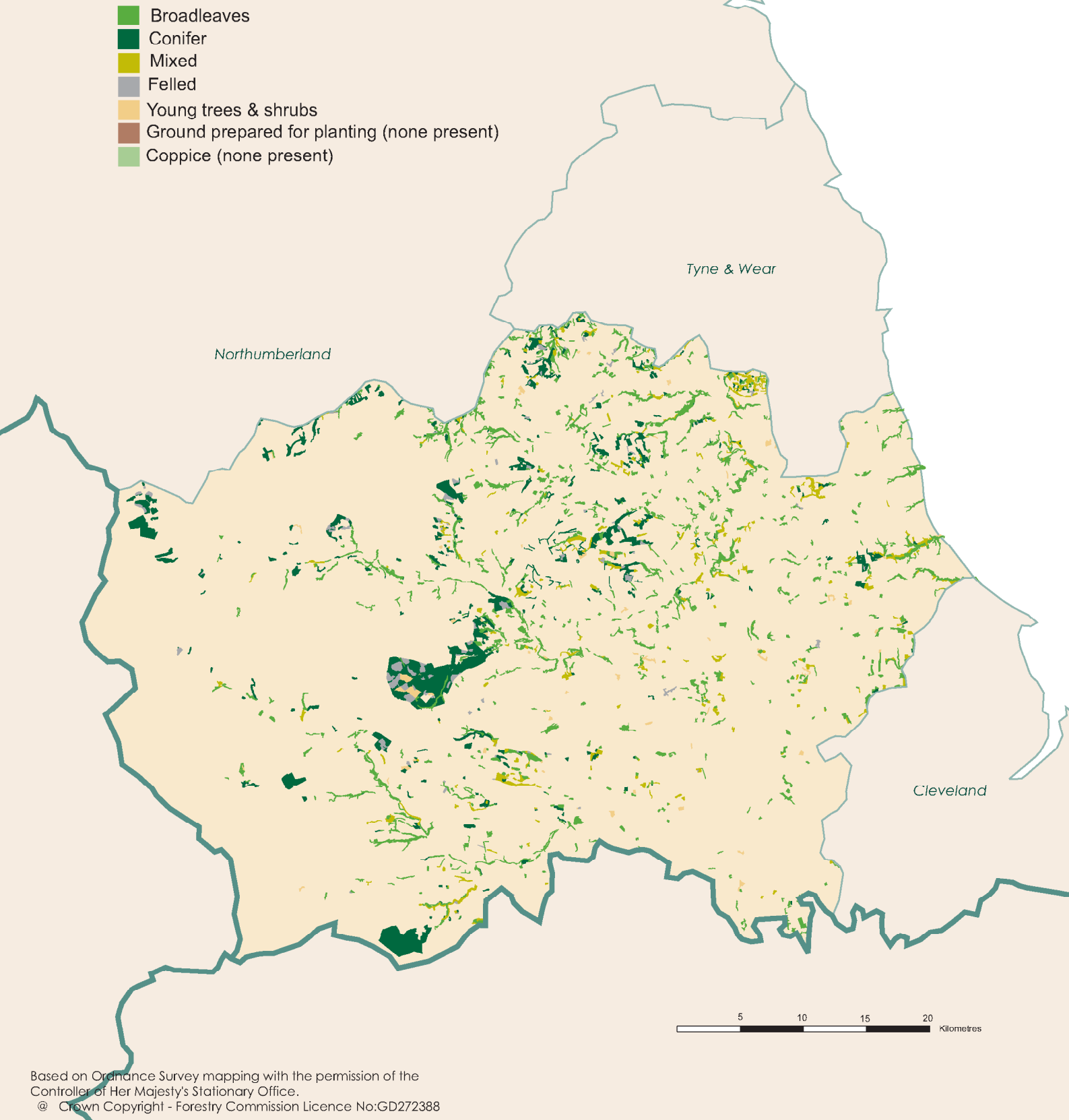


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Map 3 Distribution of woodland over 2 hectares by ownership



Map 4 Distribution of woodland over 2 hectares by Interpreted Forest Type



SUMMARY RESULTS FROM THE NATIONAL INVENTORY OF WOODLAND AND TREES (NIWT)

Both the Main Woodland Survey and the Survey of Small Woodland and Trees contributed to the estimate of woodland area for Durham.

Tables 1-3 show the combined woodland area from the Main Woodland Survey and the Survey of Small Woodland and Trees.

Tables 4 and 5 summarise the numbers of live trees outside woodland, and the lengths of Linear Features from the Survey of Small Woodland and Trees.

Table 1:	Woodland area by woodland size class
Table 2:	Woodland area by forest type and woodland size
Table 3:	Woodland area by principal species and woodland size
Table 4:	Numbers of live trees outside woodland by feature type
Table 5:	Lengths of Linear Features

Note: The figures in many of the tables may not add due to rounding

Table 1 Woodland area by woodland size class

Woodland size (ha)	Woodland area (ha)	% of Woodland area
2.00 and over	15,104	97.2
0.25 - < 2.00	436	2.8
0.10 - < 0.25	0	0.0
Total area of woodland	15,540	100.0
% Woodland land cover	6.4	

1. Area of Durham, including inland water, 242,907 ha based on digital boundaries used in the 1991 Census of Population

Table 2 Woodland area by forest type and woodland size

Forest type	Woodland size (ha)		Total area (ha)	Percentage of total area
	2.0 and over	0.1 - <2.0		
Conifer	6,266	436	6,702	43.1
Broadleaved	7,176	0	7,176	46.2
Mixed	1,347	0	1,347	8.7
Coppiced	0	0	0	0.0
Copp-w-standards	0	0	0	0.0
Windblow	0	0	0	0.0
Felled	19	0	19	0.1
Open Space	296	0	296	1.9
Total	15104	436	15,540	100

1. See Glossary for definitions of forest types.

Table 3 Woodland area by principal species and woodland size

Species/Groups	Woodland size (ha)		Total area (ha)	Percentage of total area	
	2.0 and over	0.1 -<2.0		Category*	Species**
Pine	2,424	80	2,504	33.9	16.4
Sitka spruce	2,409	175	2,584	35.0	17.0
Larch	1,134	73	1,207	16.3	7.9
Other conifers	981	0	981	13.3	6.4
Mixed conifers	6	102	108	1.5	0.7
Total conifers	6,953	430	7,383	100.0	48.5
Oak	1,813	0	1,813	23.1	11.9
Beech	1,103	0	1,103	14.1	7.2
Sycamore	1,265	0	1,265	16.1	8.3
Ash	1,133	0	1,133	14.4	7.4
Birch	1,405	7	1,412	18.0	9.3
Elm	5	0	5	0.1	0.0
Other broadleaves	975	0	975	12.4	6.4
Mixed broadleaves	136	0	136	1.7	0.9
Total broadleaves	7,836	7	7,843	100.0	51.5
Total all species***	14,789	436	15,226		100.0

*Category - species/group percentage of conifer or broadleaved category

**Species/group percentage of all species

***Excludes the 314ha of Coppice, Felled and Open space areas which were included in Table 2

1. The standard errors of the area estimates for woodland of 2 ha and over for the most common species or species groups are as follows

Conifers	9%
Broadleaves	6%
Pine	13%
Sitka spruce	14%
Oak	13%
2. Where the standard errors of these summary measures are 10% or less, the confidence intervals will be approximately symmetrical; the true value is expected to be within +/- one standard error for about 68% (or about two-thirds) of all cases, and within +/- two standard errors for about 95% of all cases. Where percentage standard errors are larger, e.g. for less common species or more variable species composition, the confidence intervals will be less symmetrical (and wider).

Table 4 Numbers of live trees outside woodland by feature type

Feature type	Total number of features	Total number of live trees	Mean number of trees per feature	Tree density (per sq km)
Groups	9,600	48,700	5	20
Narrow Linear Features	600	4,300	7	2
Individual Trees	84,700	84,700	1	35
Total		137,700		57

1. Land area used to calculate tree density 242,907ha based on digital boundaries used in 1991 Census of Population
2. The standard errors of the live tree number estimates for these feature types are:

Groups	51%
Narrow Linear Features	98%
Individual Trees	19%
3. Where the standard errors of these summary measures are 10% or less, the confidence intervals will be approximately symmetrical; the true value is expected to be within +/- one standard error for about 68% (or about two-thirds) of all cases, and within +/- two standard errors for about 95% of all cases. Where percentage standard errors are larger, e.g. for less common species or more variable species composition, the confidence intervals will be less symmetrical (and wider).
4. See Glossary for definitions of feature types.

Table 5 Lengths of Linear Features

Feature type	Total number of features	Total length of features (km)	Density of features (m per sq km)
Wide Linear Features	0	0	0
Narrow Linear Features	600	19	8
Total		19	8

1. Land area used to calculate feature density 242,907ha based on digital boundaries used in 1991 Census of Population
2. The standard errors of the length estimates for these feature types are:

Wide Linear Features	-
Narrow Linear Features	98%
3. Where the standard errors of these summary measures are 10% or less, the confidence intervals will be approximately symmetrical; the true value is expected to be within +/- one standard error for about 68% (or about two-thirds) of all cases, and within +/- two standard errors for about 95% of all cases. Where percentage standard errors are larger, e.g. for less common species or more variable species composition, the confidence intervals will be less symmetrical (and wider).
4. See Glossary for definitions of feature type.

RESULTS FROM THE MAIN WOODLAND SURVEY (MWS)

Survey Method

Woods were selected from the digital map of woodland of 2 hectares and over, then sampled using a random grid of 1 hectare sample plots. The density of sample plots was reduced as the sampled woodland increase in size, the general aim being to sample 1% of the woodland area. The ground sampling evaluated a wide range of data such as species, age and stocking.

