



NATIONAL INVENTORY OF WOODLAND AND TREES



ENGLAND

County Report for

EAST SUSSEX



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 East Sussex 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 East Sussex 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 With the statistics becoming increasingly out of date the Forestry Commission decided to undertake a new survey: the *National Inventory of Woodland and Trees*.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 East Sussex is 29,924 hectares. This represents 16.7% of the land area. (Table 1)
- Broadleaved woodland is the dominant forest type representing 60.8 % of all woodland. Conifer woodland represents 12.8 %, Mixed woodland 11.9 % and Open Space within woodlands 3.1 %. (Table 2)
- The main conifer species is pine covering 3,203 hectares or 66.8 % of all conifer species. The main broadleaved species is oak covering 5,062 hectares or 24.4 % of all broadleaved species. (Table 3)
- 2,643 hectares or 9 % of woodland over 2 hectares is owned by or leased to the Forestry Commission, and 26,156 hectares or 91 % of woodland is in Other ownership. (Table 6)
- There are a total of 1,296 woods over 2 ha within East Sussex with a mean wood area of 22.4 hectares. (Table 7a) There are a total of 2,592 woods from 0.1 - <2.0 hectares with a mean wood area of 0.43 hectares. (Table 14)
- There are 928 thousand live trees outside woodland in East Sussex. (Table 15)
- Woodland land cover increased by over 1,700 hectares from 15.6 % to 16.6 % of the land area between 1980 and 1995. (Table 19)
- The area of broadleaves increased by 53% between 1980 and 1995, with the relative proportion of broadleaves to conifers increasing from 66 % to 81 %. (Table 20)

INVENTORY REPORTS

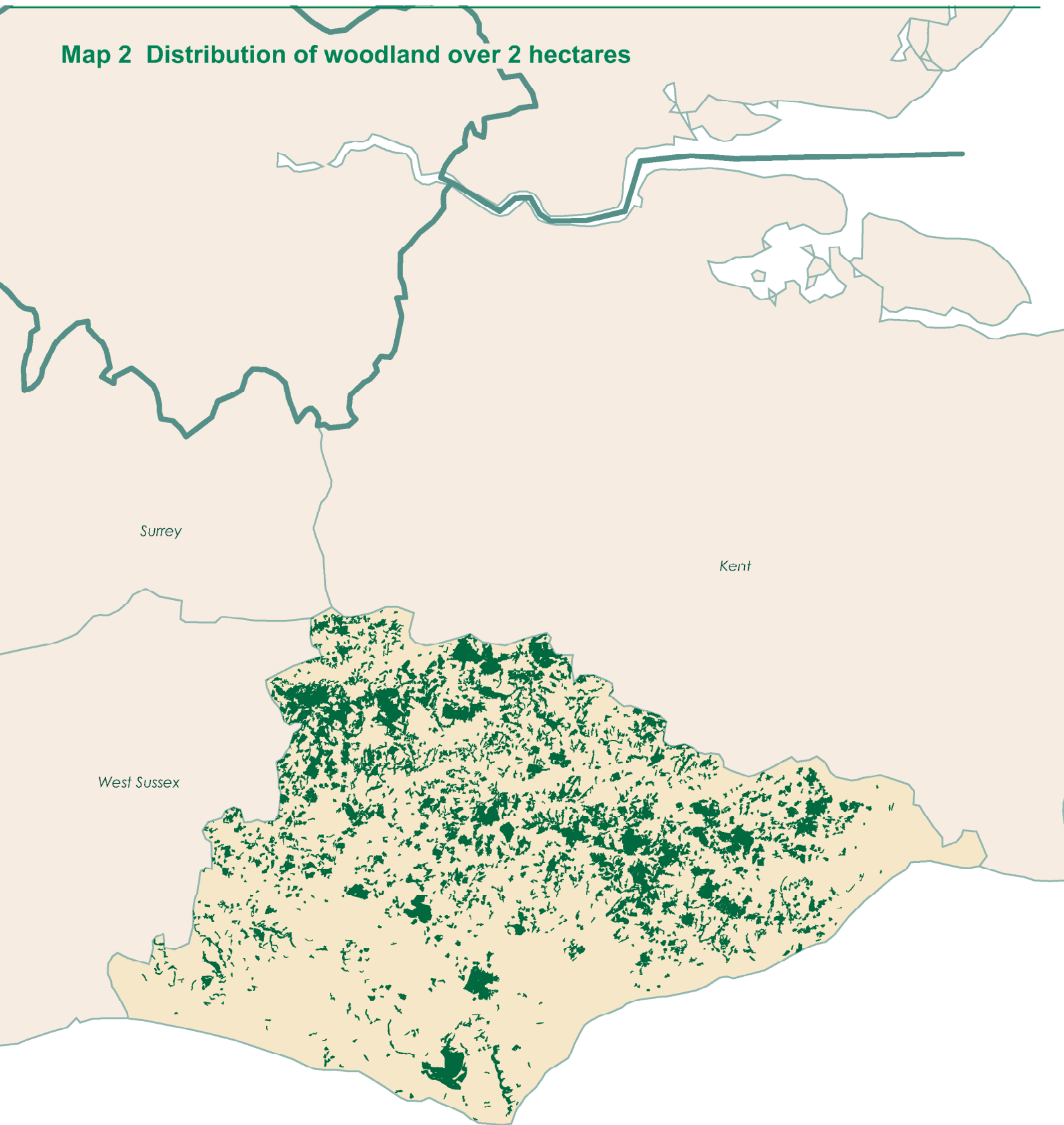
As well as this report for East Sussex, reports are available for the other counties in the region as shown on the map opposite. Also available are region and county reports for England as well as a report for the country as a whole. Wales and Scotland are also covered by reports. Inventory reports can also be viewed or downloaded from the website at www.forestry.gov.uk/inventory.

Map 1 Regional and county boundaries



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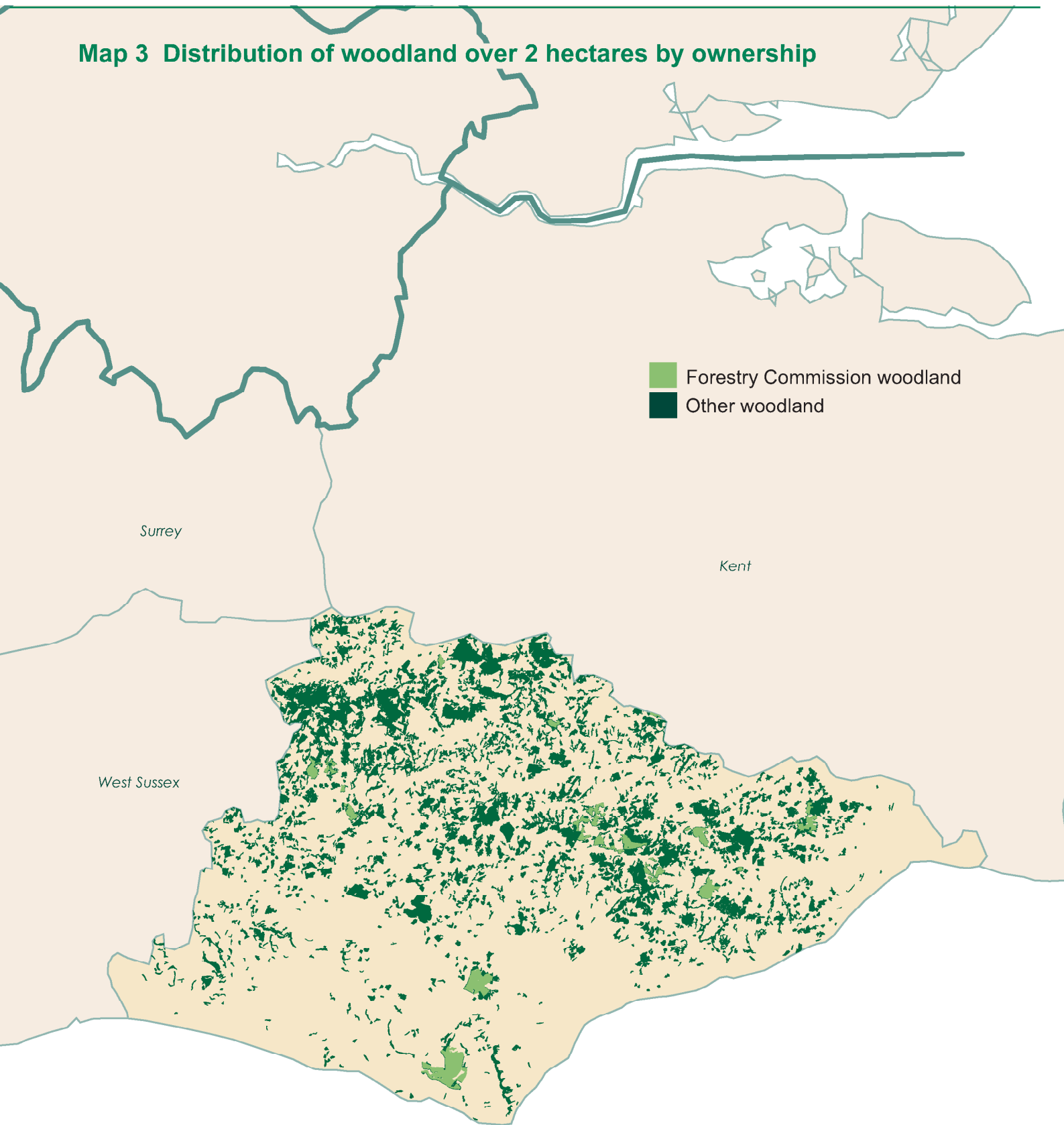
Map 2 Distribution of woodland over 2 hectares



