National Inventory of Woodland and Trees

England

County Report for

Buckinghamshire

Forestry Commission

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CONTENTS

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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 Buckinghamshire 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 Buckinghamshire 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 With the statistics becoming increasingly out of date the Forestry Commission decided to undertake a new survey: the *National Inventory of Woodland and Trees*.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 km^2 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 km^2 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

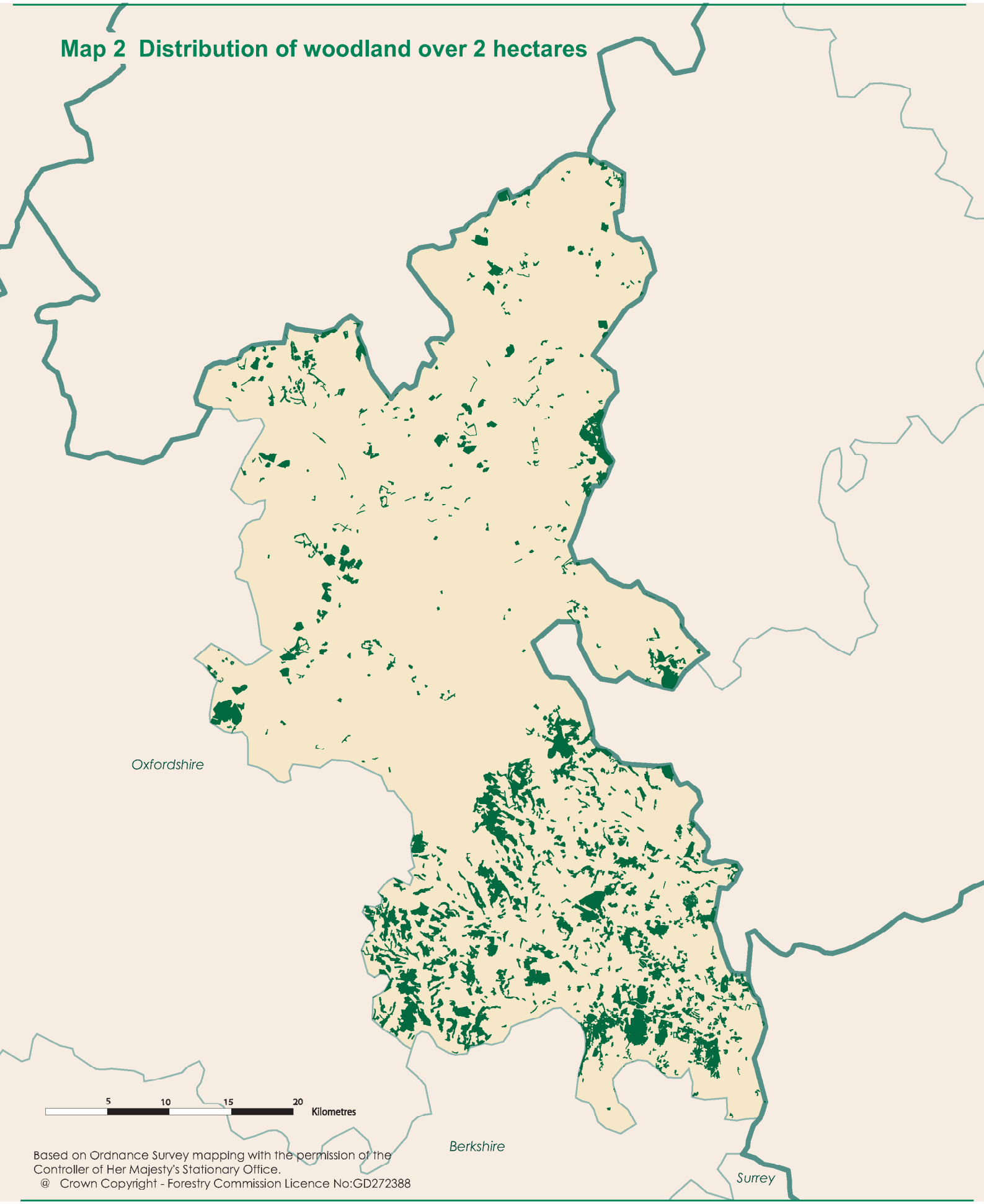
- The total area of woodland of 0.1 hectares and over in Buckinghamshire is 17,573 hectares. This represents 9.4% of the land area. (Table 1)
- Broadleaved woodland is the dominant forest type representing 64.5 % of all woodland. Conifer woodland represents 10.1 %, Mixed woodland 20.2 % and Open Space within woodlands 5.1 %. (Table 2)
- The main conifer species is pine covering 1,052 hectares or 31.6 % of all conifer species. The main broadleaved species is beech covering 3,952 hectares or 29.7 % of all broadleaved species. (Table 3)
- 1,753 hectares or 10 % of woodland over 2 hectares is owned by or leased to the Forestry Commission, and 15,139 hectares or 90 % of woodland is in Other ownership. (Table 6)
- There are a total of 855 woods over 2 ha within Buckinghamshire with a mean wood area of 19.8 hectares. (Table 7a) There are a total of 1,569 woods from 0.1 - <2.0 hectares with a mean wood area of 0.43 hectares. (Table 14)
- There are 319 thousand live trees outside woodland in Buckinghamshire. (Table 15)
- Woodland land cover increased by over 1,800 hectares from 8.3 % to 9.3 % of the land area between 1980 and 1997. (Table 19)
- The area of broadleaves increased by 18% between 1980 and 1997, with the relative proportion of broadleaves to conifers increasing from 77 % to 80 %. (Table 20)

INVENTORY REPORTS

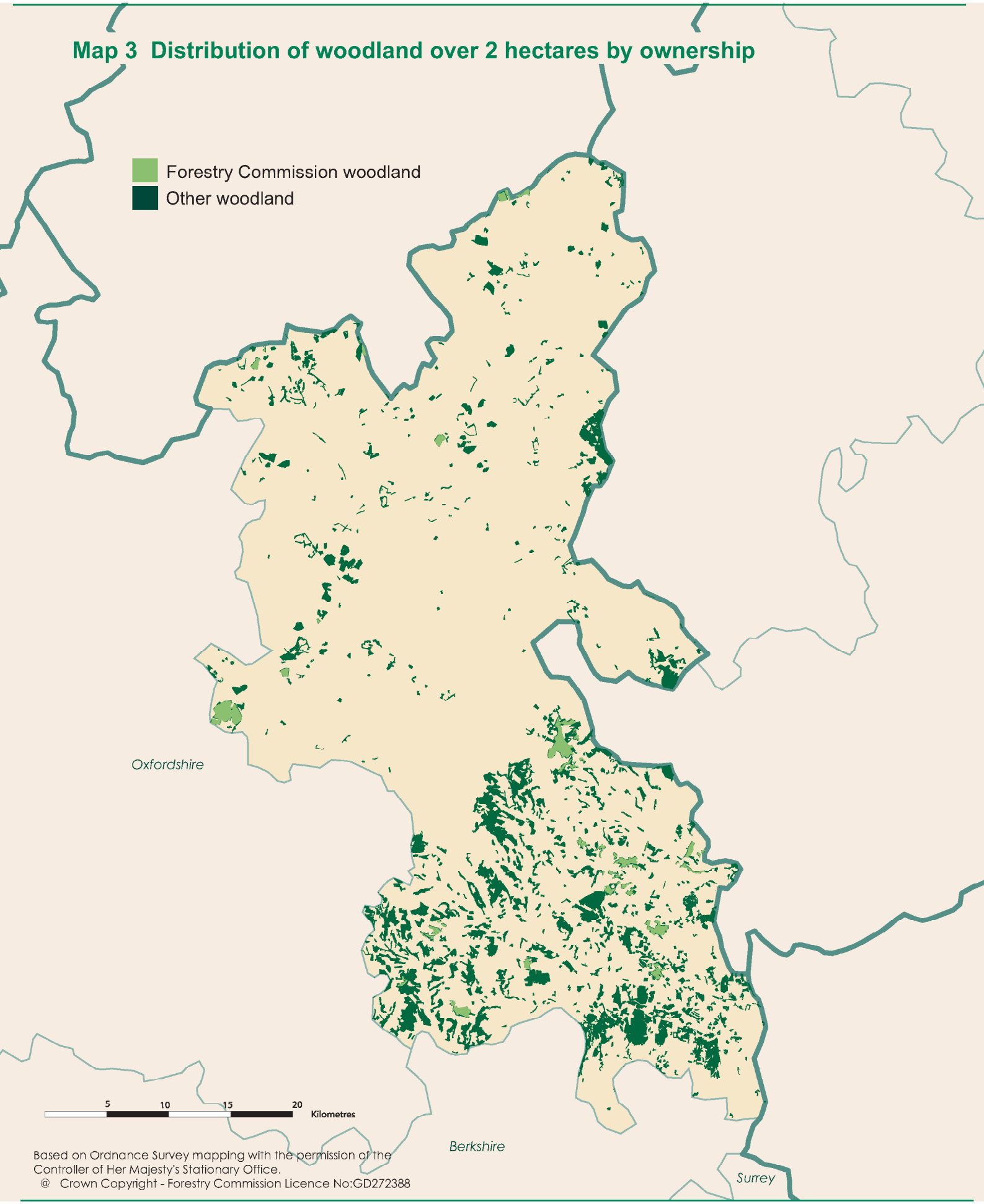
As well as this report for Buckinghamshire, reports are available for the other counties in the region as shown on the map opposite. Also available are region and county reports for England as well as a report for the country as a whole.
Wales and Scotland are also covered by reports. Inventory reports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