Table 6:	Summary of woodland area by ownership
Chart:	Woodland area by ownership
Table 7a:	Size class distribution of woodland
Table 7b:	Size class distribution of woodland by ownership units
Table 8:	Area of woodland by forest type and ownership
Chart:	Area of woodland by forest type
Table 9a:	Area of High Forest by principal species and ownership
Graph:	Area of High Forest by principal species and ownership
Table 9b:	Area of High Forest by principal species, ownership and category
Graph:	High Forest Category 1
	Area by principal species and ownership
Graph:	High Forest Category 2
	Area by principal species and ownership
Table 10a:	High Forest Category 1
	Area by principal species and planting year class
Graph:	High Forest Category 1
	Area by planting year class
Table 10b:	High Forest Category 1
	Forestry Commission: area by principal species and planting year class
Graph:	High Forest Category 1
	Forestry Commission - area by planting year class
Table 10c:	High Forest Category 1
	Other ownership: area by principal species and planting year class
Graph:	High Forest Category 1
	Other ownership: area by planting year class
Table 11:	High Forest: principal species by planting year class
Table 12:	Ownership type by area and percentage
Chart:	Ownership type by area

Note: The figures in many of the tables may not add due to rounding

Table 6 Summary of woodland area by ownership

Ownership	ha	% woodland
Forestry Commission	2,846	19
Other	12,258	81
Total area of woodland	15,104	100

1. Woodland area from aerial photographic interpretation map updated to 31 March 1999
2. See Glossary for definitions of ownership types

Woodland area by ownership

■ Forestry Commission
■ Other ownership

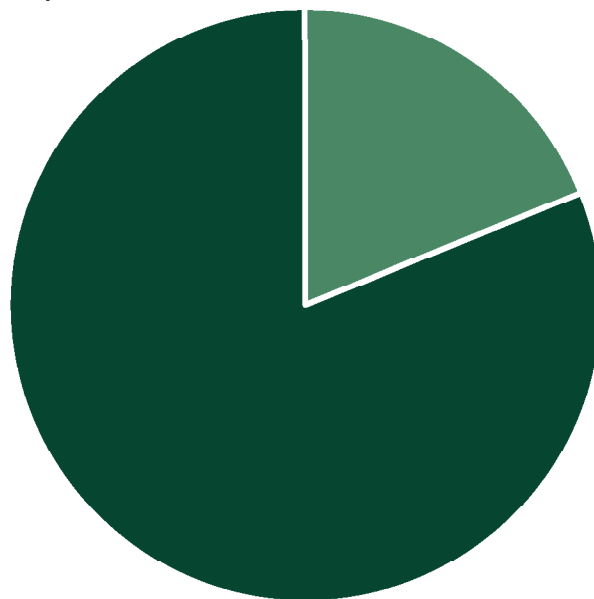


Table 7a Size class distribution of woodland

Size class (ha)	Number of woods	Total area (ha)	Percent of total area	Mean wood area (ha)
<10	644	2,735	18	4
10 - <20	133	1,840	12	14
20 - <50	79	2,415	16	31
50 - <100	27	1,969	13	73
<100	883	8,959	59	10
100 - <500	20	3,385	22	169
500 and >	2	2,815	19	1,407
All woods	905	15,159	100	17

Table 7b Size class distribution of woodland by ownership units

Size class (ha)	FC or Other	Number of woods	Total area (ha)	Percent of total area	Mean wood area (ha)
<10	FC	1	4	0	4
	O	655	2,766	18	4
10 - <20	FC	1	13	0	13
	O	136	1,876	12	14
20 - <50	FC	3	86	1	29
	O	81	2,477	16	31
50 - <100	FC	0	0	0	0
	O	28	2,028	13	72
<100	FC	5	102	1	21
	O	900	9,146	60	10
100 - <500	FC	1	146	1	146
	O	19	3,167	21	167
500 and >	FC	2	2,598	17	1,299
	O	0	0	0	0
Total	FC	8	2,846	19	356
	O	919	12,313	81	13

1. Table 7a and 7b are based solely on the digital woodland map. The other MWS tables are derived from the field sample data
2. The total area in Tables 7a and 7b is 55 hectares more than recorded in Table 6. This is mainly due to the field samples recording some land in other land uses not differentiated from woodland in the digital map
3. The data available from the digital map enable the identification of woodlands according to their ownerships, Forestry Commission or Other. The entries in table 7b cannot be added to derive table 7a as some woods may consist of both Forestry Commission and Other ownership(s)

For example, the Forestry Commission may own most of a large wood with some parts in Other ownership(s). In Table 7a the whole area would be treated as one wood and the area allocated to one size category. In Table 7b each of the ownership units would be allocated to the size category for that unit. Dividing woods by ownership can occasionally generate part woods of less than 2 hectares

Table 8 Area of woodland by forest type and ownership

Forest type	Forestry Commission		Other		All ownerships	
	ha	%	ha	%	ha	%
Conifer	2,239	78.7	4,027	32.9	6,266	41.5
Broadleaved	277	9.7	6,899	56.3	7,176	47.5
Mixed	209	7.3	1,138	9.3	1,347	8.9
Coppice	0	0.0	0	0.0	0	0.0
Copp-w-Stds	0	0.0	0	0.0	0	0.0
Windblow	0	0.0	0	0.0	0	0.0
Felled	19	0.7	0	0.0	19	0.1
Open Space	102	3.6	194	1.6	296	2.0
Total	2,846	100.0	12,258	100.0	15,104	100.0

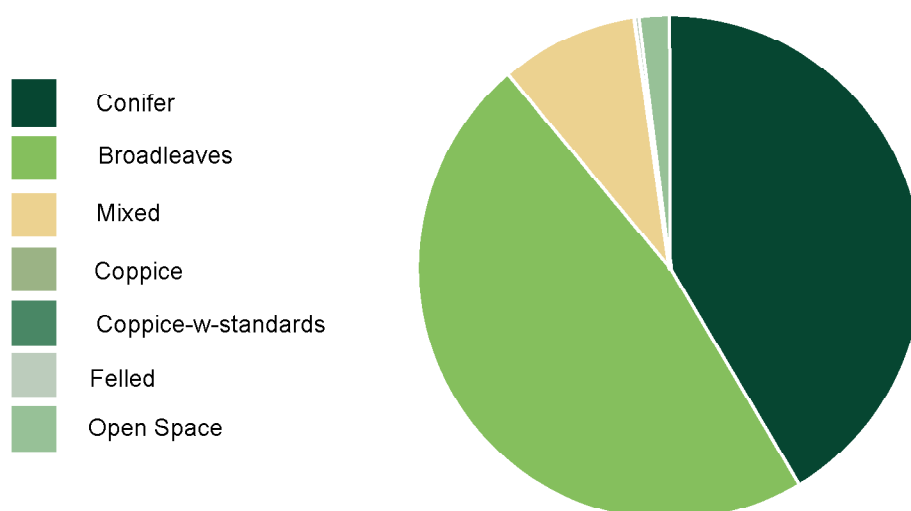
Area of woodland by forest type

Table 9a Area of High Forest by principal species and ownership

Species	Forestry Commission			Other			All ownerships		
	area (ha)	cat* %	spp** %	area (ha)	cat* %	spp** %	area (ha)	cat* %	spp** %
Scots pine	427	18	16	1,598	35	13	2,026	29	14
Corsican pine	0	0	0	170	4	1	170	2	1
Lodgepole pine	0	0	0	228	5	2	228	3	2
Sitka spruce	1,530	65	56	879	19	7	2,409	35	16
Norway spruce	19	1	1	563	12	5	583	8	4
European larch	19	1	1	403	9	3	423	6	3
Jap/Hybrid larch	185	8	7	526	11	4	711	10	5
Douglas fir	87	4	3	180	4	1	267	4	2
Other conifers	68	3	2	63	1	1	131	2	1
Mixed conifers	0	0	0	5	0	0	5	0	0
Total conifers	2,336	100	86	4,617	100	38	6,953	100	47
Oak	34	9	1	1,779	24	15	1,813	23	12
Beech	49	13	2	1,055	14	9	1,103	14	7
Sycamore	0	0	0	1,265	17	10	1,265	16	9
Ash	0	0	0	1,133	15	9	1,133	14	8
Birch	243	62	9	1,162	16	10	1,405	18	10
Poplar	0	0	0	8	0	0	8	0	0
Sweet chestnut	0	0	0	9	0	0	9	0	0
Elm	0	0	0	5	0	0	5	0	0
Other broadleaves	63	16	2	895	12	7	958	12	6
Mixed broadleaves	0	0	0	136	2	1	136	2	1
Total broadleaves	389	100	14	7,447	100	62	7,836	100	53
Total - all species	2,725		100	12,064		100	14,789		100
Felled	19			0			0		
Total High Forest	2,744			12,064			14,808		

*cat : species percentage of Conifer or Broadleaved in the ownership category

**spp : percentage of all species in the ownership category

1. In addition to the areas shown there are 296 ha of other areas integral to the woodland not stocked with tree species.
2. The standard errors of the all ownerships area estimates for the most common species or species groups are as follows;

Conifers	7%
Broadleaves	6%
Scots pine	15%
Sitka spruce	13%
Oak	13%
3. Mixtures: where possible the species in mixtures have been separately recorded. Where this has not been possible they were described as 'Mixed conifers' or 'Mixed broadleaves'.
4. Confidence Intervals: where the standard errors of these summary measures are 10% or less, the confidence intervals will be approximately symmetrical; the true value is expected to be within +/- one standard error for about 68% (or about two-thirds) of all cases, and within +/- two standard errors for about 95% of all cases. Where percentage standard errors are larger, e.g. for less common species or more variable species composition, the confidence intervals will be less symmetrical (and wider).