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5 10 15 20 Kilometres

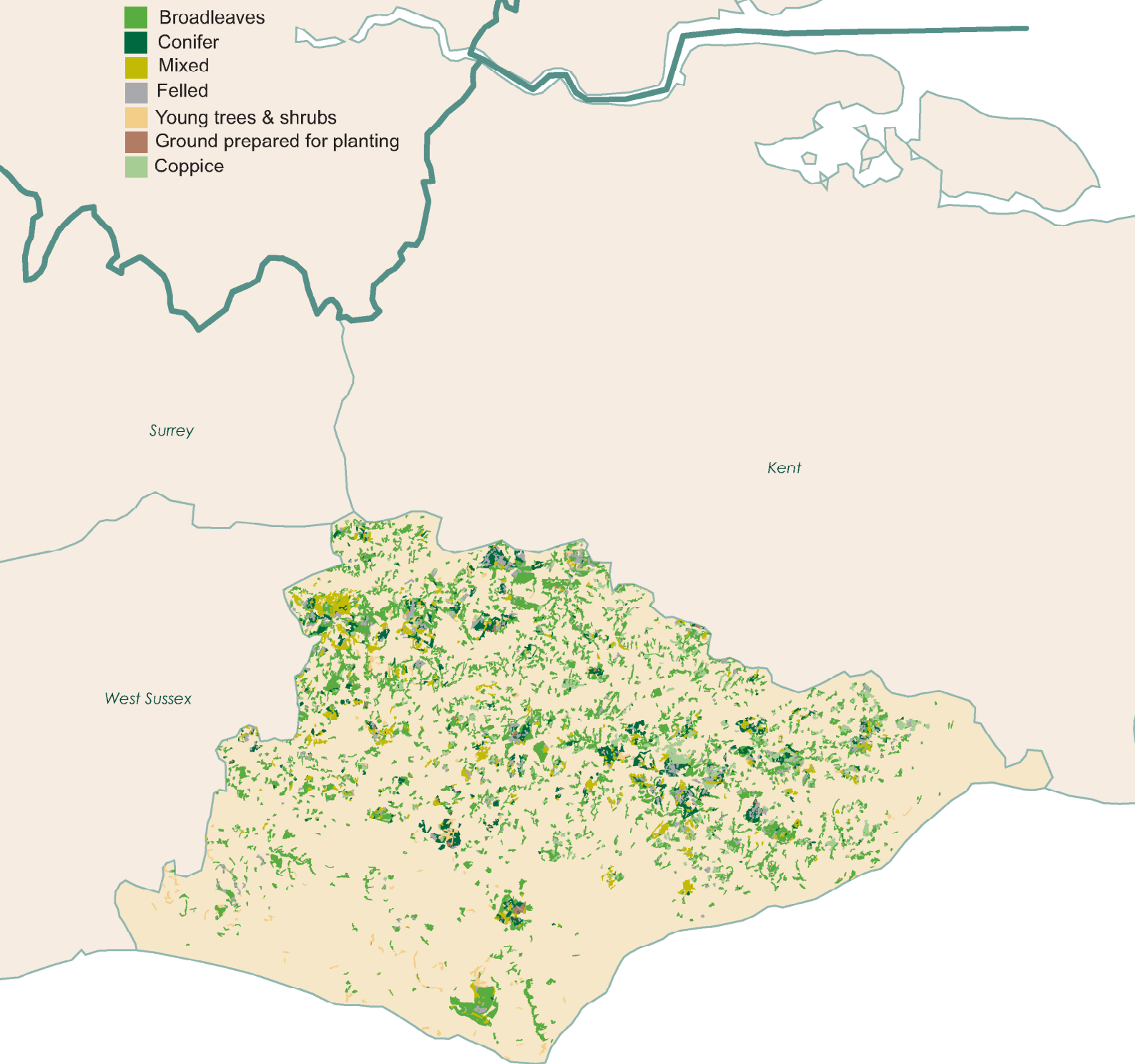
Map 3 Distribution of woodland over 2 hectares by ownership



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5 10 15 20 Kilometres

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



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5 10 15 20 Kilometres

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 East Sussex.

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	28,799	96.2
0.25 - < 2.00	1,006	3.4
0.10 - < 0.25	119	0.4
Total area of woodland	29,924	100.0
% Woodland land cover	16.7	

1. Area of East Sussex, including inland water, 179,541 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	3,819	10	3,829	12.8
Broadleaved	17,320	861	18,181	60.8
Mixed	3,400	160	3,560	11.9
Coppiced	1,783	0	1,783	6.0
Copp-w-standards	956	0	956	3.2
Windblow	0	0	0	0.0
Felled	696	0	696	2.3
Open Space	825	93	918	3.1
Total	28,799	1,125	29,924	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	3,172	31	3,203	66.8	12.5
Sitka spruce	79	0	79	1.6	0.3
Larch	423	8	431	9.0	1.7
Other conifers	982	39	1,021	21.3	4.0
Mixed conifers	35	28	63	1.3	0.2
Total conifers	4,689	106	4,795	100.0	18.8
Oak	4,828	234	5,062	24.4	19.8
Beech	1,018	75	1,093	5.3	4.3
Sycamore	574	41	615	3.0	2.4
Ash	3,103	106	3,209	15.4	12.5
Birch	3,633	0	3,633	17.5	14.2
Elm	0	10	10	0.0	0.0
Other broadleaves	5,028	160	5,188	25.0	20.3
Mixed broadleaves	1,665	299	1,964	9.5	7.7
Total broadleaves	19,850	925	20,775	100.0	81.2
Total all species***	24,540	1,032	25,572		100.0

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

**Species/group percentage of all species

***Excludes the 4,353ha 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	10%
Broadleaves	3%
Pine	13%
Oak	7%
Birch	9%
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	19,900	116,500	6	65
Narrow Linear Features	7,100	774,800	109	432
Individual Trees	36,700	36,700	1	20
Total		928,000		517

1. Land area used to calculate tree density 179,541ha 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	40%
Narrow Linear Features	32%
Individual Trees	31%
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	7,100	885	493
Total		885	493

1. Land area used to calculate tree density 179,541ha 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	29%
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	2,643	9
Other	26,156	91
Total area of woodland	28,799	100

1. Woodland area from aerial photographic interpretation map updated to 31 March 1995
2. See Glossary for definitions of ownership types

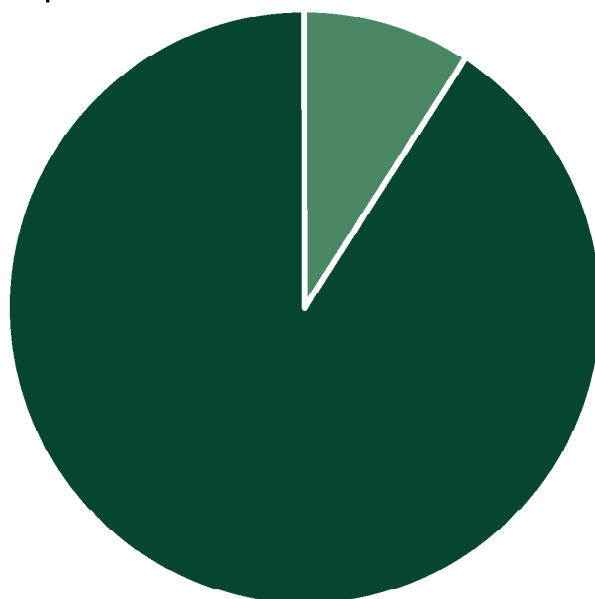
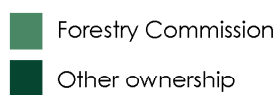
Woodland area by ownership

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	890	4,022	14	4.5
10 - <20	189	2,664	9	14.1
20 - <50	125	3,835	13	30.7
50 - <100	51	3,509	12	68.8
<100	1,255	14,030	48	11.2
100 - <500	33	6,944	24	210.4
500 and >	8	8,121	28	1015.2
All woods	1,296	29,095	100	22.4

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	3	19	0	6.3
	O	955	4,247	15	4.4
10 - <20	FC	4	70	0	17.4
	O	197	2,769	10	14.1
20 - <50	FC	5	198	1	39.7
	O	125	3,848	13	30.8
50 - <100	FC	5	339	1	67.7
	O	53	3,645	13	68.8
<100	FC	17	626	2	36.8
	O	1,330	14,509	50	10.9
100 - <500	FC	8	1,307	4	163.3
	O	31	6,452	22	208.1
500 and >	FC	1	711	2	710.6
	O	6	5,491	19	915.2
Total	FC	26	2,643	9	101.7
	O	1,367	26,452	91	19.4

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 296 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	882	33.4	2,937	11.2	3,819	13.3
Broadleaved	555	21.0	16,765	64.1	17,320	60.1
Mixed	993	37.6	2,407	9.2	3,400	11.8
Coppice	73	2.8	1,710	6.5	1,783	6.2
Copp-w-Stds	0	0.0	956	3.7	956	3.3
Windblow	0	0.0	0	0.0	0	0.0
Felled	94	3.6	601	2.3	696	2.4
Open Space	44	1.7	781	3.0	825	2.9
Total	2,643	99.9	26,156	100.0	28,799	100.0