Map 1 Regional and county boundaries

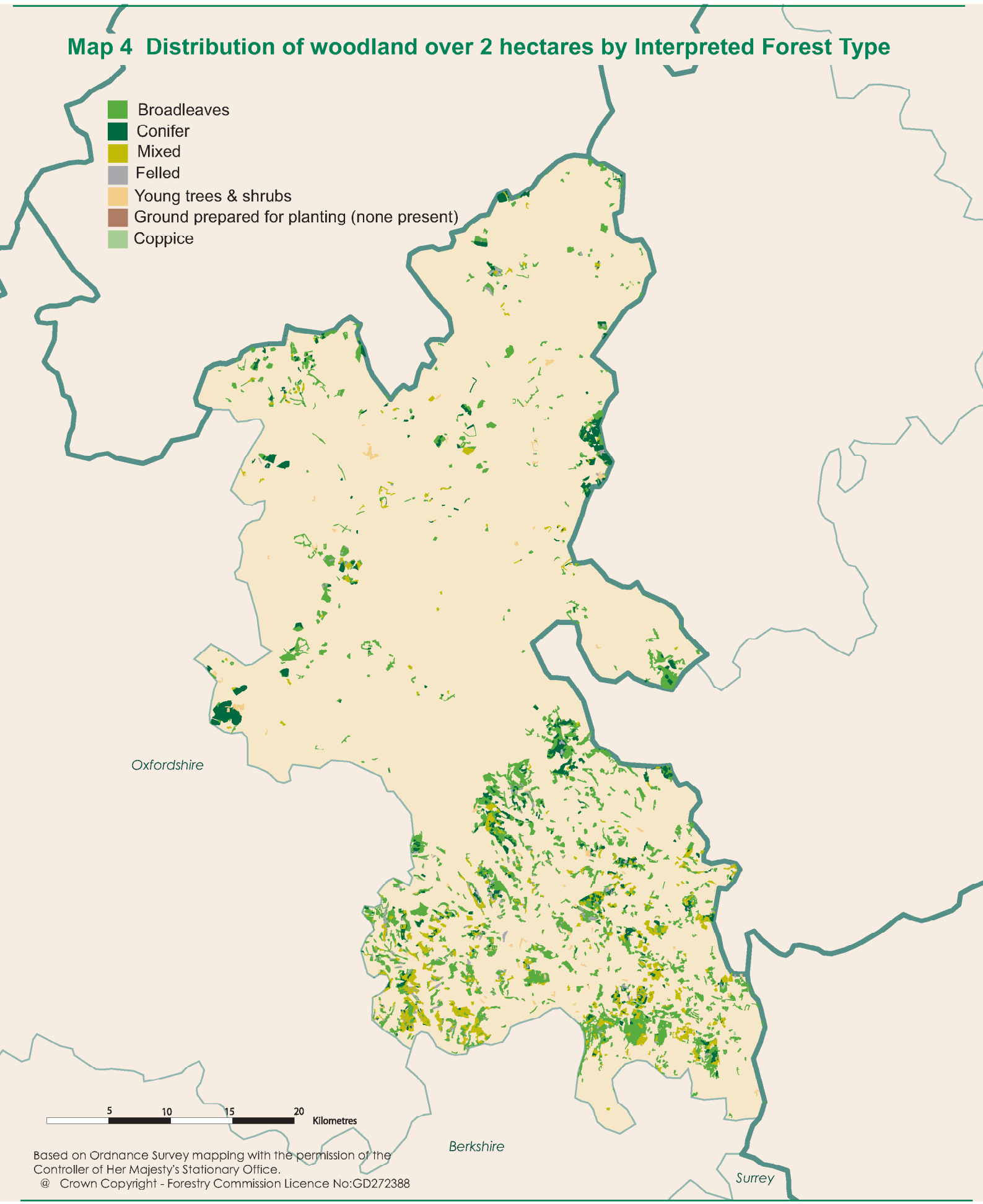
Map 2 Distribution of woodland over 2 hectares



Map 3 Distribution of woodland over 2 hectares by ownership



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



Reference Date 31 March 1997

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 Buckinghamshire.

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	16,892	96.1
0.25 - < 2.00	609	3.5
0.10 - < 0.25	72	0.4
Total area of woodland	**17,573**	**100.0**
% Woodland land cover	**9.4**	

1. Area of Buckinghamshire, including inland water, 187,673 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	1,775	6	1,781	10.1
Broadleaved	10,808	521	11,329	64.5
Mixed	3,446	97	3,543	20.2
Coppiced	0	0	0	0.0
Copp-w-standards	0	0	0	0.0
Windblow	0	0	0	0.0
Felled	27	0	27	0.2
Open Space	836	56	892	5.1
Total	**16,892**	**681**	**17,573**	**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	Percentage of total area	
	2.0 and over	0.1 -<2.0	(ha)	Category*	Species**
Pine	1,033	19	1,052	31.6	6.3
Sitka spruce	0	0	0	0.0	0.0
Larch	792	5	797	23.9	4.8
Other conifers	1,367	24	1,391	41.8	8.4
Mixed conifers	73	17	90	2.7	0.5
Total conifers	**3,265**	**65**	**3,330**	**100.0**	**20.0**
Oak	2,819	142	2,961	22.2	17.8
Beech	3,907	45	3,952	29.7	23.7
Sycamore	370	25	395	3.0	2.4
Ash	2,162	64	2,226	16.7	13.4
Birch	1,157	0	1,157	8.7	6.9
Elm	57	6	63	0.5	0.4
Other broadleaves	1,669	97	1,766	13.3	10.6
Mixed broadleaves	623	181	804	6.0	4.8
Total broadleaves	**12,763**	**560**	**13,323**	**100.0**	**80.0**
Total all species* **	**16,028**	**625**	**16,653**		**100.0**

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

***Excludes the 919 ha 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	4%
Pine	17%
Oak	9%
Beech	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	10,000	131,800	13	70
Narrow Linear Features	5,800	128,000	22	68
Individual Trees	59,200	59,200	1	32
Total		**319,000**		**170**

1. Land area used to calculate tree density 187,673 ha 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	74%
Narrow Linear Features	53%
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	5,800	640	341
Total		**640**	**341**

1. Land area used to calculate tree density 187,673 ha 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	62%

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.