Area of High Forest by principal species and ownership

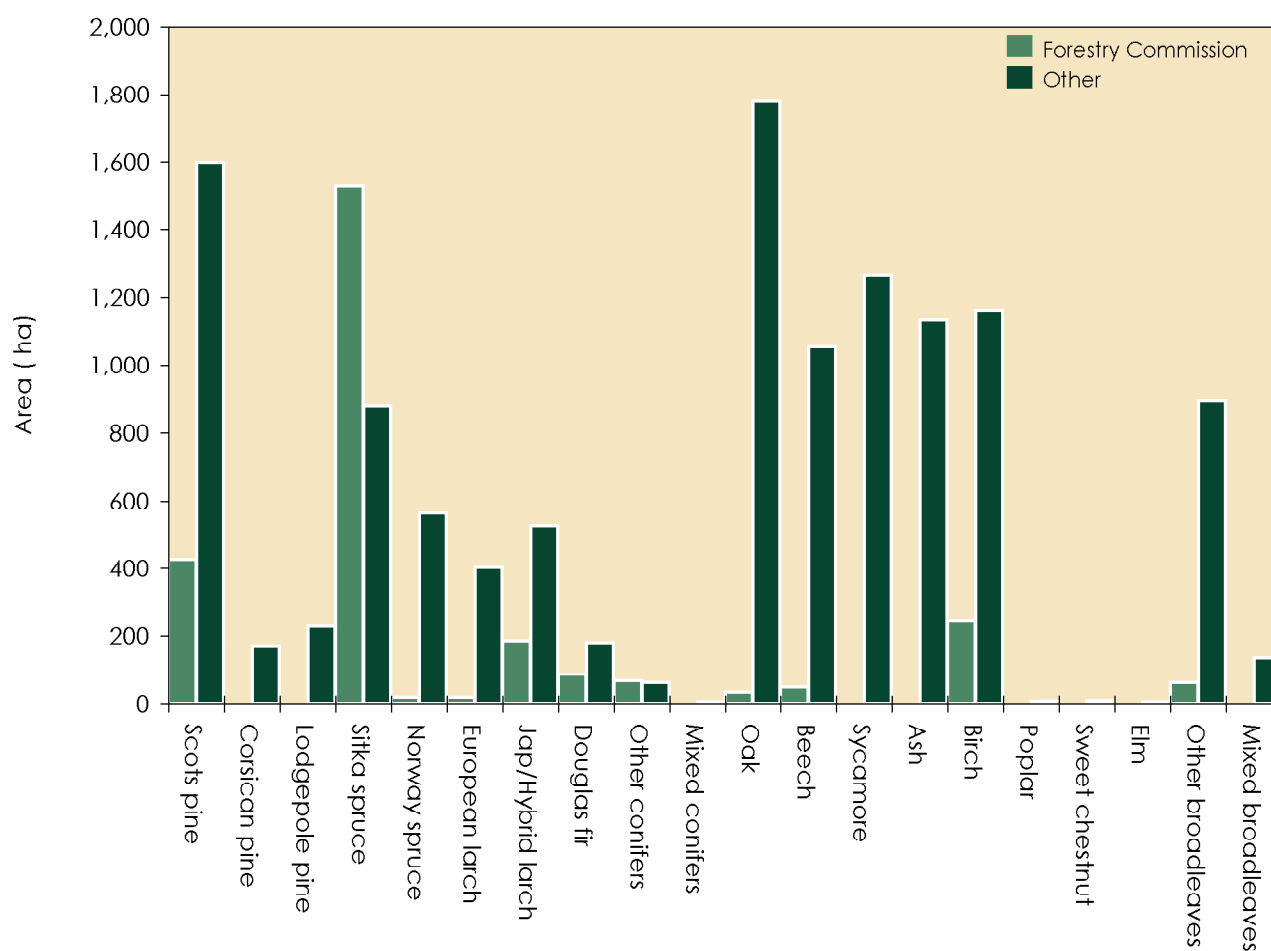


Table 9b Area of High Forest by principal species,ownership and category

Species	Forestry Commission			Other			All ownerships		
	cat. 1	cat. 2	Total (ha)	cat. 1	cat. 2	Total (ha)	cat. 1	cat. 2	Total (ha)
Scots pine	423	5	427	1,560	38	1,598	1,983	43	2,026
Corsican pine	0	0	0	170	0	170	170	0	170
Lodgepole pine	0	0	0	156	72	228	156	72	228
Sitka spruce	1,525	5	1,530	865	14	879	2,390	19	2,409
Norway spruce	19	0	19	558	5	563	577	5	583
European larch	19	0	19	393	10	403	412	10	423
Jap/Hybrid larch	185	0	185	526	0	526	711	0	711
Douglas fir	87	0	87	180	0	180	267	0	267
Other conifers	63	5	68	58	5	63	121	10	131
Mixed conifers	0	0	0	5	0	5	5	0	5
Total conifers	2,321	15	2,336	4,471	146	4,617	6,793	159	6,953
Oak	24	10	34	1,526	253	1,779	1,550	263	1,813
Beech	34	15	49	993	62	1,055	1,027	77	1,103
Sycamore	0	0	0	1,058	207	1,265	1,058	207	1,265
Ash	0	0	0	763	370	1,133	763	370	1,133
Birch	24	219	243	399	763	1,162	423	982	1,405
Poplar	0	0	0	8	0	8	8	0	8
Sweet chestnut	0	0	0	9	0	9	9	0	9
Elm	0	0	0	5	0	5	5	0	5
Other broadleaves	0	63	63	445	450	895	445	513	958
Mixed broadleaves	0	0	0	85	52	136	85	52	136
Total broadleaves	83	306	389	5,291	2,157	7,447	5,373	2,463	7,836
Total - all species	2,404	321	2,725	9,762	2,302	12,064	12,166	2,623	14,789

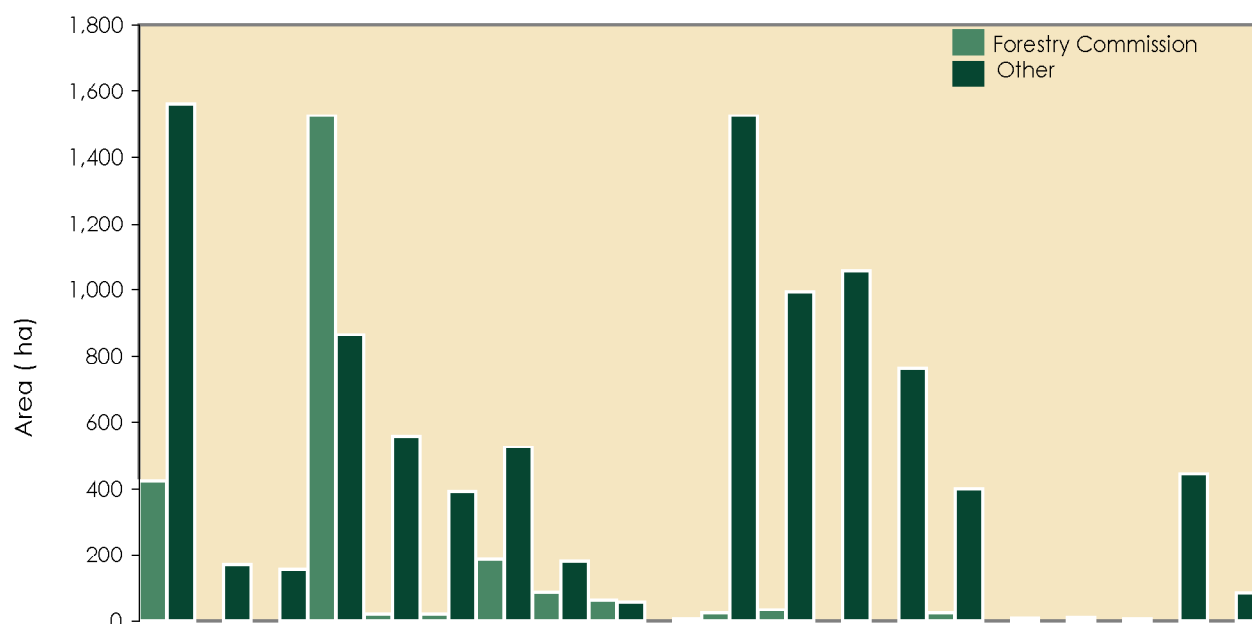
1. The standard errors of the all ownerships area estimates for the most common species or species groups (in all woodland types) are as follows

	Category 1*	Category 2*	Total High Forest	
Conifers	7%	31%	7%	
Broadleaves	8%	11%	6%	
Scots pine	15%	42%	15%	
Sitka spruce	13%	60%	13%	
Oak	15%	24%	13%	
				*See Glossary for category 1 and Category 2 descriptions

2. Where the standard errors of these summary measures are 10% or less, the confidence intervals will be approximately symmetrical; the true value is expected to be within +/- one standard error for about 68% (or about two-thirds) of all cases, and within +/- two standard errors for about 95% of all cases. Where percentage standard errors are larger, e.g. for less common species or more variable species composition, the confidence intervals will be less symmetrical (and wider).

3. Where possible the species in mixtures have been separately recorded. Where this has not been possible they were described as 'Mixed conifers' or 'Mixed broadleaves'.