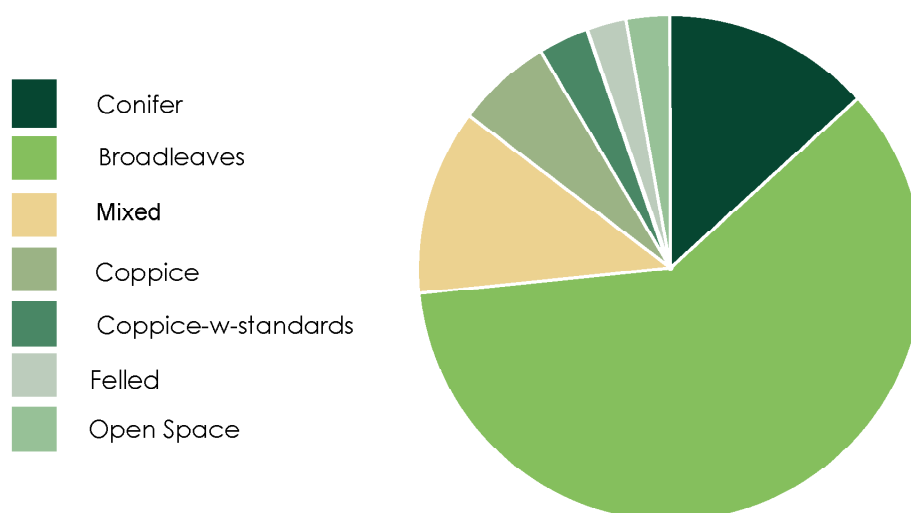
Area of woodland by forest type

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	541	46	22	1,902	54	9	2,442	52	10
Corsican pine	214	18	9	516	15	2	730	16	3
Lodgepole pine	0	0	0	0	0	0	0	0	0
Sitka spruce	0	0	0	79	2	0	79	2	0
Norway spruce	272	23	11	279	8	1	552	12	2
European larch	0	0	0	187	5	1	187	4	1
Jap/Hybrid larch	0	0	0	236	7	1	236	5	1
Douglas fir	34	3	1	17	0	0	50	1	0
Other conifers	115	10	5	264	8	1	380	8	2
Mixed conifers	0	0	0	35	1	0	35	1	0
Total conifers	1,176	100	48	3,514	100	16	4,689	100	19
Oak	189	15	8	4,639	25	21	4,828	24	20
Beech	249	20	10	769	4	3	1,018	5	4
Sycamore	0	0	0	574	3	3	574	3	2
Ash	73	6	3	3,029	16	14	3,103	16	13
Birch	493	39	20	3,141	17	14	3,633	18	15
Poplar	0	0	0	217	1	1	217	1	1
Sweet chestnut	231	18	10	1,189	6	5	1,419	7	6
Elm	0	0	0	0	0	0	0	0	0
Other broadleaves	21	2	1	3,371	18	15	3,392	17	14
Mixed broadleaves	0	0	0	1,665	9	8	1,665	8	7
Total broadleaves	1,255	100	52	18,595	100	84	19,850	100	81
Total - all species	2,431		100	22,108		100	24,540		100
Felled	94			601			696		
Total High Forest	2,525			22,709			25,236		

*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 825ha 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	10%
Broadleaves	3%
Scots pine	16%
Oak	7%
Birch	9%
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

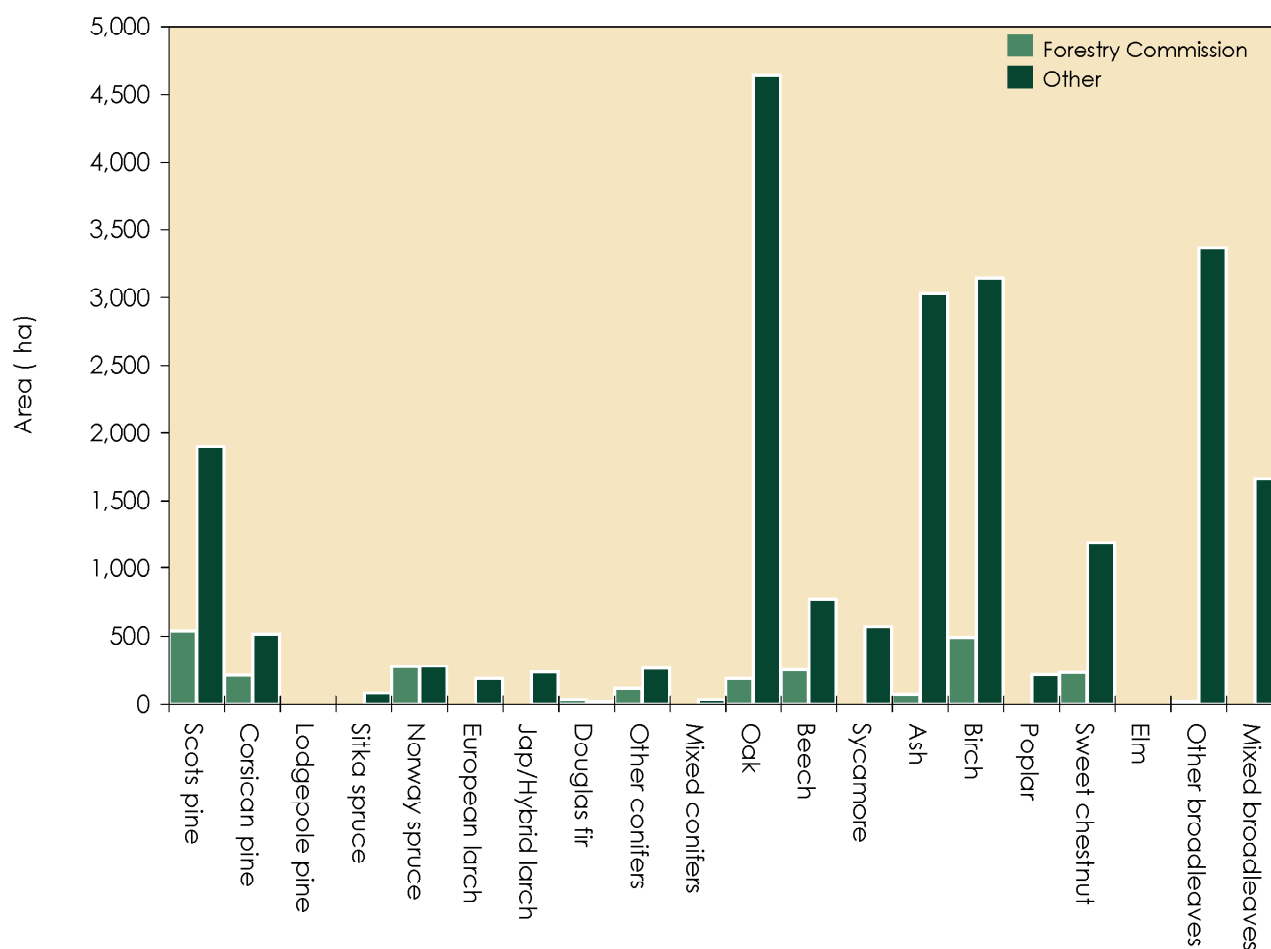


Table 9b Area of High Forest by principal species,ownership and category

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	541	0	541	1,835	66	1,902	2,376	66	2,442
Corsican pine	214	0	214	516	0	516	730	0	730
Lodgepole pine	0	0	0	0	0	0	0	0	0
Sitka spruce	0	0	0	79	0	79	79	0	79
Norway spruce	272	0	272	271	9	279	543	9	552
European larch	0	0	0	187	0	187	187	0	187
Jap/Hybrid larch	0	0	0	236	0	236	236	0	236
Douglas fir	34	0	34	17	0	17	50	0	50
Other conifers	115	0	115	230	34	264	346	34	380
Mixed conifers	0	0	0	14	21	35	14	21	35
Total conifers	1,176	0	1,176	3,384	130	3,514	4,559	130	4,689
Oak	189	0	189	3,908	731	4,639	4,097	731	4,828
Beech	249	0	249	669	99	769	919	99	1,018
Sycamore	0	0	0	478	96	574	478	96	574
Ash	73	0	73	2,780	250	3,029	2,853	250	3,103
Birch	440	52	493	2,846	295	3,141	3,286	347	3,633
Poplar	0	0	0	200	17	217	200	17	217
Sweet chestnut	84	147	231	528	661	1,189	0	807	1,419
Elm	0	0	0	0	0	0	612	0	0
Other broadleaves	0	21	21	1,449	1,923	3,371	1,449	1,944	3,392
Mixed broadleaves	0	0	0	1,035	630	1,665	1,035	630	1,665
Total broadleaves	1,035	220	1,255	13,893	4,702	18,595	14,928	4,922	19,850
Total - all species	2,211	220	2,431	17,276	4,832	22,108	19,488	5,052	24,540