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	1,753	10
Other	15,139	90
Total area of woodland	**16,892**	**100**

1. Woodland area from aerial photographic interpretation map updated to 31 March 1997

2. See Glossary for definitions of ownership types

Woodland area by ownership

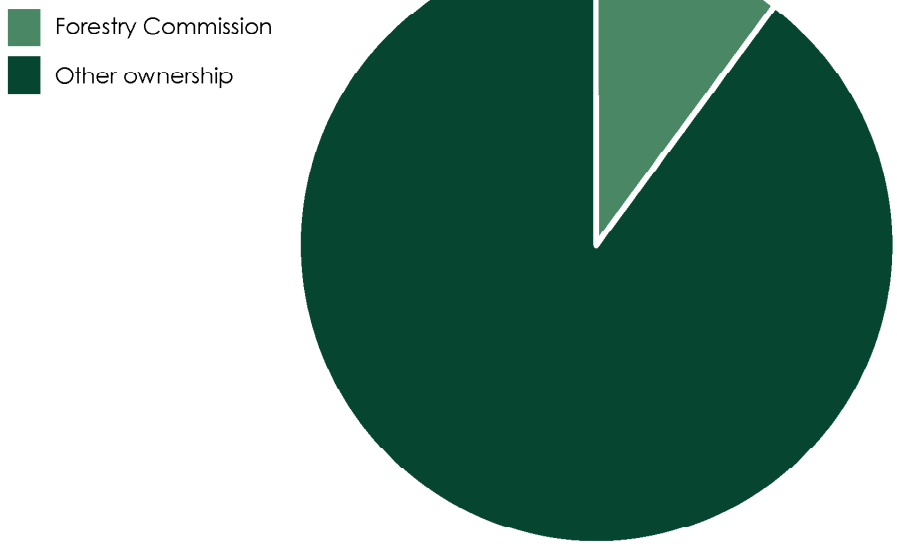


Table 7a Size class distribution of woodland

Size class (ha)	Number of woods	Total area (ha)	Percent of total area	Mean wood area (ha)
<10	586	2,486	15	4.2
10 - <20	117	1,651	10	14.1
20 - <50	85	2,719	16	32.0
50 - <100	35	2,392	14	68.3
<100	**823**	**9,247**	**55**	**11.2**
100 - <500	**30**	**5,939**	**35**	**198.0**
500 and >	**2**	**1,710**	**10**	**855.2**
All woods	**855**	**16,897**	**100**	**19.8**

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	24	129	1	5.4
	O	631	2,586	15	4.1
10 - <20	FC	7	107	1	15.2
	O	115	1,619	10	14.1
20 - <50	FC	14	478	3	34.2
	O	80	2,522	15	31.5
50 - <100	FC	4	296	2	74.1
	O	32	2,171	13	67.8
<100	FC	49	1,011	6	20.6
	O	858	8,898	53	10.4
100 - <500	FC	3	743	4	247.6
	O	26	5,163	31	198.6
500 and >	FC	0	0	0	0.0
	O	1	1,083	6	1083.3
Total	**FC**	**52**	**1,753**	**10**	**33.7**
	O	**885**	**15,144**	**90**	**17.1**

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 5 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 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 occasionaly 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	839	47.9	936	6.2	1,775	10.5
Broadleaved	415	23.7	10,392	68.6	10,808	64.0
Mixed	492	28.1	2,954	19.5	3,446	20.4
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	0	0.0	27	0.2	27	0.2
Open Space	7	0.4	829	5.5	836	4.9
Total	**1,753**	**100.0**	**15,139**	**100.0**	**16,892**	**100.0**

Area of woodland by forest type

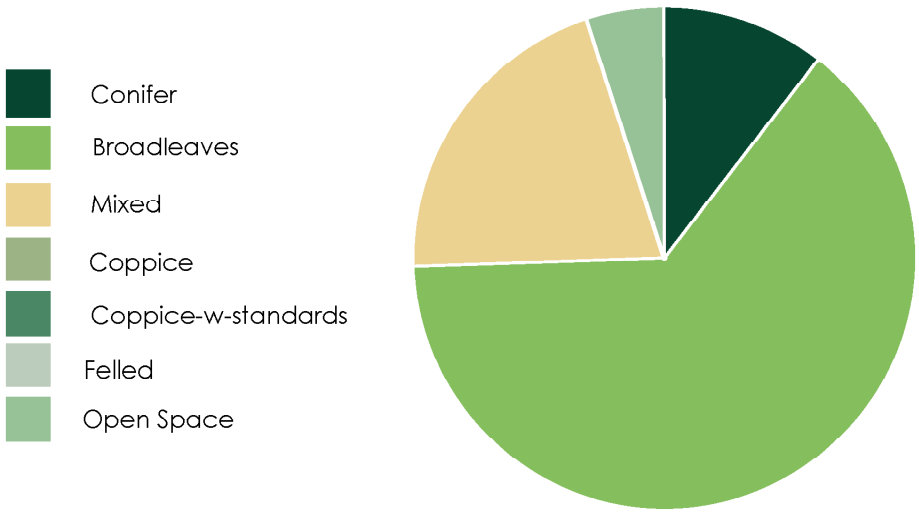


Table 9a Area of High Forest by principal species and ownership

Species	Forestry Commission			Other			All ownerships		
	area (ha)	cat* %	spp** %	area (ha)	cat* %	spp** %	area (ha)	cat* %	spp** %
Scots pine	61	6	3	619	29	4	680	21	4
Corsican pine	72	7	4	281	13	2	353	11	2
Lodgepole pine	0	0	0	0	0	0	0	0	0
Sitka spruce	0	0	0	0	0	0	0	0	0
Norway spruce	703	64	40	284	13	2	987	30	6
European larch	0	0	0	22	1	0	22	1	0
Jap/Hybrid larch	154	14	9	616	29	4	770	24	5
Douglas fir	0	0	0	5	0	0	5	0	0
Other conifers	109	10	6	265	12	2	375	11	2
Mixed conifers	6	1	0	68	3	0	73	2	0
Total conifers	**1,105**	**100**	**63**	**2,161**	**100**	**15**	**3,265**	**100**	**20**
Oak	196	31	11	2,623	22	18	2,819	22	18
Beech	167	26	10	3,740	31	26	3,907	31	24
Sycamore	0	0	0	370	3	3	370	3	2
Ash	123	19	7	2,039	17	14	2,162	17	13
Birch	49	8	3	1,108	9	8	1,157	9	7
Poplar	0	0	0	413	3	3	413	3	3
Sweet chestnut	0	0	0	176	1	1	176	1	1
Elm	0	0	0	57	0	0	57	0	0
Other broadleaves	65	10	4	1,015	8	7	1,080	8	7
Mixed broadleaves	42	7	2	581	5	4	623	5	4
Total broadleaves	**641**	**100**	**37**	**12,122**	**100**	**85**	**12,763**	**100**	**80**
Total - all species	**1,746**		**100**	**14,282**		**100**	**16,028**		**100**
Felled	**0**			**27**			**27**		
Total High Forest	**1,746**			**14,309**			**16,055**		

*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 836ha 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	9%
Broadleaves	4%
Norway spruce	14%
Oak	9%
Beech	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