High Forest Category 1 - Area by principal species and ownership



High Forest Category 2 - Area by principal species and ownership

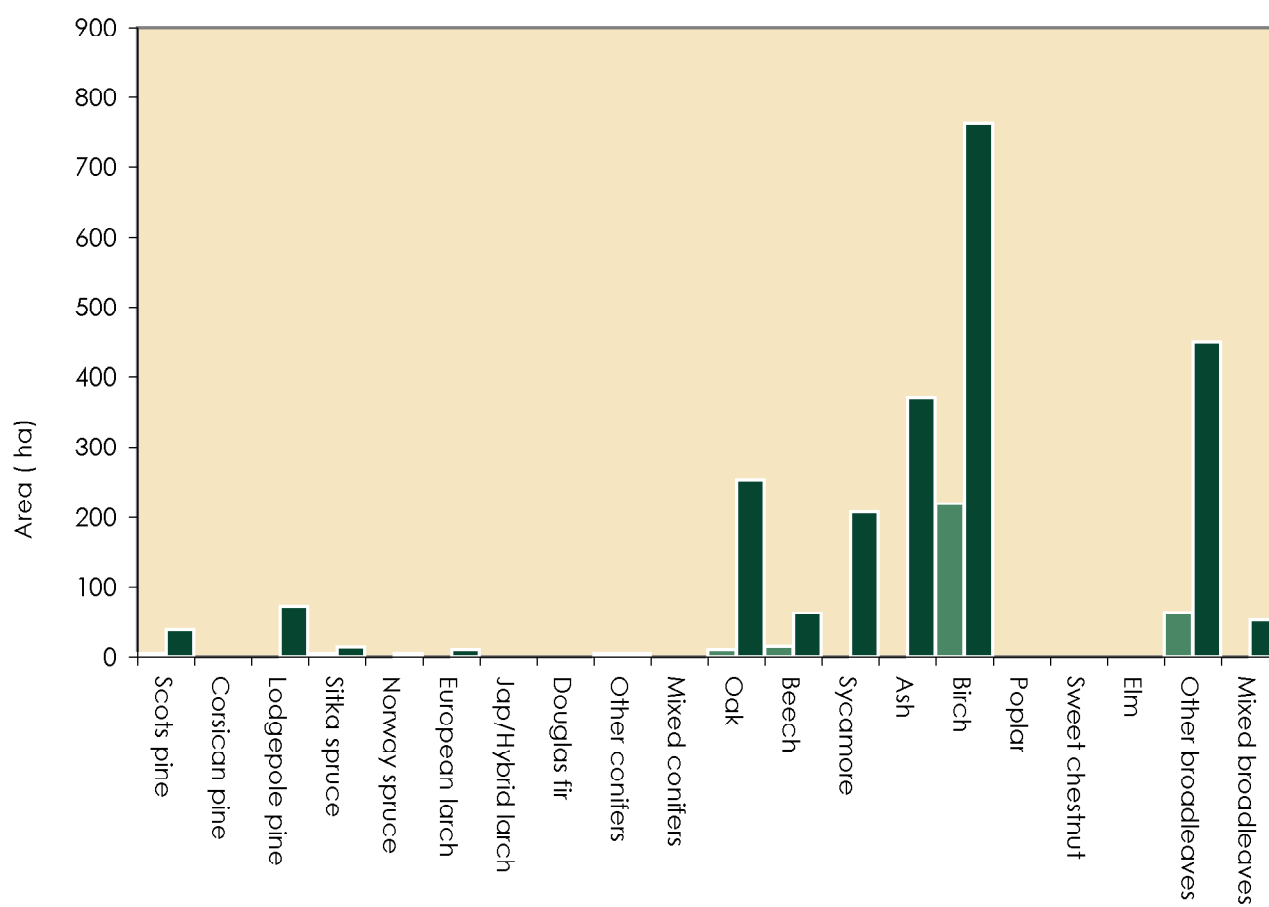
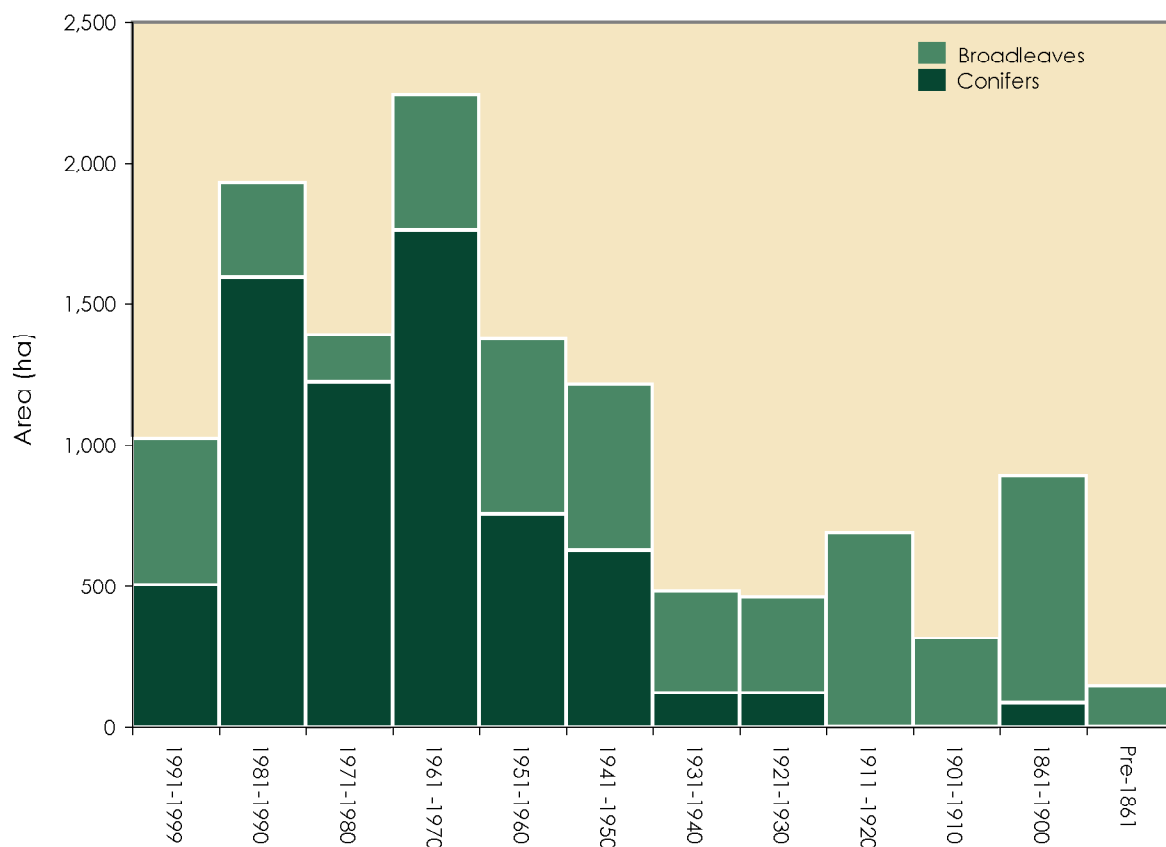


Table 10a High Forest Category 1 - Area by principal species and planting year class

Species	Planting year class*												Total (ha)
	1991-1999	1981-1990	1971-1980	1961-1970	1951-1960	1941-1950	1931-1940	1921-1930	1911-1920	1901-1910	1861-1900	Pre-1861	
Scots pine	87	407	370	459	233	354	62	0	0	0	9	0	1,983
Corsican pine	0	20	0	73	0	9	0	68	0	0	0	0	170
Lodgepole pine	0	19	0	50	88	0	0	0	0	0	0	0	156
Sitka spruce	360	898	485	438	57	97	0	0	0	0	54	0	2,390
Norway spruce	0	44	214	174	101	5	0	19	0	0	20	0	578
European larch	43	44	25	77	208	15	0	0	0	0	0	0	413
Jap/Hybrid larch	0	73	77	289	63	141	58	9	0	0	0	0	711
Douglas fir	14	49	0	175	5	0	0	25	0	0	0	0	267
Other conifers	0	43	54	24	0	0	0	0	0	0	0	0	121
Mixed conifers	0	0	0	0	0	5	0	0	0	0	0	0	5
Total conifers	504	1,594	1,224	1,760	756	627	121	121	0	0	83	0	6,793
Oak	159	45	0	0	10	155	102	102	329	147	496	5	1,551
Beech	0	5	5	21	157	48	68	127	224	52	218	102	1,027
Sycamore	166	38	107	160	140	168	165	39	0	10	43	20	1,058
Ash	49	99	9	127	193	61	5	25	122	5	49	20	763
Birch	28	39	19	93	69	123	5	0	0	49	0	0	424
Poplar	0	0	8	0	0	0	0	0	0	0	0	0	8
Sweet chestnut	0	0	0	0	0	9	0	0	0	0	0	0	9
Elm	5	0	0	0	0	0	0	0	0	0	0	0	5
Other broadleaves	110	97	14	73	34	0	9	43	9	54	0	0	445
Mixed broadleaves	4	10	5	10	15	24	5	5	5	0	0	0	85
Total broadleaves	521	333	168	484	619	589	360	341	689	316	806	147	5,373
Total - all species	1,026	1,929	1,392	2,244	1,375	1,216	481	463	689	316	888	147	12,166

*Age determined from records where these were available. Where records were not available or were clearly inaccurate age-class was assigned by reference to similar crops of known age in the locality.

High Forest Category 1 - Area by planting year class



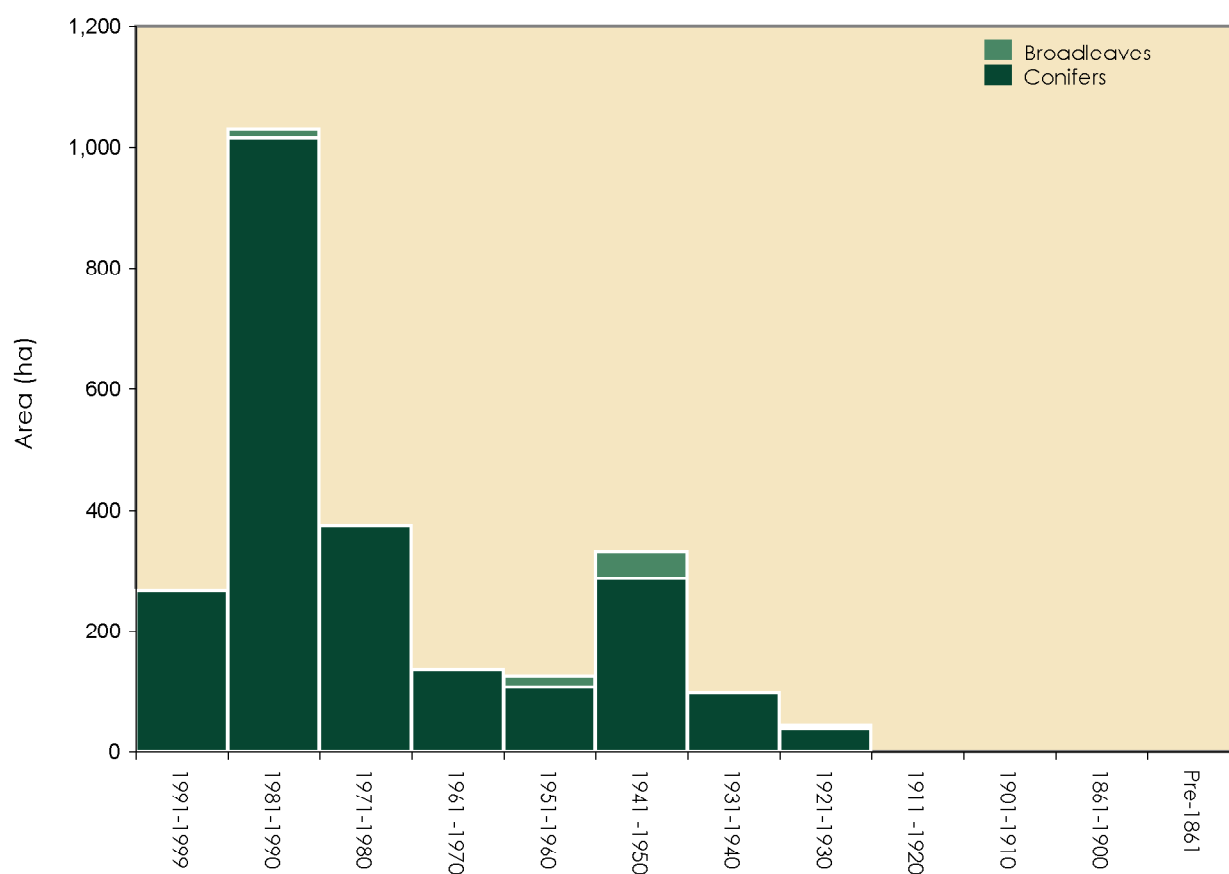
1. Most of the planting year classes cover 10 years, 1991-1999 is 9 years, and the classes prior to 1901 are 40 years or more.