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

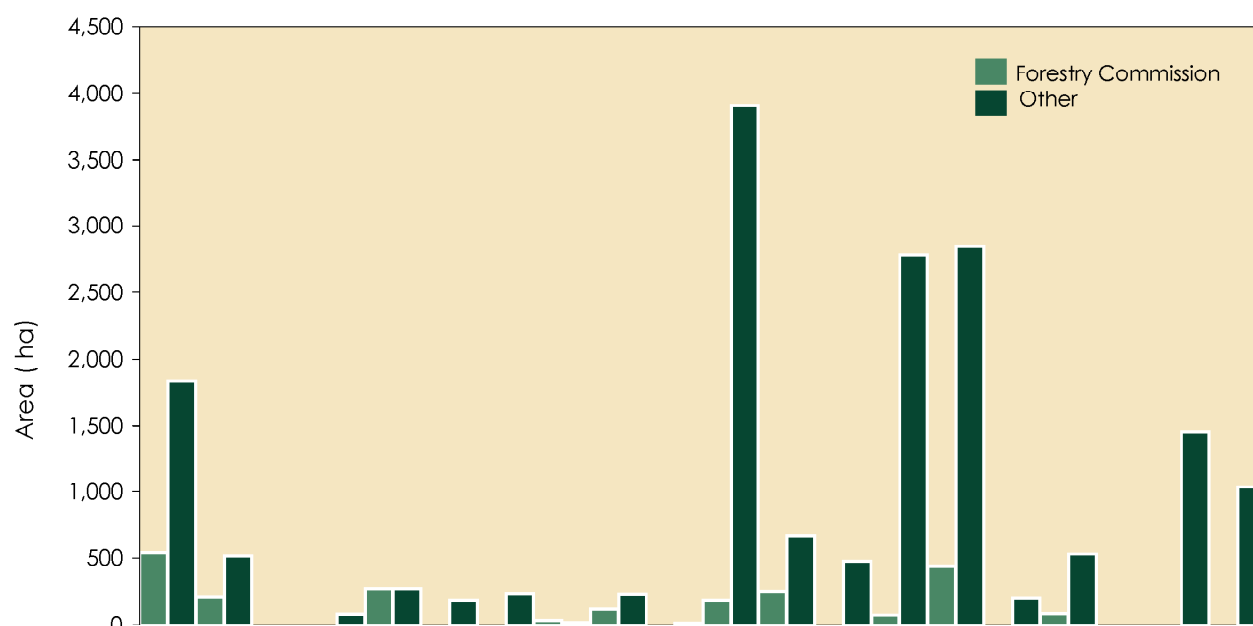
	Category 1*	Category 2*	Total High Forest
Conifers	9%	42%	10%
Broadleaves	3%	6%	3%
Scots pine	15%	70%	16%
Oak	8%	18%	7%
Birch	9%	27%	9%

*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

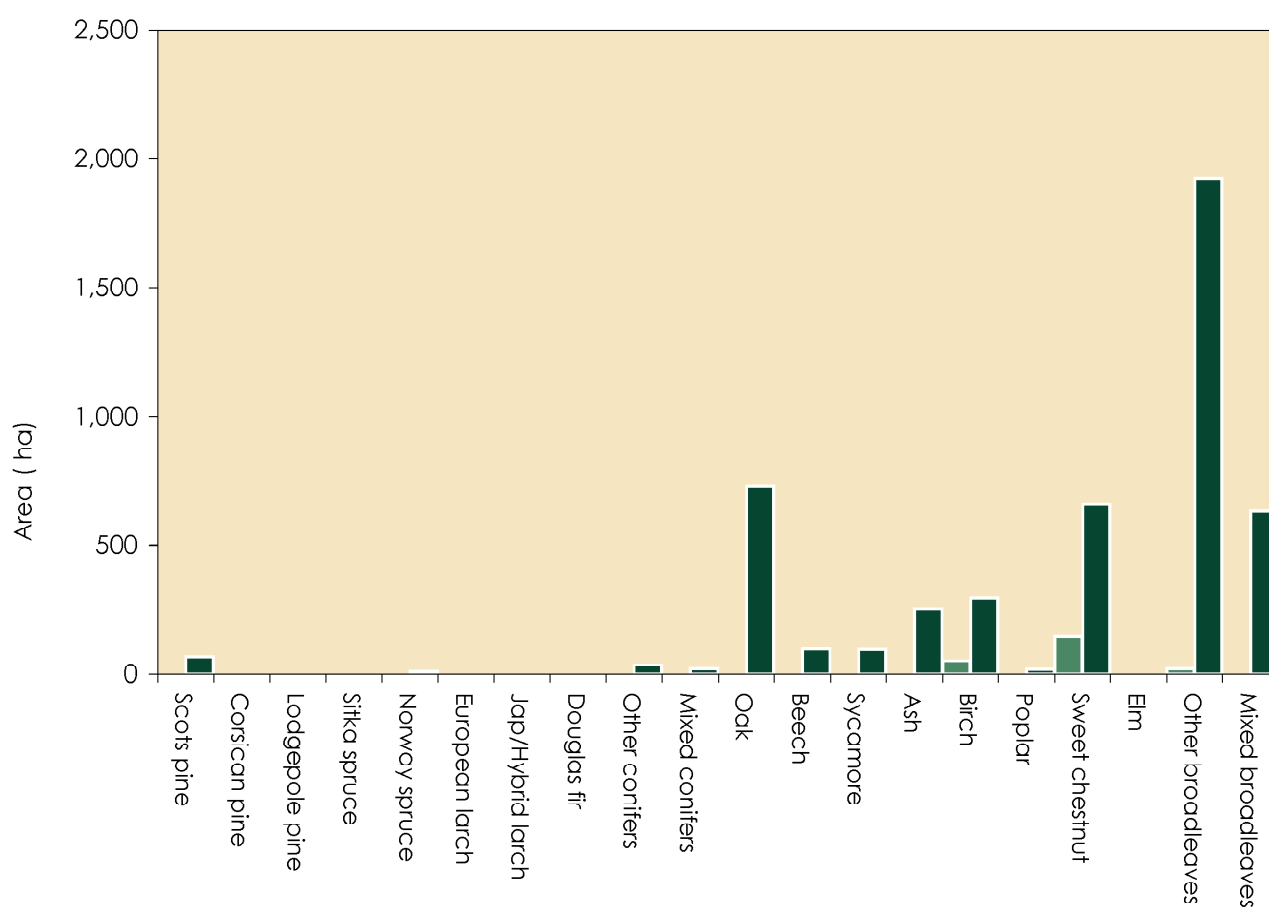
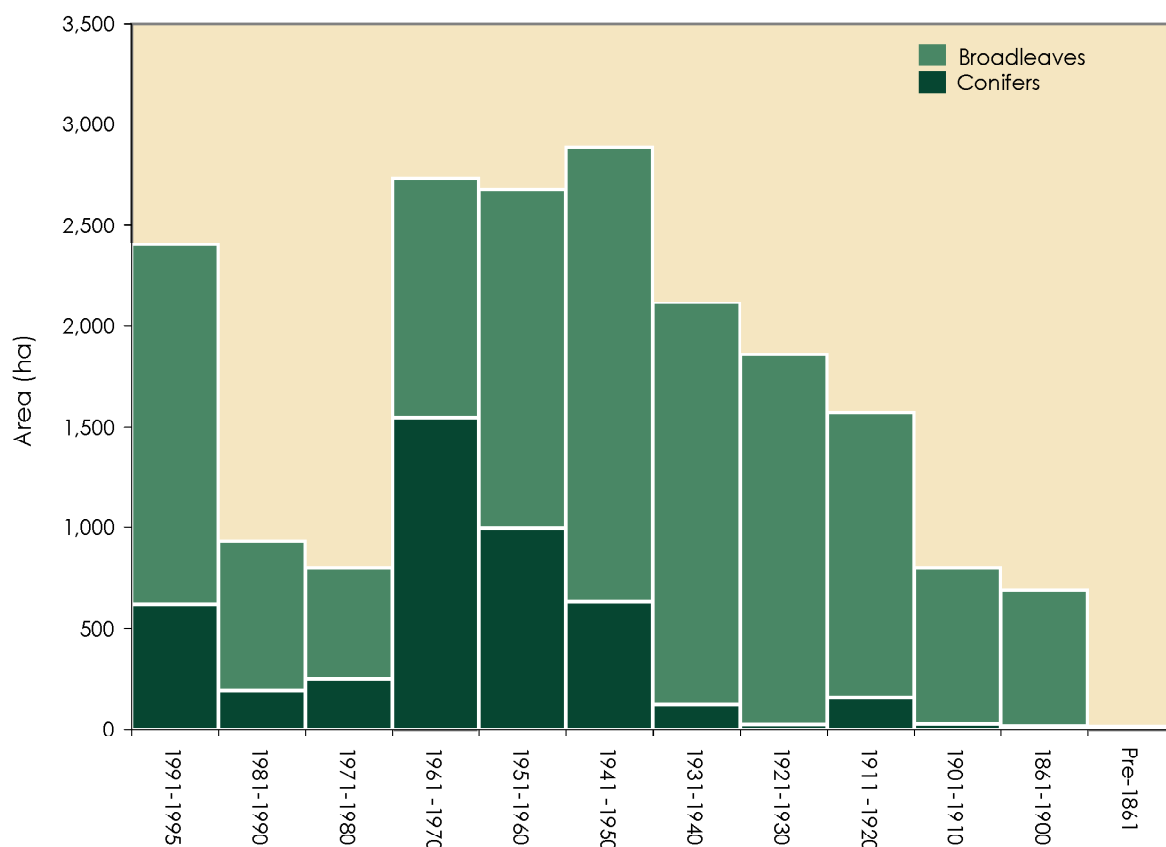


Table 10a High Forest Category 1 - Area by principal species and planting year class

Species	Planting year class*												Total (ha)
	1991-1995	1981-1990	1971-1980	1961-1970	1951-1960	1941-1950	1931-1940	1921-1930	1911-1920	1901-1910	1861-1900	Pre-1861	
Scots pine	268	68	154	695	556	326	112	23	131	26	17	0	2,376
Corsican pine	323	79	25	161	106	35	0	0	0	0	0	0	730
Lodgepole pine	0	0	0	0	0	0	0	0	0	0	0	0	0
Sitka spruce	0	0	0	0	79	0	0	0	0	0	0	0	79
Norway spruce	0	0	51	327	118	47	0	0	0	0	0	0	543
European larch	22	44	13	61	47	0	0	0	0	0	0	0	187
Jap/Hybrid larch	0	0	0	87	31	92	0	0	26	0	0	0	236
Douglas fir	0	0	0	23	12	10	4	0	0	0	0	0	50
Other conifers	0	0	0	186	35	119	4	0	0	0	0	0	346
Mixed conifers	4	0	0	0	10	0	0	0	0	0	0	0	14
Total conifers	617	190	243	1,542	993	629	120	23	157	26	17	0	4,559
Oak	339	161	39	102	261	216	147	685	921	658	554	13	4,097
Beech	51	0	82	230	26	37	241	48	163	17	19	4	919
Sycamore	54	29	69	38	91	85	58	29	25	0	0	0	478
Ash	127	57	40	111	401	490	781	563	134	78	72	0	2,853
Birch	648	334	134	329	477	601	401	293	35	17	17	0	3,286
Poplar	4	0	65	75	39	4	4	9	0	0	0	0	200
Sweet chestnut	159	65	26	140	108	77	12	25	0	0	0	0	0
Elm	0	0	0	0	0	0	0	0	0	0	0	0	612
Other broadleaves	49	31	70	6	233	557	301	134	58	0	9	0	1,449
Mixed broadleaves	356	65	31	161	51	187	50	52	77	6	0	0	1,035
Total broadleaves	1,787	741	556	1,193	1,685	2,255	1,996	1,838	1,414	775	671	17	14,928
Total - all species	2,403	931	799	2,735	2,679	2,884	2,116	1,861	1,571	801	689	17	19,488