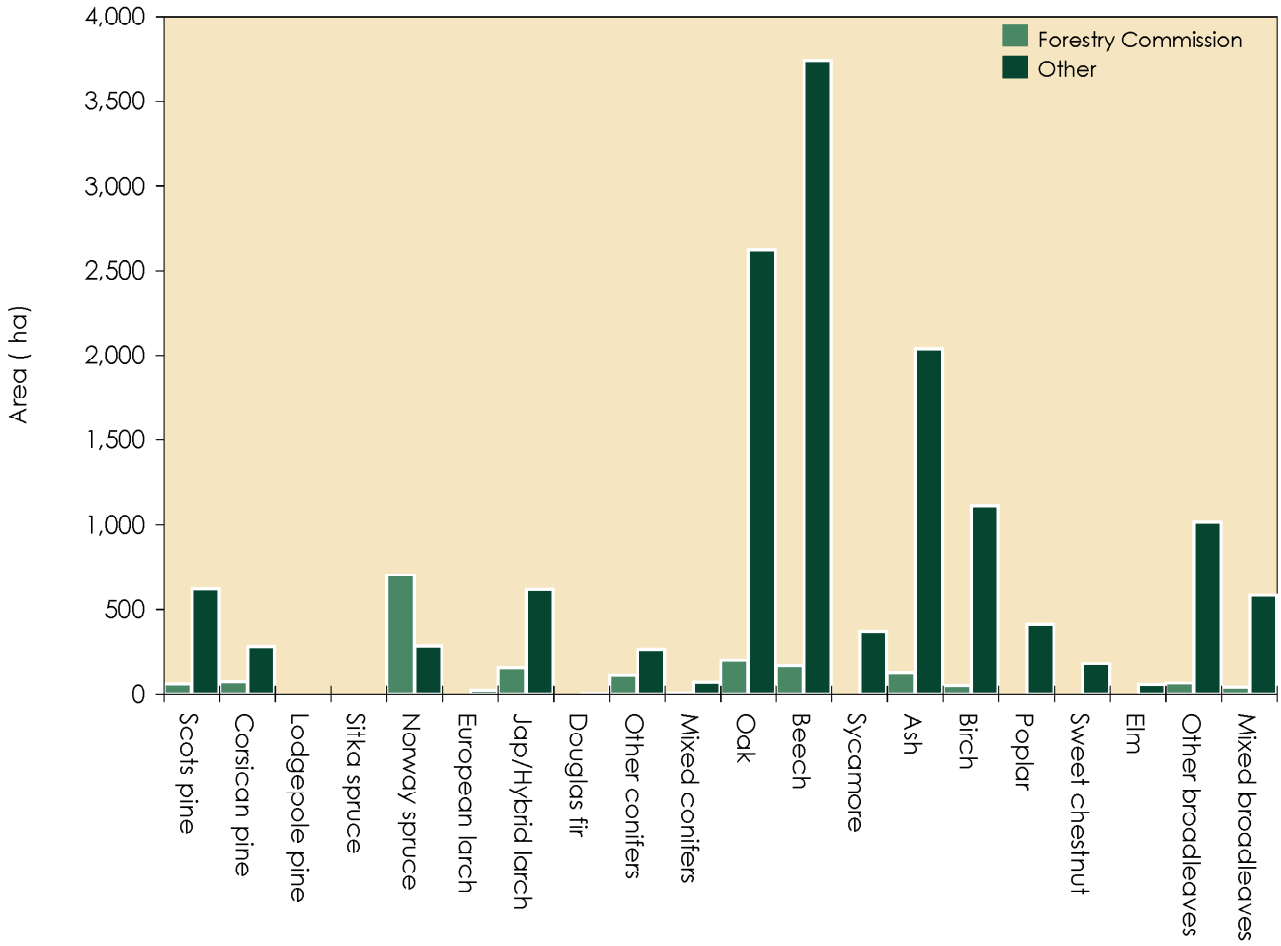


Table 9b Area of High Forest by principal species,ownership and category

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	61	0	61	619	0	619	680	0	680
Corsican pine	72	0	72	281	0	281	353	0	353
Lodgepole pine	0	0	0	0	0	0	0	0	0
Sitka spruce	0	0	0	0	0	0	0	0	0
Norway spruce	703	0	703	284	0	284	987	0	987
European larch	0	0	0	22	0	22	22	0	22
Jap/Hybrid larch	154	0	154	616	0	616	770	0	770
Douglas fir	0	0	0	5	0	5	5	0	5
Other conifers	109	0	109	261	4	265	370	4	375
Mixed conifers	6	0	6	68	0	68	73	0	73
Total conifers	**1,105**	**0**	**1,105**	**2,156**	**4**	**2,161**	**3,261**	**4**	**3,265**
Oak	196	0	196	2,615	8	2,623	2,811	8	2,819
Beech	167	0	167	3,740	0	3,740	3,907	0	3,907
Sycamore	0	0	0	370	0	370	370	0	370
Ash	123	0	123	2,039	0	2,039	2,162	0	2,162
Birch	49	0	49	1,108	0	1,108	1,157	0	1,157
Poplar	0	0	0	413	0	413	413	0	413
Sweet chestnut	0	0	0	176	0	176	176	0	176
Elm	0	0	0	51	5	57	51	5	57
Other broadleaves	65	0	65	1,015	0	1,015	1,080	0	1,080
Mixed broadleaves	42	0	42	581	0	581	623	0	623
Total broadleaves	**641**	**0**	**641**	**12,108**	**13**	**12,122**	**12,750**	**13**	**12,763**
Total - all species	**1,746**	**0**	**1,746**	**14,265**	**17**	**14,282**	**16,011**	**17**	**16,028**

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

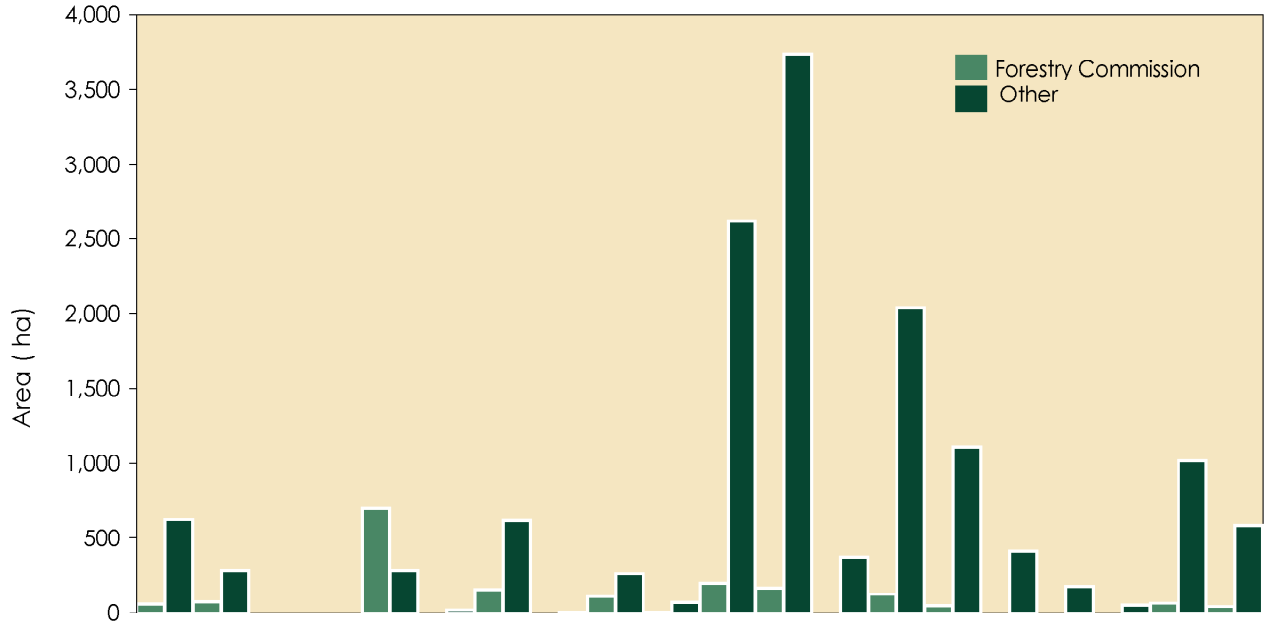
	Category 1*	Category 2*	Total High Forest
Conifers	9%	-	9%
Broadleaves	4%	-	4%
Norway spruce	14%	-	14%
Oak	9%	-	9%
Beech	9%	-	9%

*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 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