Table 10b High Forest Category 1 - Forestry Commission : area by principal species and planting year classes

Species	Planting year class*												Total (ha)
	1991-1999	1981-1990	1971-1980	1961-1970	1951-1960	1941-1950	1931-1940	1921-1930	1911-1920	1901-1910	1861-1900	Pre-1861	
Scots pine	10	44	58	49	63	141	58	0	0	0	0	0	423
Corsican pine	0	0	0	0	0	0	0	0	0	0	0	0	0
Lodgepole pine	0	0	0	0	0	0	0	0	0	0	0	0	0
Sitka spruce	257	821	291	19	39	97	0	0	0	0	0	0	1,525
Norway spruce	0	0	0	0	0	0	0	19	0	0	0	0	19
European larch	0	10	0	0	0	10	0	0	0	0	0	0	19
Jap/Hybrid larch	0	53	24	29	0	39	39	0	0	0	0	0	185
Douglas fir	0	49	0	15	5	0	0	19	0	0	0	0	87
Other conifers	0	39	0	24	0	0	0	0	0	0	0	0	63
Mixed conifers	0	0	0	0	0	0	0	0	0	0	0	0	0
Total conifers	267	1,015	374	136	107	287	97	39	0	0	0	0	2,321
Oak	0	5	0	0	5	10	0	5	0	0	0	0	24
Beech	0	0	0	0	0	34	0	0	0	0	0	0	34
Sycamore	0	0	0	0	0	0	0	0	0	0	0	0	0
Ash	0	0	0	0	0	0	0	0	0	0	0	0	0
Birch	0	10	0	0	15	0	0	0	0	0	0	0	24
Poplar	0	0	0	0	0	0	0	0	0	0	0	0	0
Sweet chestnut	0	0	0	0	0	0	0	0	0	0	0	0	0
Elm	0	0	0	0	0	0	0	0	0	0	0	0	0
Other broadleaves	0	0	0	0	0	0	0	0	0	0	0	0	0
Mixed broadleaves	0	0	0	0	0	0	0	0	0	0	0	0	0
Total broadleaves	0	15	0	0	19	44	0	5	0	0	0	0	83
Total - all species	267	1,030	374	136	126	330	97	44	0	0	0	0	2,404

*Age determined from records where these were available. Where records were not available or were clearly inaccurate age-class was assigned by reference to similar crops of known age in the locality.

High Forest Category 1 - Forestry Commission: area by planting year class



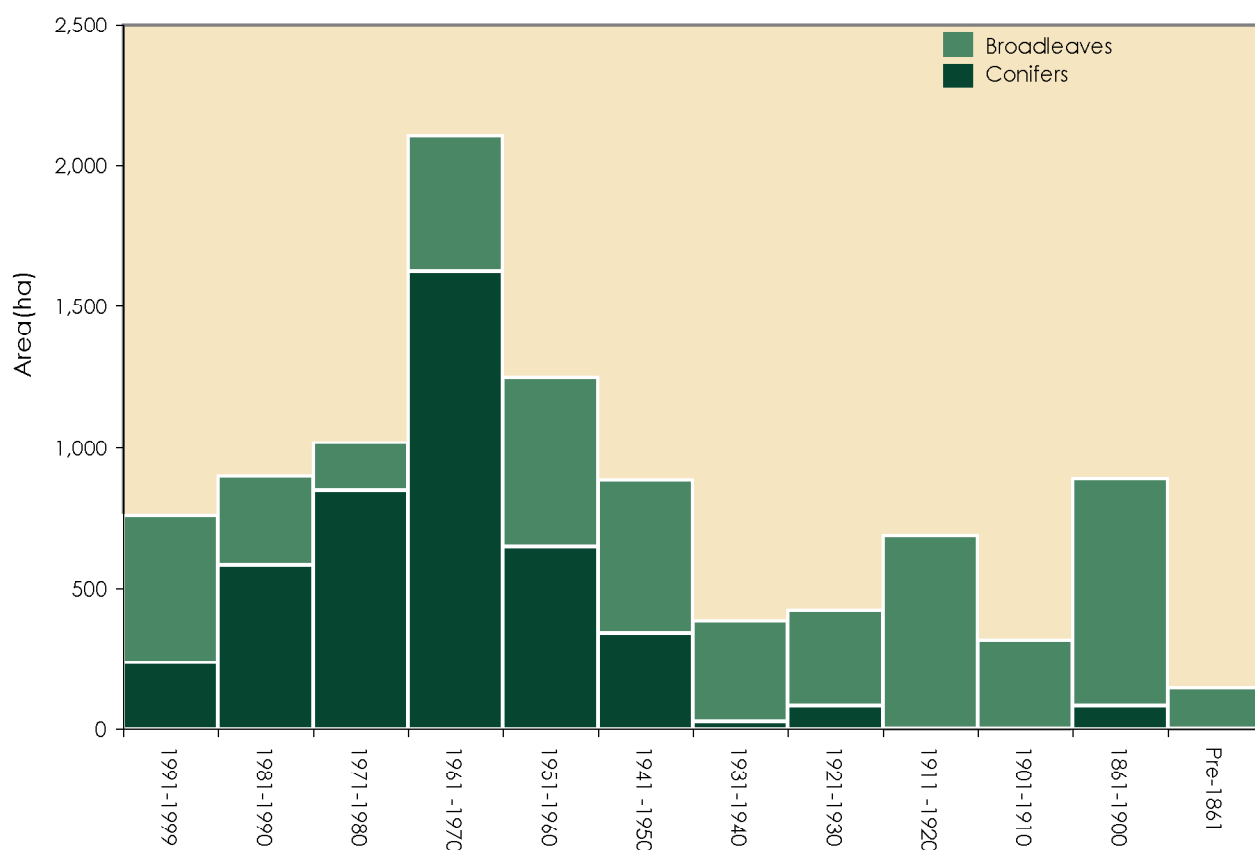
1. Most of the planting year classes cover 10 years, 1991-1999 is 9 years, and the classes prior to 1901 are 40 years or more.

Table 10c High Forest Category 1 - Other ownership: area by principal species and planting year classes

Species	Planting year class*												Total (ha)
	1991-1999	1981-1990	1971-1980	1961-1970	1951-1960	1941-1950	1931-1940	1921-1930	1911-1920	1901-1910	1861-1900	Pre-1861	
Scots pine	77	363	312	411	170	214	4	0	0	0	9	0	1,560
Corsican pine	0	20	0	73	0	9	0	68	0	0	0	0	170
Lodgepole pine	0	19	0	50	88	0	0	0	0	0	0	0	156
Sitka spruce	102	77	194	419	19	0	0	0	0	0	54	0	865
Norway spruce	0	44	214	174	101	5	0	0	0	0	20	0	558
European larch	43	34	25	77	208	5	0	0	0	0	0	0	393
Jap/Hybrid larch	0	20	53	260	63	102	20	9	0	0	0	0	526
Douglas fir	14	0	0	160	0	0	0	5	0	0	0	0	180
Other conifers	0	4	54	0	0	0	0	0	0	0	0	0	58
Mixed conifers	0	0	0	0	0	5	0	0	0	0	0	0	5
Total conifers	237	581	850	1,624	649	341	24	83	0	0	83	0	4,471
Oak	159	40	0	0	5	146	102	97	329	147	496	5	1,526
Beech	0	5	5	21	157	14	68	127	224	52	218	102	993
Sycamore	166	38	107	160	140	168	165	39	0	10	43	20	1,058
Ash	49	99	9	127	193	61	5	25	122	5	49	20	763
Birch	28	29	19	93	55	123	5	0	0	49	0	0	399
Poplar	0	0	8	0	0	0	0	0	0	0	0	0	8
Sweet chestnut	0	0	0	0	0	9	0	0	0	0	0	0	9
Elm	5	0	0	0	0	0	0	0	0	0	0	0	5
Other broadleaves	110	97	14	73	34	0	9	43	9	54	0	0	445
Mixed broadleaves	4	10	5	10	15	24	5	5	5	0	0	0	85
Total broadleaves	521	319	168	484	600	545	360	336	689	316	806	147	5,291
Total - all species	758	900	1,019	2,108	1,249	885	384	419	689	316	888	147	9,762

*Age determined from records where these were available. Where records were not available or were clearly inaccurate age-class was assigned by reference to similar crops of known age in the locality.

High Forest Category 1 - Other Ownership: area by planting year class



1. Most of the planting year classes cover 10 years, 1991-1999 is 9 years, and the classes prior to 1901 are 40 years or more.

Table 11 High Forest : principal species by planting year class

Planting year class	First	%	Second	%	Third	%
1991-99	Sitka spruce	33	Sycamore	15	Oak	15
1981-90	Sitka spruce	44	Scots pine	20	Other broadleaves	6
1971-80	Sitka spruce	31	Scots pine	24	Norway spruce	14
1961-70	Birch	20	Scots pine	16	Sitka spruce	15
1951-60	Ash	15	Birch	13	Scots pine	13
1941-50	Scots pine	25	Birch	14	Sycamore	13
1931-40	Sycamore	23	Oak	19	Ash	11
1921-30	Beech	21	Oak	21	Ash	13
1911-20	Oak	45	Beech	29	Ash	16
1901-10	Oak	47	Other broadleaves	15	Beech	15
1861-1900	Oak	56	Beech	22	Ash	7
Pre 1861	Beech	70	Sycamore / Ash	13	Oak	3
All years	Sitka spruce	16	Scots pine	14	Oak	12

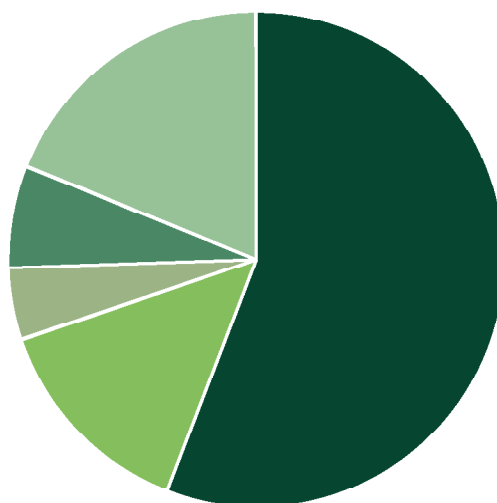
1. Principal species as a percentage of area in the planting year class.

Table 12 Ownership type* by area and percentage

Ownership type	Area (ha)	%
Personal	8,426	55.8
Business	2,122	14.0
Forestry or timber business	0	0.0
Charity	711	4.7
Local Authority	1,000	6.6
Other public (not FC)	0	0.0
Forestry Commission	2,846	18.8
Community ownership or common land	0	0.0
Unidentified	0	0.0
Total	15,104	100.0

* This table is produced from data contributed on a voluntary basis by owners or their representatives.