*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



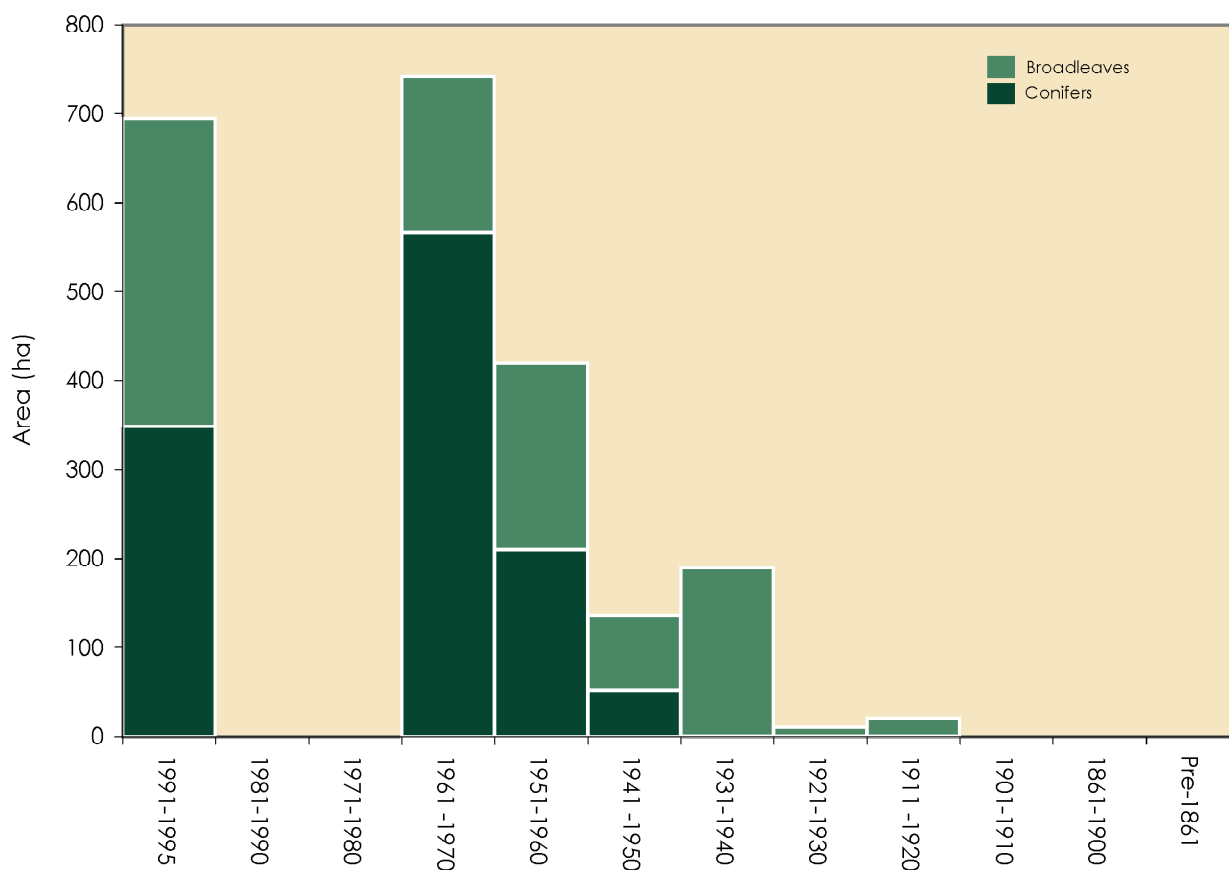
1. Most of the planting year classes cover 10 years, 1991-1995 is 5 years, and the classes prior to 1901 are 40 years or more.

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

Species	Planting year class*												Total (ha)
	1991 - 1995	1981 - 1990	1971 - 1980	1961 - 1970	1951 - 1960	1941 - 1950	1931 - 1940	1921 - 1930	1911 - 1920	1901 - 1910	1861 - 1900	Pre- 1861	
Scots pine	134	0	0	260	147	0	0	0	0	0	0	0	541
Corsican pine	214	0	0	0	0	0	0	0	0	0	0	0	214
Lodgepole pine	0	0	0	0	0	0	0	0	0	0	0	0	0
Sitka spruce	0	0	0	0	0	0	0	0	0	0	0	0	0
Norway spruce	0	0	0	210	63	0	0	0	0	0	0	0	272
European larch	0	0	0	0	0	0	0	0	0	0	0	0	0
Jap/Hybrid larch	0	0	0	0	0	0	0	0	0	0	0	0	0
Douglas fir	0	0	0	23	0	10	0	0	0	0	0	0	34
Other conifers	0	0	0	73	0	42	0	0	0	0	0	0	115
Mixed conifers	0	0	0	0	0	0	0	0	0	0	0	0	0
Total conifers	348	0	0	566	210	52	0	0	0	0	0	0	1,176
Oak	63	0	0	63	42	0	0	0	21	0	0	0	189
Beech	0	0	0	61	0	0	189	0	0	0	0	0	249
Sycamore	0	0	0	0	0	0	0	0	0	0	0	0	0
Ash	0	0	0	0	63	0	0	10	0	0	0	0	73
Birch	283	0	0	52	63	42	0	0	0	0	0	0	440
Poplar	0	0	0	0	0	0	0	0	0	0	0	0	0
Sweet chestnut	0	0	0	0	42	42	0	0	0	0	0	0	84
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	346	0	0	176	210	84	189	10	21	0	0	0	1,035
Total - all species	694	0	0	742	419	136	189	10	21	0	0	0	2,211

*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



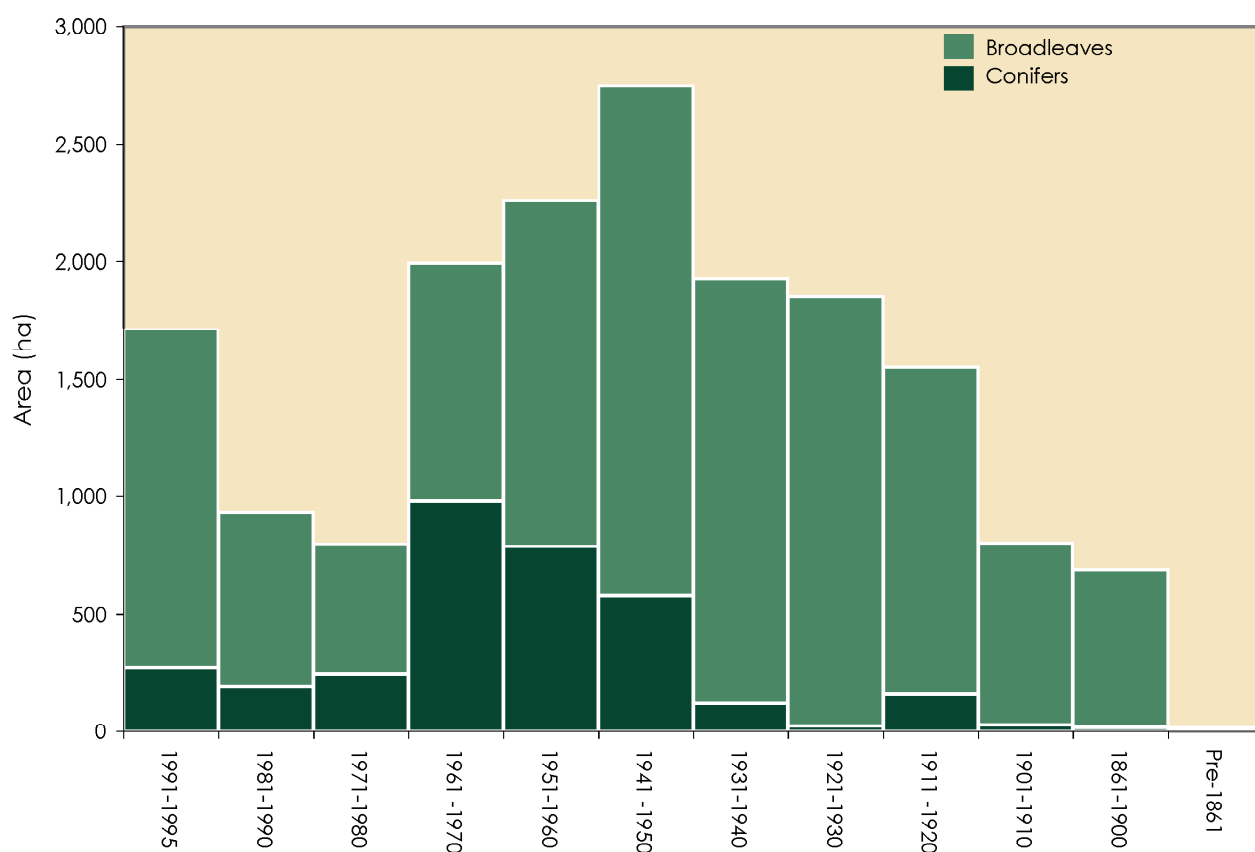
1. Most of the planting year classes cover 10 years, 1991-1995 is 5 years, and the classes prior to 1901 are 40 years or more.