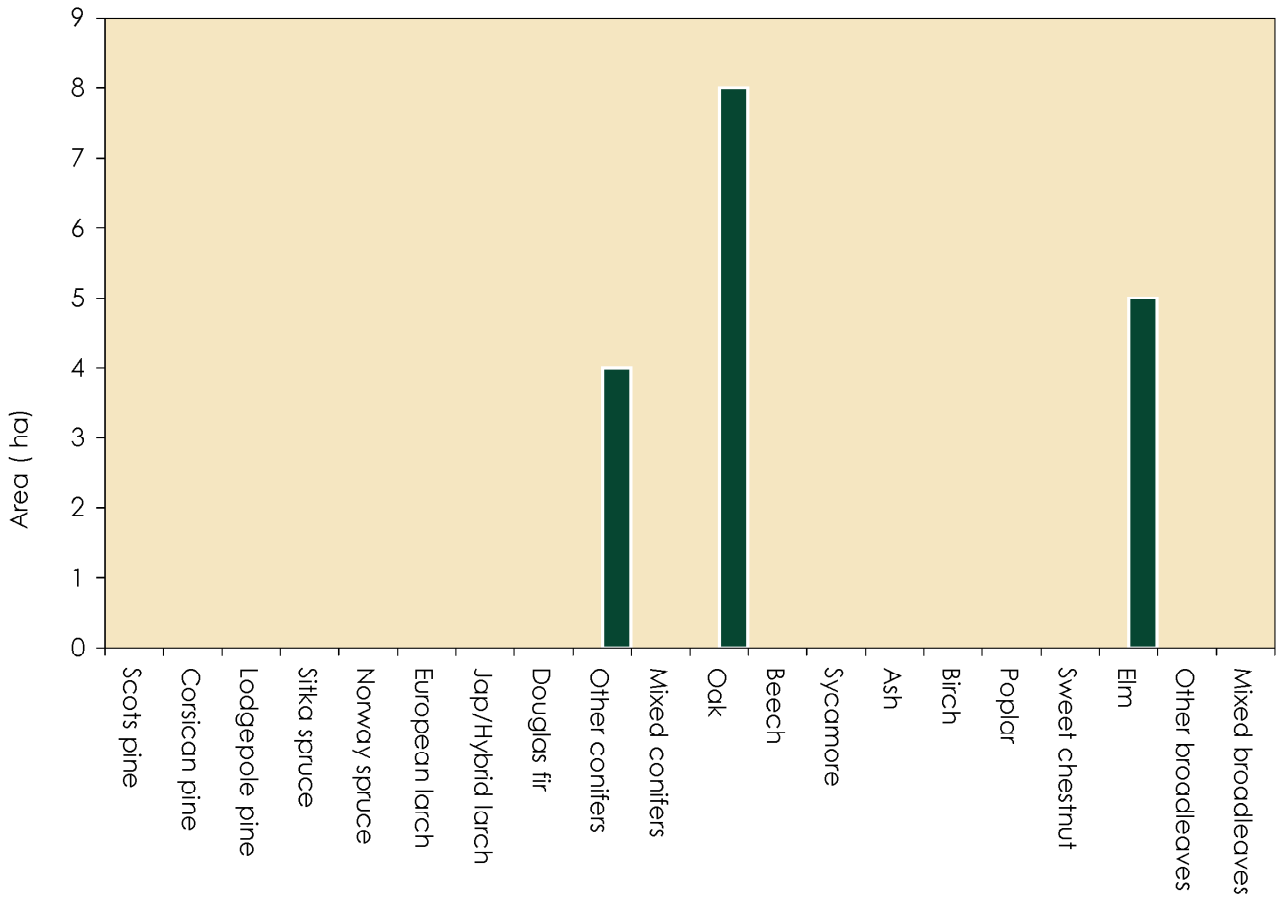
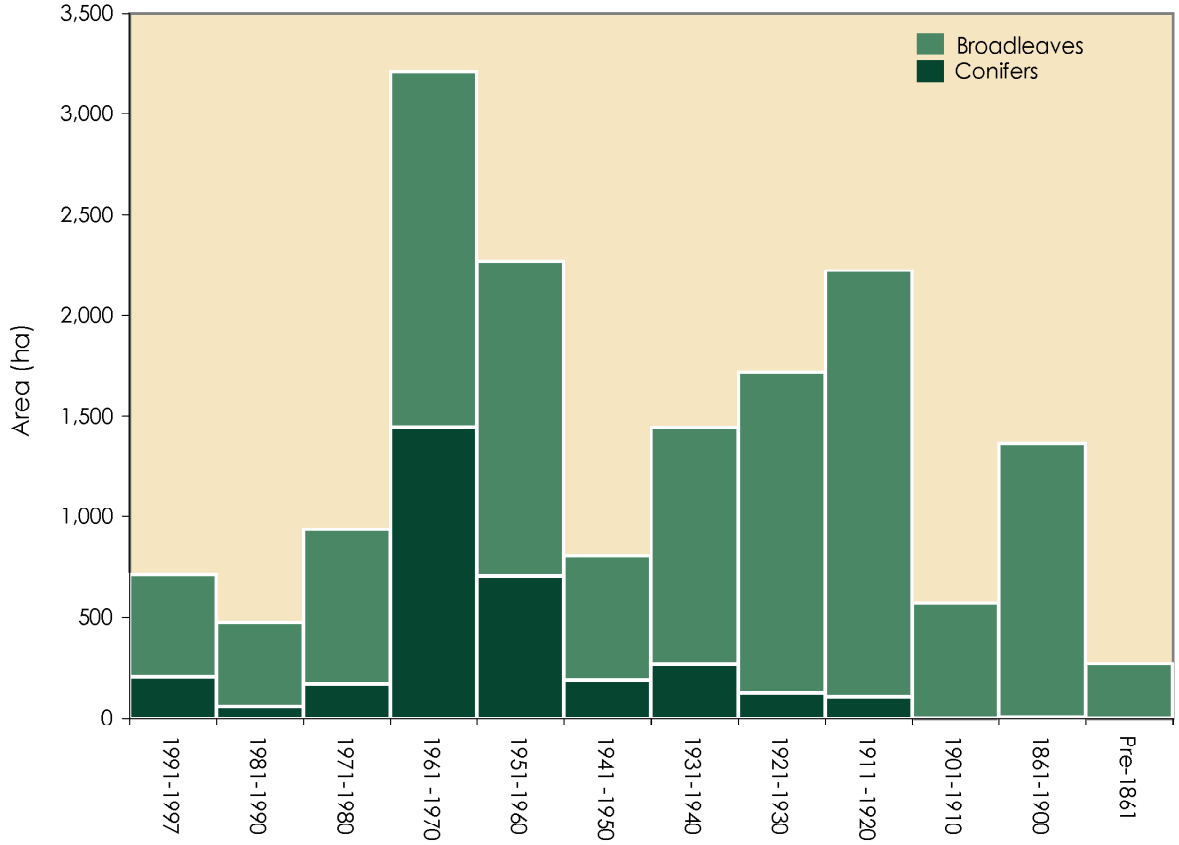


Table 10a High Forest Category 1 - Area by principal species and planting year class

Species	Planting year class*												Total (ha)
	1991-1997	1981-1990	1971-1980	1961 - 1970	1951-1960	1941 - 1950	1931-1940	1921-1930	1911 - 1920	1901-1910	1861-1900	Pre-1861	
Scots pine	16	13	100	235	94	49	95	52	24	0	0	0	680
Corsican pine	0	32	54	221	0	0	15	4	27	0	0	0	353
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	95	11	2	641	132	10	80	0	16	0	0	0	987
European larch	16	0	0	0	0	0	0	5	0	0	0	0	22
Jap/Hybrid larch	54	0	0	214	377	66	23	4	33	0	0	0	770
Douglas fir	0	0	5	0	0	0	0	0	0	0	0	0	5
Other conifers	21	0	0	110	73	49	55	52	4	0	4	0	370
Mixed conifers	0	0	5	25	25	14	0	4	0	0	0	0	73
Total conifers	**203**	**56**	**167**	**1,445**	**701**	**188**	**269**	**123**	**105**	**0**	**4**	**0**	**3,261**
Oak	105	29	30	115	187	112	178	495	836	225	297	201	2,811
Beech	27	44	127	306	354	63	365	717	711	217	914	60	3,907
Sycamore	11	21	27	38	84	5	45	50	44	23	22	0	370
Ash	68	42	166	459	310	103	284	208	433	83	8	0	2,162
Birch	105	131	40	479	332	27	21	0	21	0	0	0	1,157
Poplar	28	89	110	31	37	114	0	3	0	0	0	0	413
Sweet chestnut	0	0	5	0	0	63	63	11	5	0	27	0	176
Elm	0	4	26	14	7	0	0	0	0	0	0	0	51
Other broadleaves	129	34	215	169	130	49	147	49	42	20	82	10	1,080
Mixed broadleaves	34	25	24	153	127	81	73	59	27	5	14	0	623
Total broadleaves	**508**	**421**	**771**	**1,765**	**1,570**	**618**	**1,176**	**1,593**	**2,118**	**573**	**1,364**	**272**	**12,750**
Total - all species	**710**	**476**	**938**	**3,211**	**2,271**	**806**	**1,445**	**1,717**	**2,223**	**573**	**1,369**	**272**	**16,011**