Ownership type by area



RESULTS FROM THE SURVEY OF SMALL WOODLAND AND TREES (SSWT)

Survey Method

The land area of England was stratified into coastal and inland 1 km x 1 km squares and a random sample of 1 km² plots were then selected, representing around 1% of the land area. 1:25 000 scale aerial photos were then used to identify features in each sample square. Each 1 km² was then divided into 16 parts, and two of these were selected at random for field data collection. Data was collected on Small Woodlands (0.10 - <2.00 ha), Linear Features, Groups and Individual Trees. The survey did not collect information from areas of developed land of 2 hectares or more.

Table 13:	Summary of information from the Survey of Small Woodland and Trees
Table 14:	Woodland area by feature type and woodland size
Table 15:	Numbers of live trees outside woodland by species and feature type
Table 16 :	Numbers of dead trees outside woodland by species and feature type
Table 17:	Numbers of live trees outside woodland by species and height band
Table 18:	Numbers of Groups by group size

Note: The figures in many of the tables may not add due to rounding

Table 13 Summary of information from the Survey of Small Woodlands and Trees

Feature type	Number of features	Total	Unit
Small Woods	291	436	Area (ha)
Wide Linear Features	0	0	Area (ha)
Wide Linear Features	0	0	Length (Km)
Narrow Linear Features	600	19	Length (Km)
Narrow Linear Features	600	4,300	Number of live trees
Groups	9,600	48,700	Number of live trees
Individual Trees	84,700	84,700	Number of live trees

1. See Glossary for definitions of feature types.

Table 14 Woodland area by feature type and woodland size

Feature type	Woodland size (ha)		Total area (ha)	Number of features	Mean size (ha)
	0.1 - <0.25	0.25 - <2.0			
Small Woods	0	436	436	291	1.50
Wide Linear Features	0	0	0	0	0.00
Total	0	436	436	291	1.50

1. See Glossary for definitions of feature types.

Species	Feature type				Total live trees	Percent of total trees	
	Boundary Trees	Middle Trees	Groups	Narrow Linear Features		Category	Species
Pine	0.4	0.4	0.0	0.0	0.8	16.7	0.6
Spruce	0.0	0.0	4.0	0.0	4.0	83.3	2.9
Larch	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cypress	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other conifers	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total conifers	0.4	0.4	4.0	0.0	4.8	100.0	3.5
Oak	12.0	3.2	0.0	0.0	15.2	11.4	11.0
Beech	0.8	0.0	2.4	0.0	3.2	2.4	2.3
Sycamore	7.2	2.4	7.2	2.5	19.3	14.5	14.0
Ash	32.0	4.8	20.8	1.9	59.5	44.7	43.2
Birch	0.0	0.0	1.6	0.0	1.6	1.2	1.2
Poplar	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sweet chestnut	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Horse chestnut	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alder	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lime	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Elm	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Willow	0.0	1.6	0.0	0.0	1.6	1.2	1.2
Other broadleaves	14.8	5.2	12.8	0.0	32.8	24.6	23.8
Total broadleaves	66.8	17.2	44.8	4.3	133.2	100.0	96.7
Total - all species	67.2	17.6	48.8	4.3	137.7		100.0

- Percentages

Category : species percentage of conifer or broadleaved.
Species : percentage of all species.
- The standard errors of the total tree number estimates for these feature types are:

Individual Trees	19%
Groups	51%
Narrow Linear Features	98%
- See Glossary for definitions of feature types.

Table 16 Numbers of dead trees outside woodland by species and feature type (000's trees)

Species	Feature type				Total dead trees	Percent of total trees	
	Boundary Trees	Middle Trees	Groups	Narrow Linear Features		Category	Species
Pine	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spruce	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Larch	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cypress	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other conifers	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total conifers	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oak	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beech	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sycamore	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ash	0.0	0.8	0.0	0.0	0.8	100.0	100.0
Birch	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Poplar	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sweet chestnut	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Horse chestnut	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alder	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lime	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Elm	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Willow	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other broadleaves	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total broadleaves	0.0	0.8	0.0	0.0	0.8	100.0	100.0
Total - all species	0.0	0.8	0.0	0.0	0.8		100.0

1. See Glossary for definitions of feature types.

Table 17 Numbers of live trees outside woodland by species and height band (000's trees)

Species	Height band (m)				Total live trees
	2-5	5-15	15-20	>20	
Pine	0.8	0.0	0.0	0.0	0.8
Spruce	4.0	0.0	0.0	0.0	4.0
Larch	0.0	0.0	0.0	0.0	0.0
Cypress	0.0	0.0	0.0	0.0	0.0
Other conifers	0.0	0.0	0.0	0.0	0.0
Total conifers	4.8	0.0	0.0	0.0	4.8
Oak	0.0	14.4	0.8	0.0	15.2
Beech	0.0	3.2	0.0	0.0	3.2
Sycamore	8.0	8.6	2.7	0.0	19.3
Ash	25.6	30.4	3.5	0.0	59.5
Birch	1.6	0.0	0.0	0.0	1.6
Poplar	0.0	0.0	0.0	0.0	0.0
Sweet chestnut	0.0	0.0	0.0	0.0	0.0
Horse chestnut	0.0	0.0	0.0	0.0	0.0
Alder	0.0	0.0	0.0	0.0	0.0
Lime	0.0	0.0	0.0	0.0	0.0
Elm	0.0	0.0	0.0	0.0	0.0
Willow	0.0	1.6	0.0	0.0	1.6
Other broadleaves	29.6	3.2	0.0	0.0	32.8
Total broadleaves	64.8	61.4	6.9	0.0	133.2
Total - all species	69.5	61.4	6.9	0.0	137.7

Table 18 Number of Groups by group size

Number of trees per Group*	Number of Groups (000's)
2	2
3-5	5
6-10	0
11-20	3
21-50	0
51-100	0
>100	0
Total	10

*The size of the group is determined by the total number of trees, live plus dead.

COMPARISON OF RESULTS WITH THE 1980 CENSUS AND PREVIOUS SURVEYS

Survey Method

The 1980 Census and 1999 Inventory were undertaken using very different sampling methods.

Inventory practice and technology have moved on since the 1980 Census; this has led to changes in sampling methodology, scope and woodland definitions. For example, the Main Woodland Survey used the digital woodland map, created from aerial photos as a basis for sampling whereas the 1980 Census relied only on the woodland shown on the 1:50,000 Ordnance Survey map. Also in contrast to the 1980 Census, the Survey of Small Woodland and Trees did not record information within developed land e.g. residential or industrial areas of 2 or more hectares.

Where possible adjustments have been made to both the 1980 Census and the Inventory to achieve the nearest available comparison. The apparent changes indicated in the following tables and charts should therefore be treated with caution, particularly where areas are small.

Table 19:	Comparison of woodland area between 1980 Census and 1999 Inventory
Table 20:	Comparison of High Forest area by species between 1980 Census and 1999 Inventory
Chart:	Comparison of High Forest area by species between 1980 Census and 1999 Inventory
Table 21:	Comparison of High Forest Category 1 area by planting year class between 1980 Census and 1999 Inventory
Chart:	Comparison of High Forest Category 1 area by planting year class between 1980 Census and 1999 Inventory
Table 22:	Comparison of numbers of live trees outside woodland between 1980 Census and 1999 Inventory
Table 23:	Comparison of density of non-woodland features between 1980 Census and 1999 Inventory

Woodland cover

Chart	Change in woodland cover through time (1890 – 2000)
Maps:	Woodland by county through time (1895 – 1998)

Note: The figures in many of the tables may not add due to rounding

Table 19 Comparison of woodland area between 1980 Census and 1999 Inventory

Woodland size (ha)	1980 Census woodland area		1999 Inventory woodland area		Change (%)
	(ha)	(%)	(ha)	(%)	(%)
2.0 or more	12,840	92.1	15,104	97.2	18
0.25 - <2.0	1,094	7.9	436	2.8	-60
Total	13,934		15,540		12
% Woodland land cover	5.7		6.4		

1. Differences in sampling methodology may account for some of the apparent differences.
2. The above figures from the 1999 Inventory exclude woodland between 0.1 and <0.25 ha, thereby matching the scope of the 1980 Census. The 1999 figures above will therefore not match those in the previous sections of the report.
3. Land area used to calculate woodland cover percent (1999), 242,907 ha, was based on the 1991 Census of Population digital boundaries.
4. Land area used to calculate woodland cover percent (1980), 243,591 ha, (Ordnance Survey data)

Table 20 Comparison of High Forest area by species between 1980 Census and 1999 Inventory

Species	1980 Census woodland area (ha)	1999 Inventory woodland area (ha)	Change (%)
Scots pine	2,269	2,106	-7
Corsican pine	192	170	-12
Lodgepole pine	239	228	-5
Sitka spruce	2,354	2,584	10
Norway spruce	720	583	-19
European larch	664	423	-36
Jap/Hybrid larch	665	784	18
Douglas fir	142	267	88
Other conifers	70	131	88
Mixed conifers	408	107	-74
Total conifers	7,724	7,383	-4
Oak	926	1,813	96
Beech	432	1,103	156
Sycamore	1,210	1,265	5
Ash	420	1,133	170
Birch	811	1,412	74
Poplar	87	8	-91
Sweet chestnut	0	9	-
Elm	216	5	-98
Other broadleaves	487	958	97
Mixed broadleaves	1,185	136	-89
Total broadleaves	5,773	7,842	36
Total all species	13,498	15,225	13
Felled	173	19	-89
Total High Forest	13,670	15,244	12

1. Differences in sampling methodology may account for some of the apparent differences.
2. In the 1980 Census the areas assigned to species included any associated open space such as roads and rides. In the Inventory open spaces are separately identified and the overall proportion is 1.9% (Table 2). To obtain meaningful comparisons between the two datasets the 1980 Census data have therefore been reduced by 1.9%.
3. The above figures from the 1999 Inventory exclude woodland between 0.1 and <0.25 ha, thereby matching the scope of the 1980 Census. The 1999 figures above will therefore not match those in the previous sections of the report.
4. The 1980 figures include scrub to enable comparison