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

Species	Planting year class*												Total (ha)
	1991-1995	1981-1990	1971-1980	1961-1970	1951-1960	1941-1950	1931-1940	1921-1930	1911-1920	1901-1910	1861-1900	Pre-1861	
Scots pine	134	68	154	435	409	326	112	23	131	26	17	0	1,835
Corsican pine	109	79	25	161	106	35	0	0	0	0	0	0	516
Lodgepole pine	0	0	0	0	0	0	0	0	0	0	0	0	0
Silka spruce	0	0	0	0	79	0	0	0	0	0	0	0	79
Norway spruce	0	0	51	118	55	47	0	0	0	0	0	0	271
European larch	22	44	13	61	47	0	0	0	0	0	0	0	187
Jap/Hybrid larch	0	0	0	87	31	92	0	0	26	0	0	0	236
Douglas fir	0	0	0	0	12	0	4	0	0	0	0	0	17
Other conifers	0	0	0	113	35	78	4	0	0	0	0	0	230
Mixed conifers	4	0	0	0	10	0	0	0	0	0	0	0	14
Total conifers	269	190	243	977	784	577	120	23	157	26	17	0	3,384
Oak	276	161	39	39	219	216	147	685	900	658	554	13	3,908
Beech	51	0	82	169	26	37	52	48	163	17	19	4	669
Sycamore	54	29	69	38	91	85	58	29	25	0	0	0	478
Ash	127	57	40	111	338	490	781	552	134	78	72	0	2,780
Birch	365	334	134	277	414	559	401	293	35	17	17	0	2,846
Poplar	4	0	65	75	39	4	4	9	0	0	0	0	200
Sweet chestnut	159	65	26	140	66	35	12	25	0	0	0	0	528
Elm	0	0	0	0	0	0	0	0	0	0	0	0	0
Other broadleaves	49	31	70	6	233	557	301	134	58	0	9	0	1,449
Mixed broadleaves	356	65	31	161	51	187	50	52	77	6	0	0	1,035
Total broadleaves	1,441	741	556	1,017	1,476	2,171	1,807	1,827	1,393	775	671	17	13,893
Total - all species	1,710	931	799	1,993	2,259	2,748	1,928	1,850	1,550	801	689	17	17,276

*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, 1991-1995 is 5 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	%
1991-95	Birch	26	Mixed broadleaves	16	Oak	14
1981-90	Birch	14	Sweet chestnut	14	Mixed broadleaves	14
1971-80	Birch	17	Sweet chestnut	16	Mixed broadleaves	15
1961-70	Scots pine	23	Birch	11	Norway spruce	10
1951-60	Scots pine	18	Birch	18	Ash	13
1941-50	Other broadleaves	29	Birch	18	Ash	13
1931-40	Other broadleaves	32	Ash	28	Birch	14
1921-30	Oak	33	Ash	27	Other broadleaves	18
1911-20	Oak	56	Beech	12	Ash	7
1901-10	Oak	85	Ash	8	Scots pine / Beech	2
1861-1900	Oak	77	Ash	7	Mixed broadleaves	6
Pre 1861	Oak	89	Beech	11	-	
All years	Oak	20	Birch	15	Other broadleaves	14

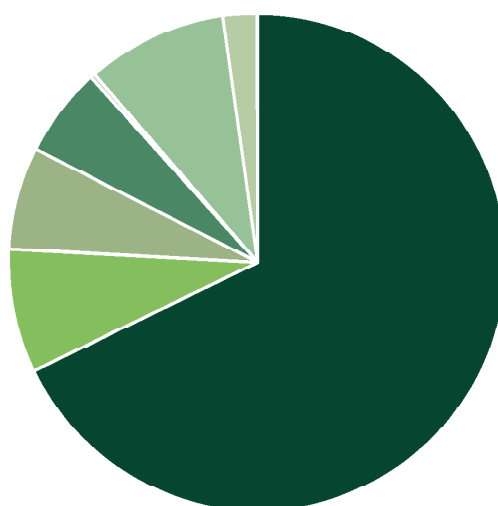
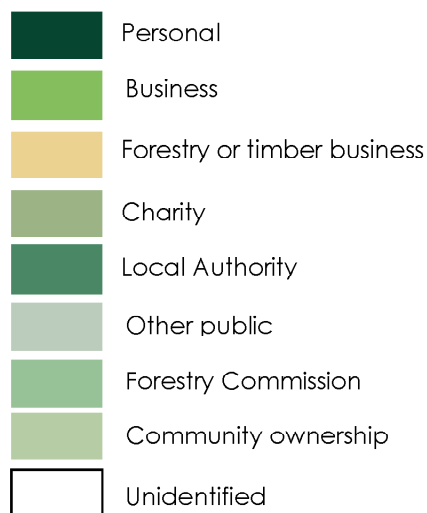
1. Principal species as a percentage of area in the planting year class.

Table 12 Ownership type* by area and percentage

Ownership type	Area (ha)	%
Personal	19,526	67.8
Business	2,342	8.1
Forestry or timber business	0	0.0
Charity	1,910	6.6
Local Authority	1,691	5.9
Other public (not FC)	28	0.1
Forestry Commission	2,643	9.2
Community ownership or common land	659	2.3
Unidentified	0	0.0
Total	28,799	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	2,592	1,125	Area (ha)
Wide Linear Features	0	0	Area (ha)
Wide Linear Features	0	0	Length (Km)
Narrow Linear Features	7,100	885	Length (Km)
Narrow Linear Features	7,100	774,800	Number of live trees
Groups	19,900	116,500	Number of live trees
Individual Trees	36,700	36,700	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	119	1,006	1,125	2,592	0.43
Wide Linear Features	0	0	0	0	0.00
Total	119	1,006	1,125	2,592	0.43

1. See Glossary for definitions of feature types.

Table 15 Numbers of live trees outside woodland by species and feature type (000's trees)

Species	Feature type				Total live trees	Percent of total trees	
	Boundary Trees	Middle Trees	Groups	Narrow Linear Features		Category	Species
Pine	0.9	6.3	13.6	1.1	21.9	90.1	2.4
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	1.6	0.8	0.0	0.0	2.4	9.9	0.3
Total conifers	2.5	7.1	13.6	1.1	24.3	100.0	2.6
Oak	14.4	1.6	26.3	134.7	177.0	19.6	19.1
Beech	0.0	0.0	0.8	49.5	50.3	5.6	5.4
Sycamore	0.0	0.0	0.0	22.0	22.0	2.4	2.4
Ash	5.6	0.0	6.4	176.5	188.5	20.9	20.3
Birch	0.8	1.6	24.7	9.9	37.0	4.1	4.0
Poplar	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sweet chestnut	0.0	0.0	0.0	7.1	7.1	0.8	0.8
Horse chestnut	0.8	0.0	0.0	0.0	0.8	0.1	0.1
Alder	0.0	0.0	12.0	8.2	20.2	2.2	2.2
Lime	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Elm	0.0	0.0	18.4	0.0	18.4	2.0	2.0
Willow	0.0	0.8	7.2	1.1	9.1	1.0	1.0
Other broadleaves	1.6	0.0	7.2	364.6	373.4	41.3	40.2
Total broadleaves	23.2	4.0	102.9	773.7	903.8	100.0	97.4
Total - all species	25.7	11.1	116.5	774.8	928.0		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	31%
Groups	40%
Narrow Linear Features	32%
- 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	0.8	0.0	0.0	0.0	0.8	100.0	100.0
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	0.0	0.0	0.0	0.0	0.0	0.0
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	0.8	0.0	0.0	0.0	0.8	100.0	100.0
Total - all species	0.8	0.0	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	5.6	14.4	1.9	0.0	21.9
Spruce	0.0	0.0	0.0	0.0	0.0
Larch	0.0	0.0	0.0	0.0	0.0
Cypress	0.0	0.0	0.0	0.0	0.0
Other conifers	0.8	0.8	0.8	0.0	2.4
Total conifers	6.4	15.2	2.7	0.0	24.3
Oak	16.4	136.3	23.5	0.8	177.0
Beech	14.3	35.2	0.8	0.0	50.3
Sycamore	0.0	22.0	0.0	0.0	22.0
Ash	23.6	163.3	1.6	0.0	188.5
Birch	4.8	32.2	0.0	0.0	37.0
Poplar	0.0	0.0	0.0	0.0	0.0
Sweet chestnut	7.1	0.0	0.0	0.0	7.1
Horse chestnut	0.0	0.8	0.0	0.0	0.8
Alder	0.0	20.2	0.0	0.0	20.2
Lime	0.0	0.0	0.0	0.0	0.0
Elm	13.6	4.8	0.0	0.0	18.4
Willow	0.5	7.7	0.8	0.0	9.0
Other broadleaves	326.7	46.7	0.0	0.0	373.4
Total broadleaves	407.0	469.2	26.7	0.8	903.7
Total - all species	413.4	484.4	29.4	0.8	928.0

Table 18 Number of Groups by group size

Number of trees per Group*	Number of Groups (000's)
2	2
3-5	10
6-10	4
11-20	3
21-50	2
51-100	0
>100	0
Total	20