*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



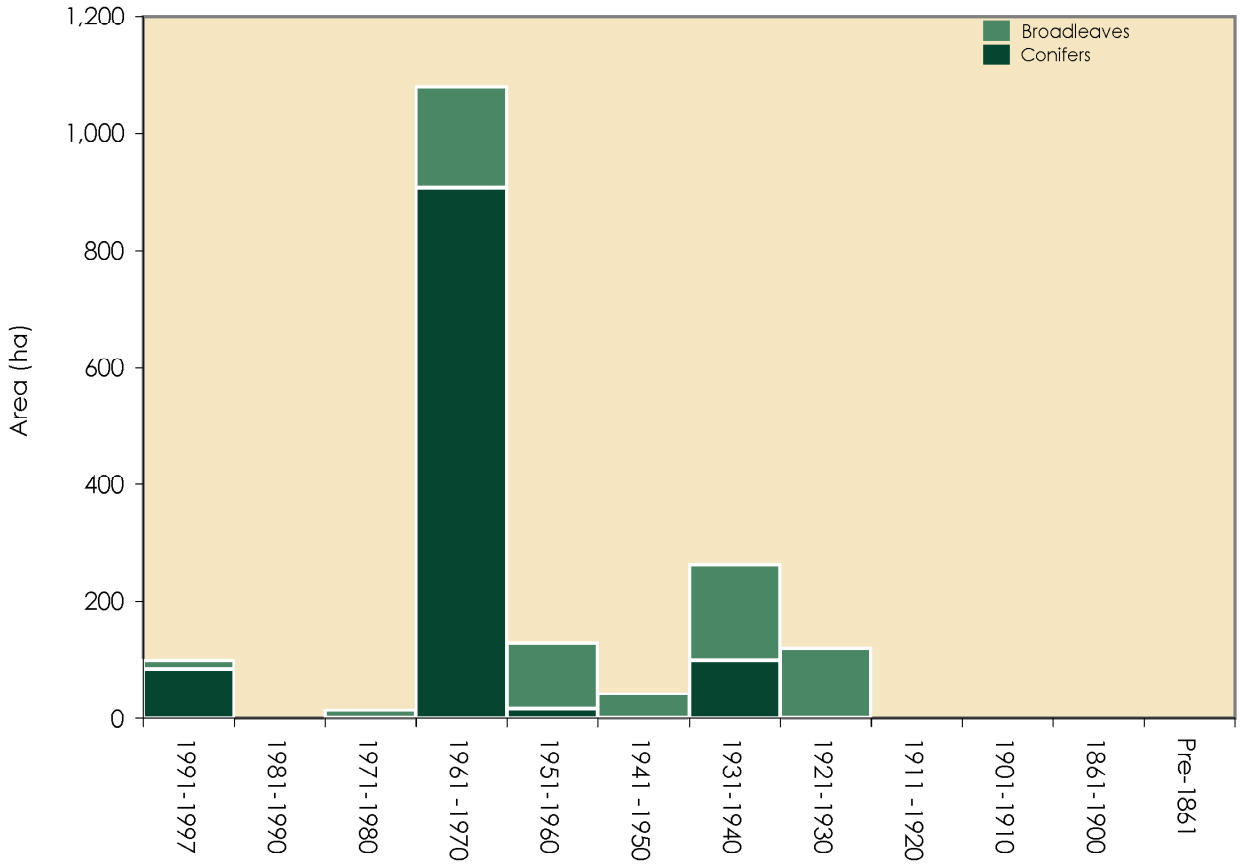
1. Most of the planting year classes cover 10 years, 1991-1997 is 7 years, and the classes prior to 1901 are 40 years or more.

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

Species	Planting year class*												Total (ha)
	1991-1997	1981-1990	1971-1980	1961 - 1970	1951-1960	1941 - 1950	1931-1940	1921-1930	1911 - 1920	1901-1910	1861-1900	Pre-1861	
Scots pine	0	0	0	57	0	0	3	0	0	0	0	0	61
Corsican pine	0	0	0	72	0	0	0	0	0	0	0	0	72
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	84	0	0	549	0	0	70	0	0	0	0	0	703
European larch	0	0	0	0	0	0	0	0	0	0	0	0	0
Jap/Hybrid larch	0	0	0	147	0	0	7	0	0	0	0	0	154
Douglas fir	0	0	0	0	0	0	0	0	0	0	0	0	0
Other conifers	0	0	0	78	14	0	17	0	0	0	0	0	109
Mixed conifers	0	0	0	3	3	0	0	0	0	0	0	0	6
Total conifers	**84**	**0**	**0**	**907**	**17**	**0**	**98**	**0**	**0**	**0**	**0**	**0**	**1,105**
Oak	0	0	7	57	20	35	26	50	0	0	0	0	196
Beech	0	0	0	38	45	0	14	70	0	0	0	0	167
Sycamore	0	0	0	0	0	0	0	0	0	0	0	0	0
Ash	0	0	0	10	17	0	95	0	0	0	0	0	123
Birch	10	0	0	20	20	0	0	0	0	0	0	0	49
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	8	21	7	6	23	0	0	0	0	0	65
Mixed broadleaves	3	0	0	27	3	1	7	0	0	0	0	0	42
Total broadleaves	**14**	**0**	**15**	**173**	**112**	**43**	**165**	**120**	**0**	**0**	**0**	**0**	**641**
Total - all species	**98**	**0**	**15**	**1,080**	**129**	**43**	**263**	**120**	**0**	**0**	**0**	**0**	**1,746**

*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



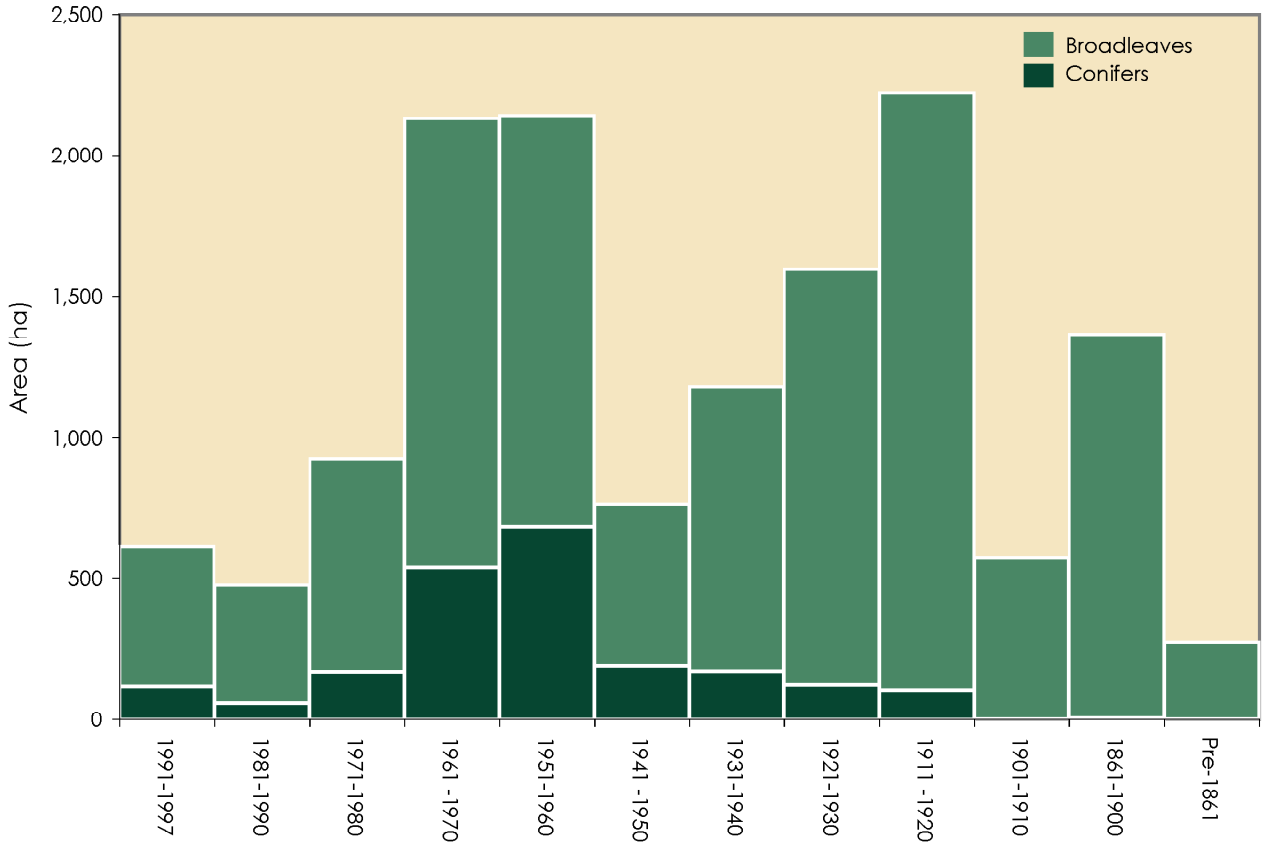
1. Most of the planting year classes cover 10 years, 1991-1997 is 7 years, and the classes prior to 1901 are 40 years or more.