Comparison of High Forest area by species between 1980 Census and 1999 Inventory

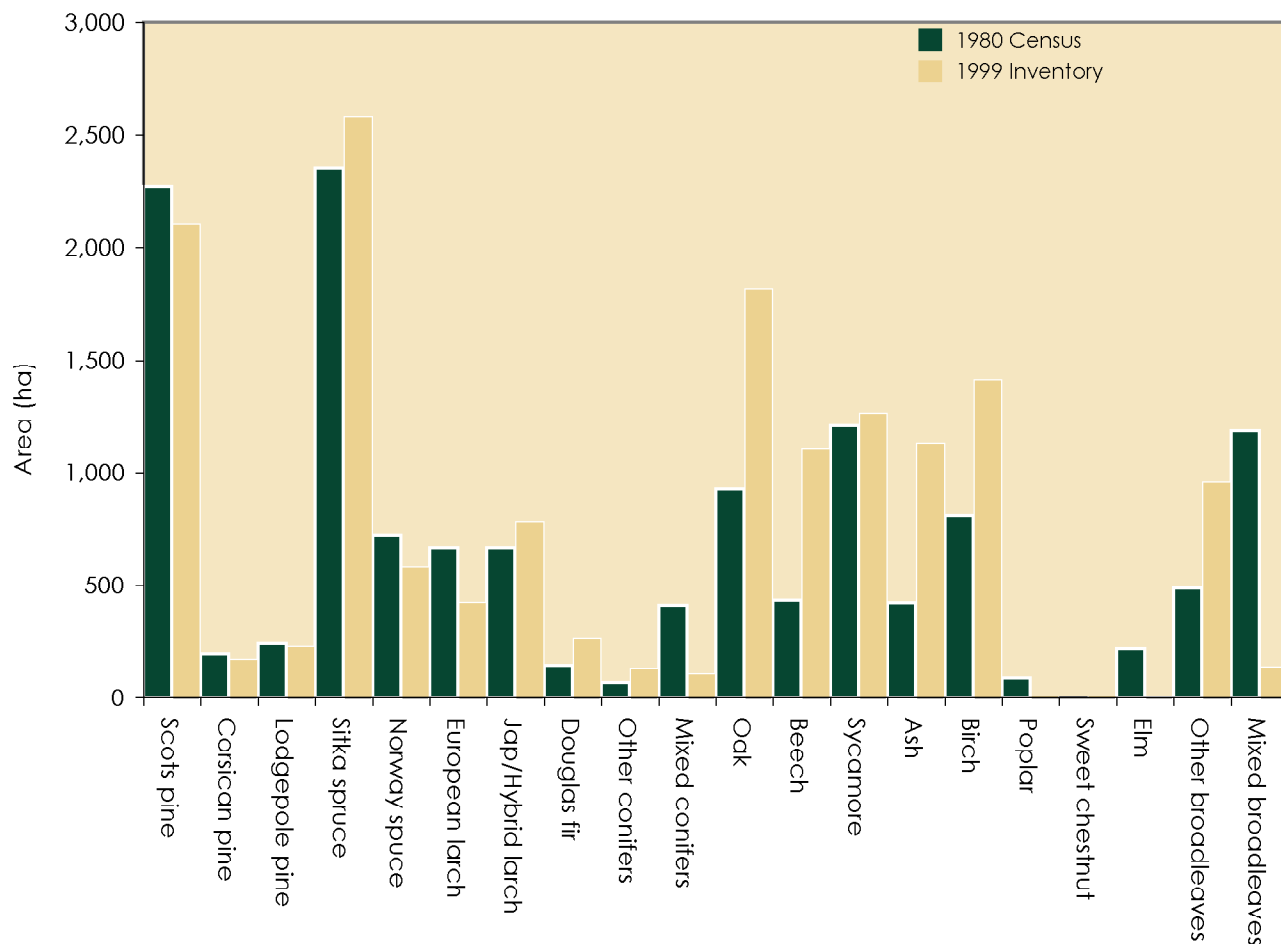


Table 21 Comparison of High Forest Category 1 area by planting year class
between 1980 Census and 1999 Inventory

Planting year class	1980 Census woodland area (ha)	1999 Inventory woodland area (ha)	Change (%)
1991-1999	0	1,025	see note
1981-1990	0	2,104	see note
1971-1980	1,080	1,392	29
1961-1970	1,886	2,251	19
1951-1960	2,129	1,630	-23
1941-1950	2,086	1,216	-42
1931-1940	1,197	481	-60
1921-1930	1,618	462	-71
1911-1920	490	689	41
1901-1910	384	316	-18
1861-1900	1,911	889	-53
Pre 1861	130	147	13
Total all years	12,910	12,602	-2

1. The first two classes, 1991-1999 and 1981-1990, cover the period since the 1980 Census and no comparison is therefore available.
2. The definition of High Forest Category 1 in the Inventory does not fully coincide with High Forest as defined in the 1980 Census.

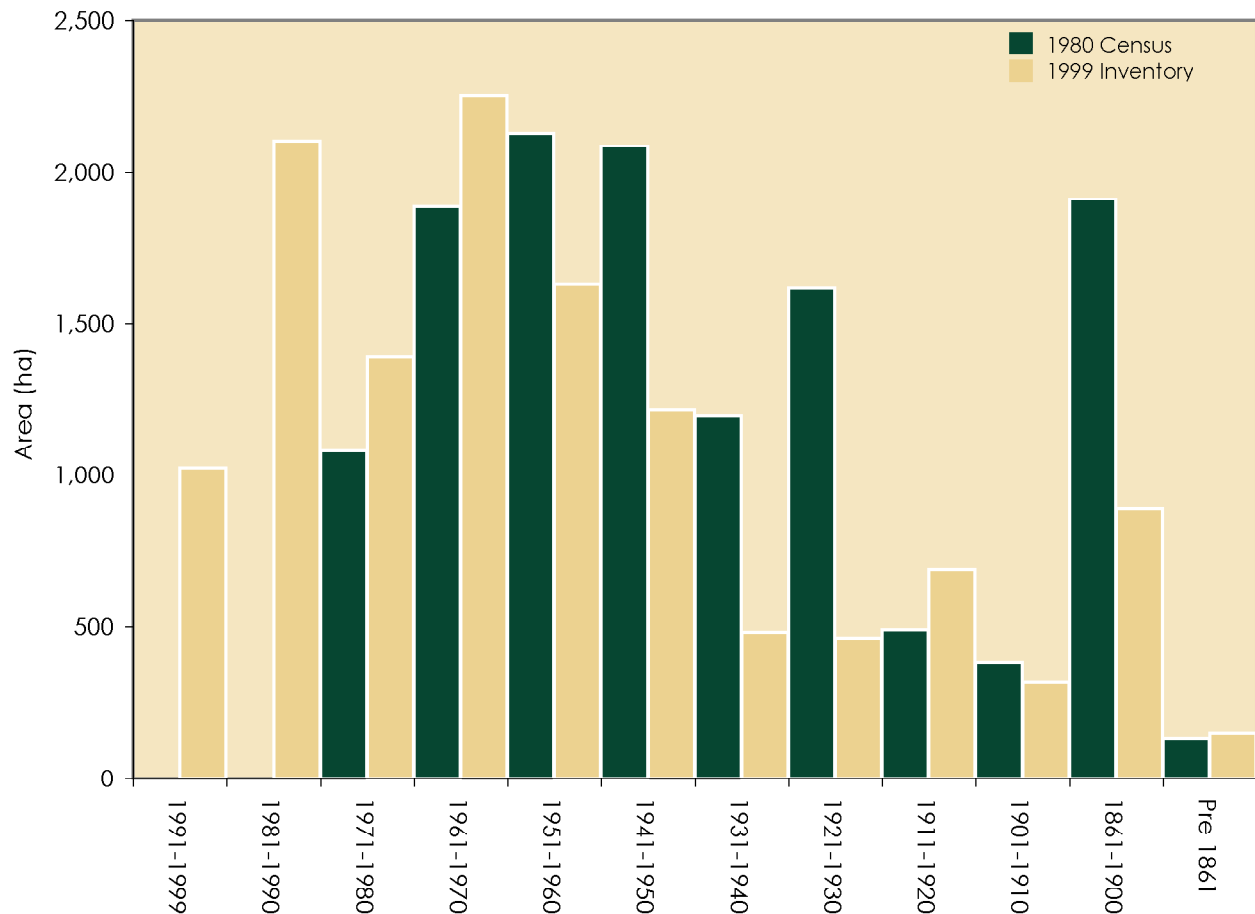
Comparison of High Forest Category 1 area by planting year class between 1980 Census and 1999 Inventory

Table 22 Comparison of numbers of live trees outside woodland
between 1980 Census and 1999 Inventory (000's)

Feature type	1980 Census	1999 Inventory	Change (%)
Boundary Tree	66	55	-16
Middle Tree	41	16	-62
Total Individual Trees	107	71	-34
Groups	59	40	-32
Linear Features	87	4	-95
Total	253	115	-54

1. The Survey of Small Woodland and Trees did not record information referring to tree features (I.e. Individual trees, Groups and Narrow Linear Features) within developed land.
2. In the 1980 Census hazel, hawthorn, blackthorn and goat willow were excluded, the 1999 Inventory figures have been adjusted accordingly.
The 1999 figures above will therefore not match those in the previous sections of the report.
3. Changes stated in this table are indicative only. Even with adjustments to the 1999 Inventory, the two surveys are not directly comparable - 1980 used 7cm diameter at breast height, and 1999 used 2m height, as minimum criteria for inclusion.
4. See Glossary for definitions of feature type.