*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 1995 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 1995 Inventory
Table 20:	Comparison of High Forest area by species between 1980 Census and 1995 Inventory
Chart:	Comparison of High Forest area by species between 1980 Census and 1995 Inventory
Table 21:	Comparison of High Forest Category 1 area by planting year class between 1980 Census and 1995 Inventory
Chart:	Comparison of High Forest Category 1 area by planting year class between 1980 Census and 1995 Inventory
Table 22:	Comparison of numbers of live trees outside woodland between 1980 Census and 1995 Inventory
Table 23:	Comparison of density of non-woodland features between 1980 Census and 1995 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 1995 Inventory

Woodland size (ha)	1980 Census woodland area		1995 Inventory woodland area		Change (%)
	(ha)	(%)	(ha)	(%)	(%)
2.0 or more	25,719	91.7	28,799	96.6	12
0.25 - <2.0	2,325	8.3	1,006	3.4	-57
Total	28,044		29,805		6
% Woodland land cover	15.6		16.6		

1. Differences in sampling methodology may account for some of the apparent differences.
2. The above figures from the 1995 Inventory exclude woodland between 0.1 and <0.25 ha, thereby matching the scope of the 1980 Census. The 1995 figures above will therefore not match those in the previous sections of the report.
3. Land area used to calculate woodland cover percent (1995), 179,541 ha, was based on the 1991 Census of Population digital boundaries.
4. Land area used to calculate woodland cover percent (1980), 179,519 ha, (Ordnance Survey data)

Table 20 Comparison of High Forest area by species between 1980 Census and 1995 Inventory

Species	1980 Census woodland area (ha)	1995 Inventory woodland area (ha)	Change (%)
Scots pine	2,198	2,473	12
Corsican pine	723	730	1
Lodgepole pine	9	0	-100
Sitka spruce	195	79	-59
Norway spruce	1,018	552	-46
European larch	464	187	-60
Jap/Hybrid larch	940	244	-74
Douglas fir	359	50	-86
Other conifers	658	419	-36
Mixed conifers	359	45	-87
Total conifers	6,923	4,779	-31
Oak	3,486	5,035	44
Beech	1,300	1,093	-16
Sycamore	142	615	332
Ash	1,688	3,203	90
Birch	2,605	3,633	39
Poplar	273	227	-17
Sweet chestnut	608	1,419	133
Elm	2	10	416
Other broadleaves	2,386	3,522	48
Mixed broadleaves	1,055	1,915	82
Total broadleaves	13,543	20,672	53
Total all species	20,466	25,451	24
Felled	360	696	94
Total High Forest	20,826	26,147	26

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 3.1% (Table 2). To obtain meaningful comparisons between the two datasets the 1980 Census data have therefore been reduced by 3.1%.
3. The above figures from the 1995 Inventory exclude woodland between 0.1 and <0.25 ha, thereby matching the scope of the 1980 Census. The 1995 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 1995 Inventory

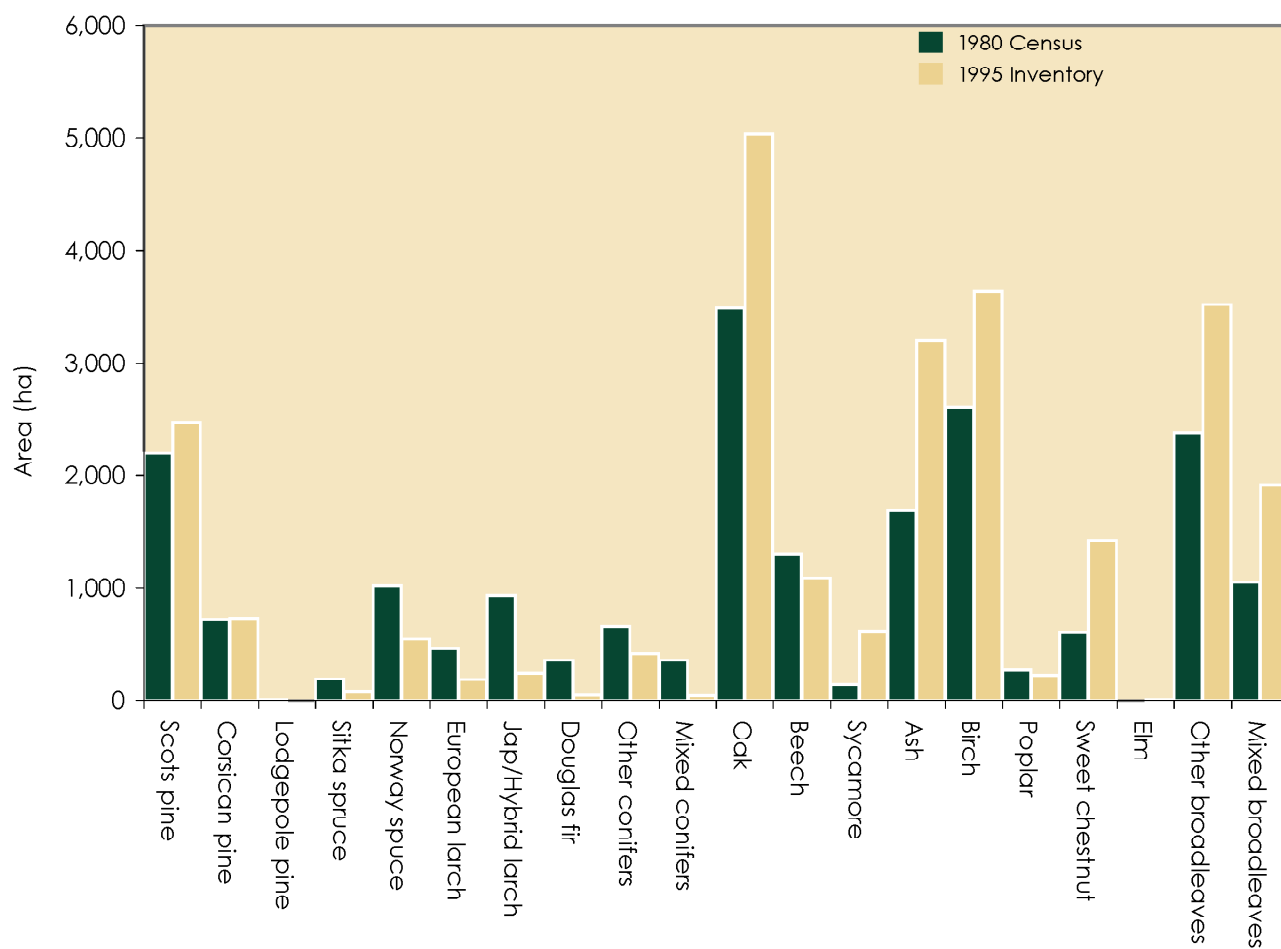


Table 21 Comparison of High Forest Category 1 area by planting year class
between 1980 Census and 1995 Inventory

Planting year class	1980 Census woodland area (ha)	1995 Inventory woodland area (ha)	Change (%)
1991-1995	0	2,488	see note
1981-1990	0	931	see note
1971-1980	747	849	14
1961-1970	3,780	2,808	-26
1951-1960	5,071	2,802	-45
1941-1950	2,030	2,967	46
1931-1940	919	2,116	130
1921-1930	687	1,975	187
1911-1920	626	1,602	156
1901-1910	378	801	112
1861-1900	2,247	714	-68
Pre 1861	1,012	17	-98
Total all years	17,497	20,070	15

1. The first two classes, 1991-1995 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.

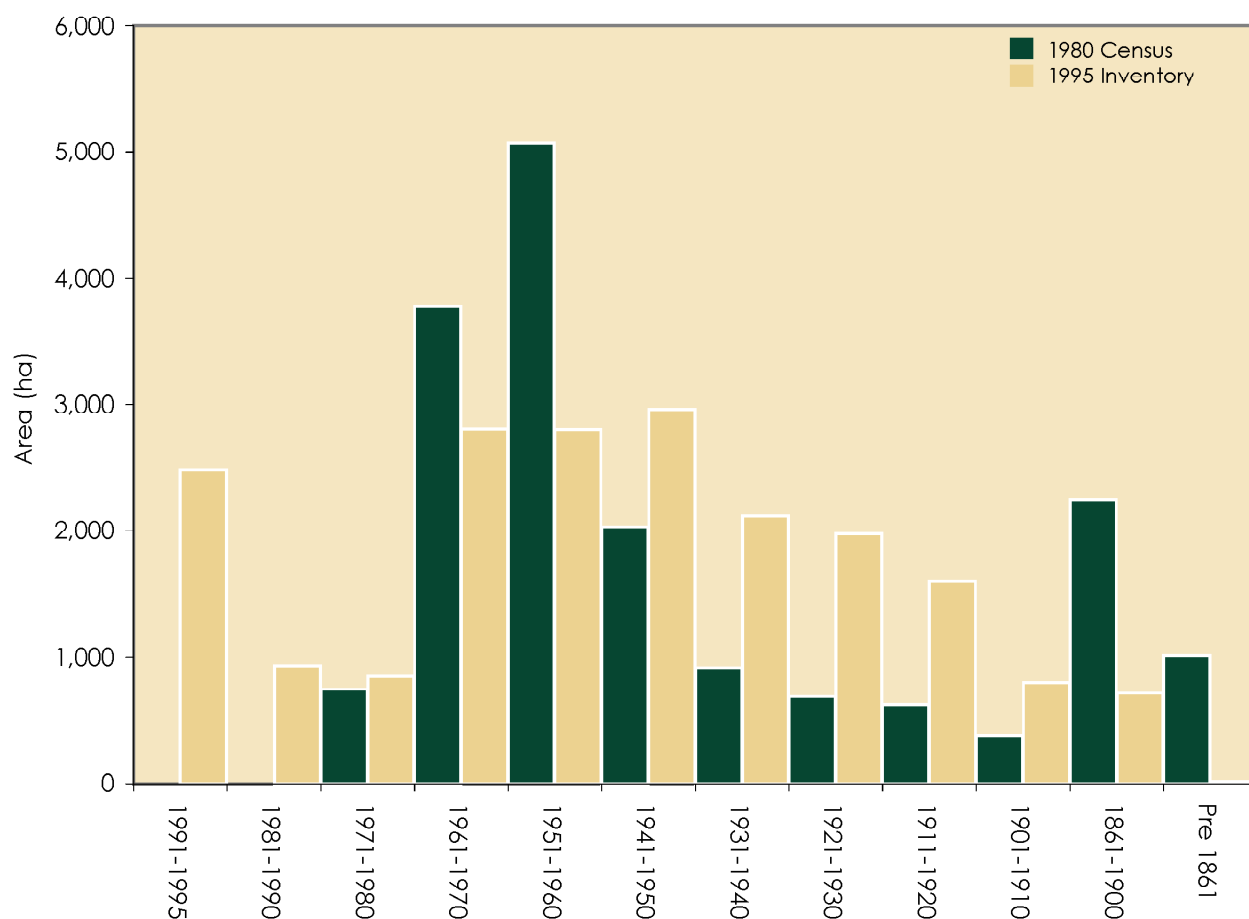
Comparison of High Forest Category 1 area by planting year class between 1980 Census and 1995 Inventory