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

Species	Planting year class*												Total (ha)
	1991-1997	1981-1990	1971-1980	1961 - 1970	1951-1960	1941 - 1950	1931-1940	1921-1930	1911 - 1920	1901-1910	1861-1900	Pre-1861	
Scots pine	16	13	100	178	94	49	92	52	24	0	0	0	619
Corsican pine	0	32	54	149	0	0	15	4	27	0	0	0	281
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	11	11	2	92	132	10	10	0	16	0	0	0	284
European larch	16	0	0	0	0	0	0	5	0	0	0	0	22
Jap/Hybrid larch	54	0	0	67	377	66	16	4	33	0	0	0	616
Douglas fir	0	0	5	0	0	0	0	0	0	0	0	0	5
Other conifers	21	0	0	32	59	49	38	52	4	0	4	0	261
Mixed conifers	0	0	5	22	22	14	0	4	0	0	0	0	68
Total conifers	**119**	**56**	**167**	**539**	**684**	**188**	**171**	**123**	**105**	**0**	**4**	**0**	**2,156**
Oak	105	29	23	58	167	78	152	445	836	225	297	201	2,615
Beech	27	44	127	269	309	63	351	648	711	217	914	60	3,740
Sycamore	11	21	27	38	84	5	45	50	44	23	22	0	370
Ash	68	42	166	449	293	103	189	208	433	83	8	0	2,039
Birch	95	131	40	460	312	27	21	0	21	0	0	0	1,108
Poplar	28	89	110	31	37	114	0	3	0	0	0	0	413
Sweet chestnut	0	0	5	0	0	63	63	11	5	0	27	0	176
Elm	0	4	26	14	7	0	0	0	0	0	0	0	51
Other broadleaves	129	34	208	150	123	42	124	49	42	20	82	10	1,015
Mixed broadleaves	31	25	24	126	125	80	66	59	27	5	14	0	581
Total broadleaves	**494**	**421**	**756**	**1,593**	**1,458**	**576**	**1,010**	**1,474**	**2,118**	**573**	**1,364**	**272**	**12,108**
Total - all species	**613**	**476**	**923**	**2,131**	**2,142**	**764**	**1,182**	**1,597**	**2,223**	**573**	**1,369**	**272**	**14,265**

*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, 1991-1997 is 7 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	%
1991-97	Other broadleaves	18	Oak / Birch	15	Norway spruce	13
1981-90	Birch	28	Poplar	19	Beech	9
1971-80	Other broadleaves	23	Ash	18	Beech	13
1961-70	Norway spruce	20	Birch	15	Ash	14
1951-60	Jap/Hybrid larch	17	Beech	16	Birch	15
1941-50	Poplar	14	Oak	14	Ash	13
1931-40	Beech	25	Ash	20	Oak	12
1921-30	Beech	42	Oak	29	Ash	12
1911-20	Oak	38	Beech	32	Ash	19
1901-10	Oak	39	Beech	38	Ash	14
1861-1900	Beech	66	Oak	22	Other broadleaves	6
Pre 1861	Oak	74	Beech	22	Other broadleaves	4
All years	**Beech**	**24**	**Oak**	**18**	**Ash**	**13**

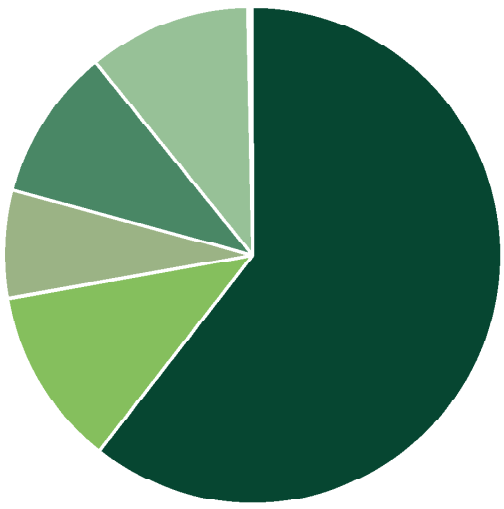
1. Principal species as a percentage of area in the planting year class.

Table 12 Ownership type* by area and percentage

Ownership type	Area (ha)	%
Personal	10,222	60.5
Business	1,956	11.6
Forestry or timber business	0	0.0
Charity	1,173	6.9
Local Authority	1,734	10.3
Other public (not FC)	0	0.0
Forestry Commission	1,753	10.4
Community ownership or common land	0	0.0
Unidentified	54	0.3
Total	**16,892**	**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 km^2 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 km^2 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.

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	1,569	681	Area (ha)
Wide Linear Features	0	0	Area (ha)
Wide Linear Features	0	0	Length (Km)
Narrow Linear Features	5,800	640	Length (Km)
Narrow Linear Features	5,800	128,000	Number of live trees
Groups	10,000	131,800	Number of live trees
Individual Trees	59,200	59,200	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	72	609	681	1,569	0.43
Wide Linear Features	0	0	0	0	0.00
Total	**72**	**609**	**681**	**1,569**	**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	0.0	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	8.3	2.5	5.8	11.6	28.2	8.8	8.8
Beech	0.8	0.8	0.0	0.0	1.6	0.5	0.5
Sycamore	3.3	1.7	0.8	0.0	5.8	1.8	1.8
Ash	17.5	0.8	13.3	8.1	39.7	12.4	12.4
Birch	0.0	1.7	0.8	0.0	2.5	0.8	0.8
Poplar	3.3	0.0	0.0	0.0	3.3	1.0	1.0
Sweet chestnut	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Horse chestnut	0.0	0.8	0.0	55.9	56.7	17.8	17.8
Alder	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lime	0.0	1.7	0.0	0.0	1.7	0.5	0.5
Elm	0.0	0.0	25.0	0.0	25.0	7.8	7.8
Willow	0.8	0.0	36.7	1.2	38.7	12.1	12.1
Other broadleaves	11.7	3.3	49.2	51.2	115.4	36.2	36.2
Total broadleaves	**45.9**	**13.3**	**131.8**	**128.0**	**319.0**	**100.0**	**100.0**
Total - all species	**45.9**	**13.3**	**131.8**	**128.0**	**319.0**		**100.0**

1. Percentages

   Category : species percentage of conifer or broadleaved.
   Species : percentage of all species.