Table 23 Comparison of density of non-woodland features between 1980
Census and 1998 Inventory

Feature type	1980 Census	1999 Inventory	Change (%)
Individual Trees (per sq km)	43.9	29.3	-33
Groups (per sq km)	8.0	4.0	-50
Linear Features (m per sq km)	160.0	7.6	-95

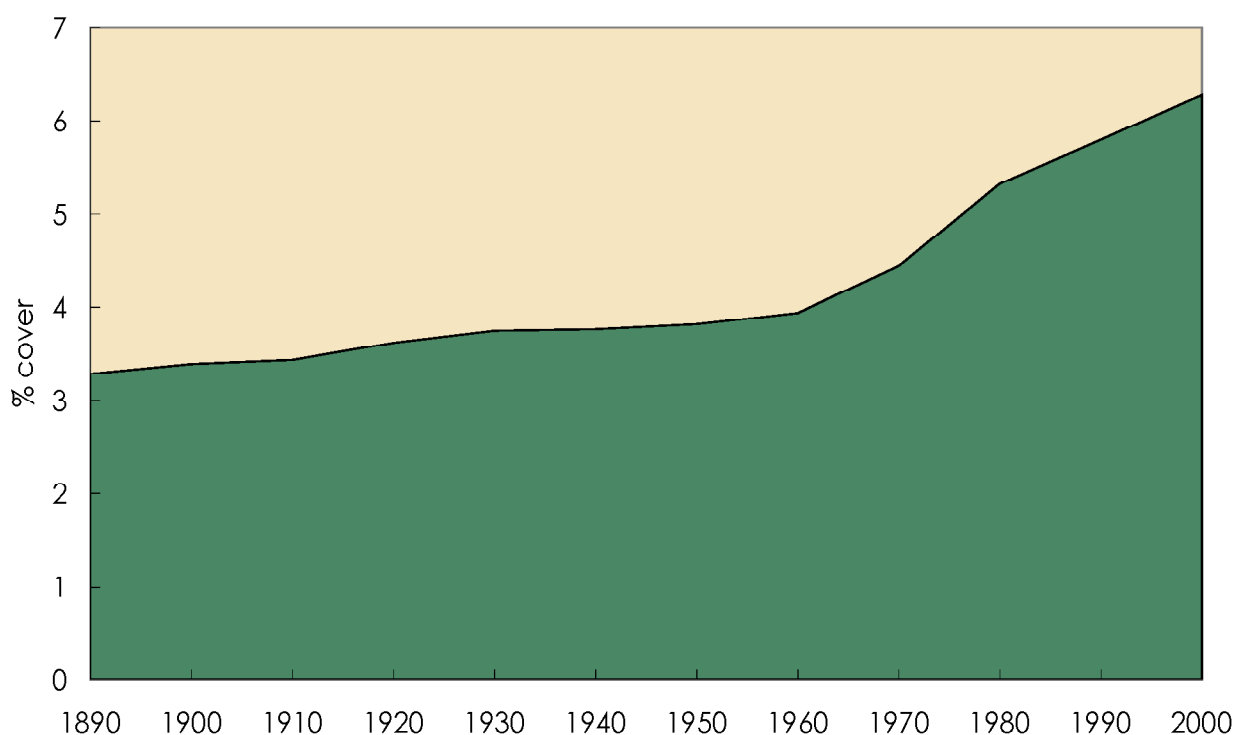
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WOODLAND COVER

Woodland area data is available from Ministry of Agriculture surveys since 1871, and from Forestry Commission national woodland inventories since 1924. The following chart and maps show the changes in woodland area through time.

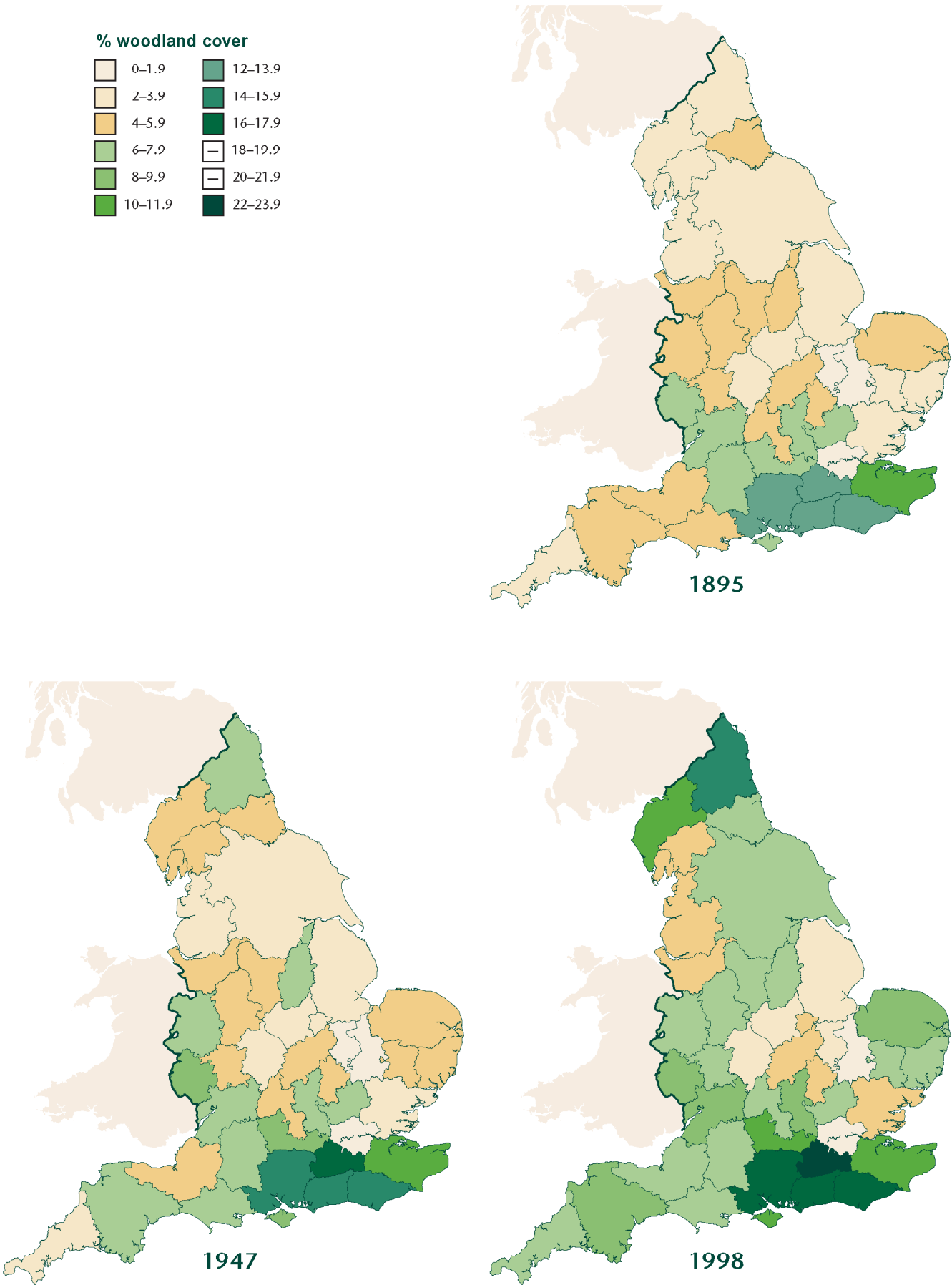
The maps use the old County structure data of England, as reported on in 1895 and 1947. The data from these counties could not be re-worked for different geographic areas. In contrast, the digital woodland map, which forms the basis of the current inventory, can be analysed for any geographic area.

Change in county woodland cover through time (1890 – 2000)



1. Following local government reorganisation the boundaries of the county of the report have changed significantly since 1890 and therefore data from a wider geographic area have been used.

Map 5 Woodland Cover in England by County through time (1895–1998)



GLOSSARY

Woodland

In the United Kingdom woodland is defined as land with a minimum area of 0.1 ha under stands of trees with, or the potential to achieve, tree crown cover of more than 20%. Areas of open space integral to the woodland are also included. Orchards and urban woodland between 0.1 and 2 ha are excluded. Intervening land-classes such as roads, rivers or pipelines are disregarded if less than 50m in extent. 'Scrubby' vegetation is not included as a separate category but as Conifer, Broadleaved or Mixed tree types. There is additional information on the quality of woodland within the inventory database.

Woodland of 2 ha and over, and with a minimum width of 50m, is included in the Main Woodland Survey; other woodland and trees are assessed in the Survey of Small Woodland and Trees.

Interpreted Forest Types

The woodland map derived from aerial photographs is differentiated into Interpreted Forest Types (IFTs) which are: Conifer, Broadleaved, Mixed, Coppice, Coppice-with-Standards, Shrubs, Young Trees, Ground Prepared for Planting and Felled. Note that forest types (see below) based on ground survey data are used for reporting purposes because they are more reliable.

High Forest

All woodland except stands managed as Coppice or Coppice-with-Standards with, or with the potential to achieve a tree cover of more than 20%. Two categories of High Forest are recognised:

- **High Forest Category 1**
Stands which are, or could become, capable of producing wood of a size and quality suitable for sawlogs.
- **High Forest Category 2**
Stands of lower quality than High Forest Category 1.

Mixtures

Where possible the species in mixtures have been separately recorded. Where this has not been possible they were described as 'Mixed conifers' or 'Mixed broadleaves'.

Forest Types

- **Conifer**
Woodland containing more than 80% by area of coniferous species.
- **Broadleaved**
Woodland containing more than 80% by area of broadleaved species.
- **Mixed**
A combination of broadleaved and coniferous species where each category occupies at least 20% of the canopy (see note on mixtures above.)

- **Coppice**

Crops of marketable broadleaved species that have at least 2 stems per stool and are either being worked or are capable of being worked on rotation. With the exception of hazel coppice more than half the stems should be capable of producing 1m timber lengths of good form.

- **Coppice with Standards**

Two-storey stands where the overstorey consists of at least 25 stems per ha that are older than the understorey of worked coppice by at least one coppice rotation.

- **Felled**

Woodland areas that have been felled or stands where the stocking has been reduced to less than 20% and where it is expected that these areas will be replanted.

- **Windblow**

Areas of blown woodland which remain uncleared and not regenerated.

- **Open Space**

Areas within a woodland that are not covered by trees but are integral to the woodland such as open areas, streamsides, deer glades, rides and forest roads.

Ownership types

- **Other Ownership**

Woodland other than that owned by, or leased to, the Forestry Commission

- **Personal**

types of private occupation, e.g. individuals, private family trusts and family partnerships.

- **Private forestry or timber business**

owned by wood processing industry. This category does not include forest management companies.

- **Other private business**

occupiers, e.g. companies, partnerships, syndicates and pension funds.

- **Local Authority**

Region, County, District or other Council

- **Other public bodies (not FC)**

Government department/agency, nationalised industry, etc.

- **Charitable organisations**

organisations funded by voluntary public subscription, e.g. National Trust, churches and colleges.

- Community ownership or common land

the common property of all members of the community.

- **Forestry Commission**

Land owned by or land leased to the Forestry Commission

Feature types

- **Small Wood**

A woodland with an area of 0.1 ha or over but less than 2 ha.

- **Group**

A group containing two or more trees with an area less than 0.1 ha.

- **Individual Tree**

A tree the crown of which has no contact with any other tree crown and which is at least 2m tall. Two types of individual tree are recognised:

- Boundary Tree (an Individual Tree on any boundary)
- Middle Tree (an Individual Tree not on a boundary)

- **Linear Feature**

A feature with a length of 25 m or more, and one which is at least four times as long as it is broad. It can be up to 50m wide or as narrow as a single line of trees. Two types of Linear Features are recognised:

- Narrow Linear Features (with a width of 1.6 m or less)
- Wide Linear Features (with a width greater than 1.6 m)

NOTES



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