Table 22 Comparison of numbers of live trees outside woodland between 1980 Census and 1995 Inventory (000's)

Feature type	1980 Census	1995 Inventory	Change (%)
Boundary Tree	54	26	-52
Middle Tree	81	11	-87
Total Individual Trees	136	37	-73
Groups	211	117	-45
Linear Features	587	552	-6
Total	934	705	-24

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 1995 Inventory figures have been adjusted accordingly. The 1995 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 1995 Inventory, the two surveys are not directly comparable - 1980 used 7cm diameter at breast height, and 1995 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 1995 Inventory

Feature type	1980 Census	1995 Inventory	Change (%)
Individual Trees (per sq km)	75.5	20.4	-73
Groups (per sq km)	19.5	11.1	-43
Linear Features (m per sq km)	1,587.6	493.1	-69

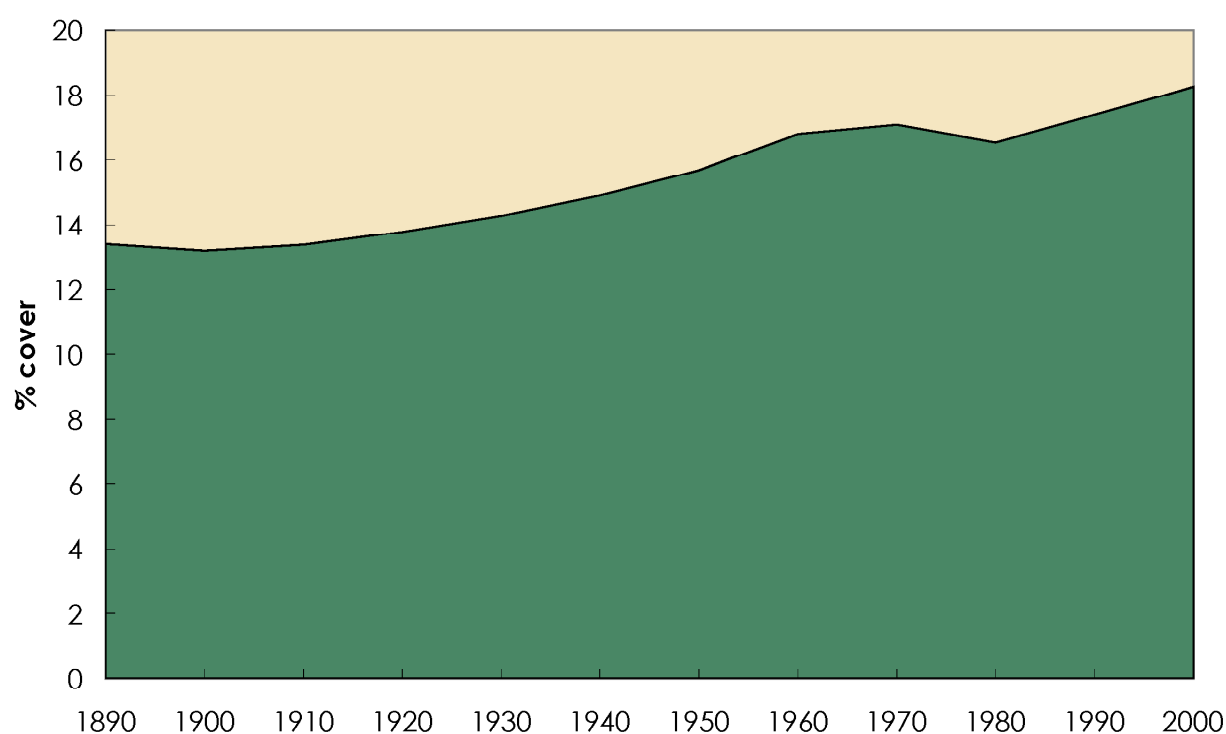
1. The Survey of Small Woodland and Trees did not record information referring to tree features (I.e. Individual trees, Groups and Narrow Linear Features) within developed land.
2. In the 1980 Census hazel, hawthorn, blackthorn and goat willow were excluded, the 1995 Inventory figures have been adjusted accordingly. The 1995 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 1995 Inventory, the two surveys are not directly comparable - 1980 used 7cm diameter at breast height, and 1995 used 2m height, as minimum criteria for inclusion.
4. See Glossary for definitions of feature type.

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.

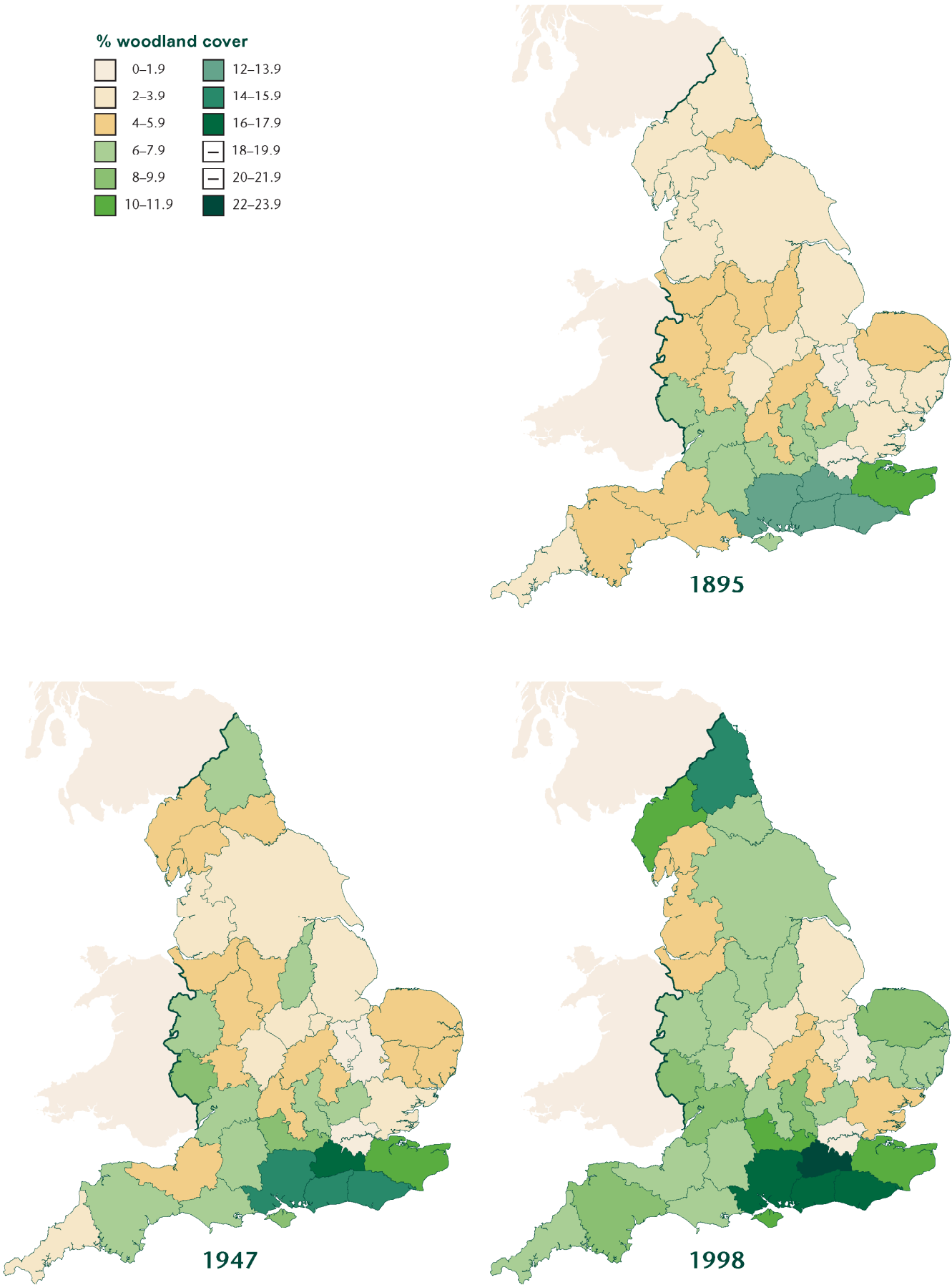
The maps use the old County structure data of England, as reported on in 1895 and 1947. The data from these counties could not be re-worked for different geographic areas. In contrast, the digital woodland map, which forms the basis of the current inventory, can be analysed for any geographic area.

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 0.1ha.

- **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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