2. The standard errors of the total tree number estimates for these feature types are:

Individual Trees	31%
Groups	74%
Narrow Linear Features	53%

3. 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	0.0	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	6.7	0.0	6.7	100.0	100.0
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**	**0.0**	**6.7**	**0.0**	**6.7**	**100.0**	**100.0**
Total - all species	**0.0**	**0.0**	**6.7**	**0.0**	**6.7**		**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	0.0	0.0	0.0	0.0	0.0
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	0.0	0.0	0.0	0.0	0.0
Total conifers	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Oak	0.0	11.7	16.6	0.0	28.3
Beech	0.0	0.0	1.7	0.0	1.7
Sycamore	0.8	5.0	0.0	0.0	5.8
Ash	1.7	17.5	20.7	0.0	39.9
Birch	1.7	0.8	0.0	0.0	2.5
Poplar	0.0	0.0	0.0	3.3	3.3
Sweet chestnut	0.0	0.0	0.0	0.0	0.0
Horse chestnut	0.8	0.0	55.9	0.0	56.7
Alder	0.0	0.0	0.0	0.0	0.0
Lime	0.8	0.0	0.8	0.0	1.6
Elm	2.5	22.5	0.0	0.0	25.0
Willow	7.0	29.2	2.5	0.0	38.7
Other broadleaves	62.1	52.5	0.8	0.0	115.4
Total broadleaves	**77.5**	**139.2**	**99.0**	**3.3**	**319.0**
Total - all species	**77.5**	**139.2**	**99.0**	**3.3**	**319.0**

Table 18 Number of Groups by group size

Number of trees per Group*	Number of Groups (000's)
2	0
3-5	5
6-10	0
11-20	3
21-50	1
51-100	2
>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 1997 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 1997 Inventory
Table 20:	Comparison of High Forest area by species between 1980 Census and 1997 Inventory
Chart:	Comparison of High Forest area by species between 1980 Census and 1997 Inventory
Table 21:	Comparison of High Forest Category 1 area by planting year class between 1980 Census and 1997 Inventory
Chart:	Comparison of High Forest Category 1 area by planting year class between 1980 Census and 1997 Inventory
Table 22:	Comparison of numbers of live trees outside woodland between 1980 Census and 1997 Inventory
Table 23:	Comparison of density of non-woodland features between 1980 Census and 1997 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 1997 Inventory

Woodland size (ha)	1980 Census woodland area		1997 Inventory woodland area		Change (%)
	(ha)	(%)	(ha)	(%)	(%)
2.0 or more	14,751	94.4	16,892	96.5	15
0.25 - <2.0	867	5.6	609	3.5	-30
Total	**15,618**		**17,501**		**12**
% Woodland land cover	**8.3**		**9.3**		

1. Differences in sampling methodology may account for some of the apparent differences.

2. The above figures from the 1997 Inventory exclude woodland between 0.1 and <0.25 ha, thereby matching the scope of the 1980 Census. The 1997 figures above will therefore not match those in the previous sections of the report.

3. Land area used to calculate woodland cover percent (1997), 187,673 ha, was based on the 1991 Census of Population digital boundaries.

4. Land area used to calculate woodland cover percent (1980), 188,285 ha, (Ordnance Survey data)

Table 20 Comparison of High Forest area by species between 1980 Census and 1997 Inventory

Species	1980 Census woodland area (ha)	1997 Inventory woodland area (ha)	Change (%)
Scots pine	453	699	54
Corsican pine	493	353	-28
Lodgepole pine	0	0	0
Sitka spruce	11	0	-100
Norway spuce	649	987	52
European larch	585	22	-96
Jap/Hybrid larch	438	775	77
Douglas fir	88	5	-94
Other conifers	235	399	69
Mixed conifers	340	79	-77
Total conifers	**3,292**	**3,319**	**1**
Oak	2,106	2,945	40
Beech	5,625	3,952	-30
Sycamore	309	395	28
Ash	786	2,222	183
Birch	766	1,157	51
Poplar	43	419	881
Sweet chestnut	45	176	294
Elm	3	63	2112
Other broadleaves	781	1,158	48
Mixed broadleaves	778	774	-1
Total broadleaves	**11,242**	**13,261**	**18**
Total all species	**14,534**	**16,580**	**14**
Felled	**277**	**27**	**-90**
Total High Forest	**14,811**	**16,607**	**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 5.1% (Table 2). To obtain meaningful comparisons between the two datasets the 1980 Census data have therefore been reduced by 5.1%.

3. The above figures from the 1997 Inventory exclude woodland between 0.1 and <0.25 ha, thereby matching the scope of the 1980 Census.
The 1997 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 1997 Inventory

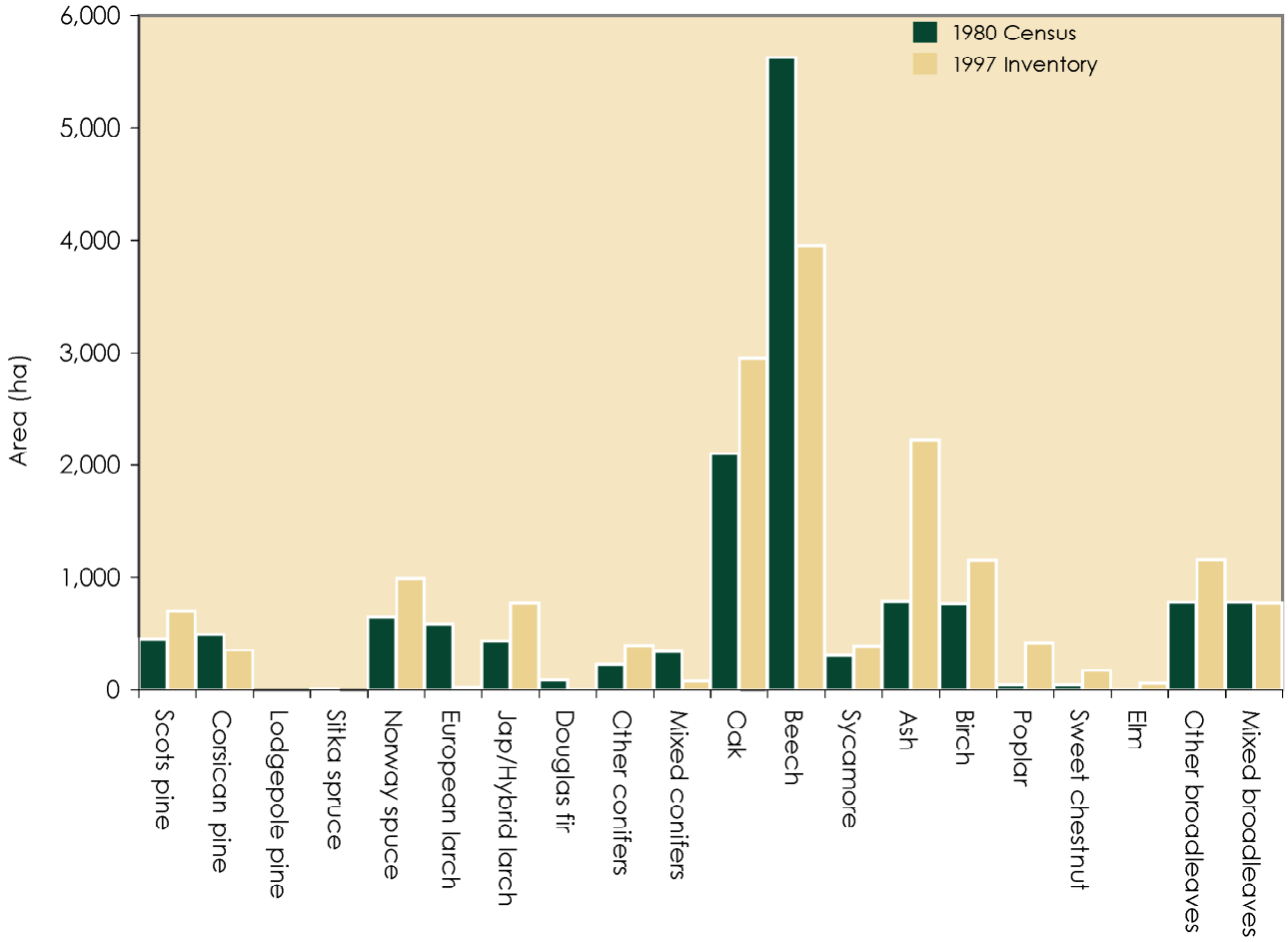


Table 21 Comparison of High Forest Category 1 area by planting year class between 1980 Census and 1997 Inventory

Planting year class	1980 Census woodland area (ha)	1997 Inventory woodland area (ha)	Change (%)
1991-1997	0	762	see note
1981-1990	0	477	see note
1971-1980	602	968	61
1961-1970	1,765	3,254	84
1951-1960	1,864	2,346	26
1941-1950	800	856	7
1931-1940	721	1,445	100
1921-1930	469	1,785	281
1911-1920	663	2,242	238
1901-1910	1,019	573	-44
1861-1900	4,220	1,384	-67
Pre 1861	1,452	272	-81
Total all years	**13,575**	**16,364**	**21**

1. The first two classes, 1991-1997 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 1997 Inventory

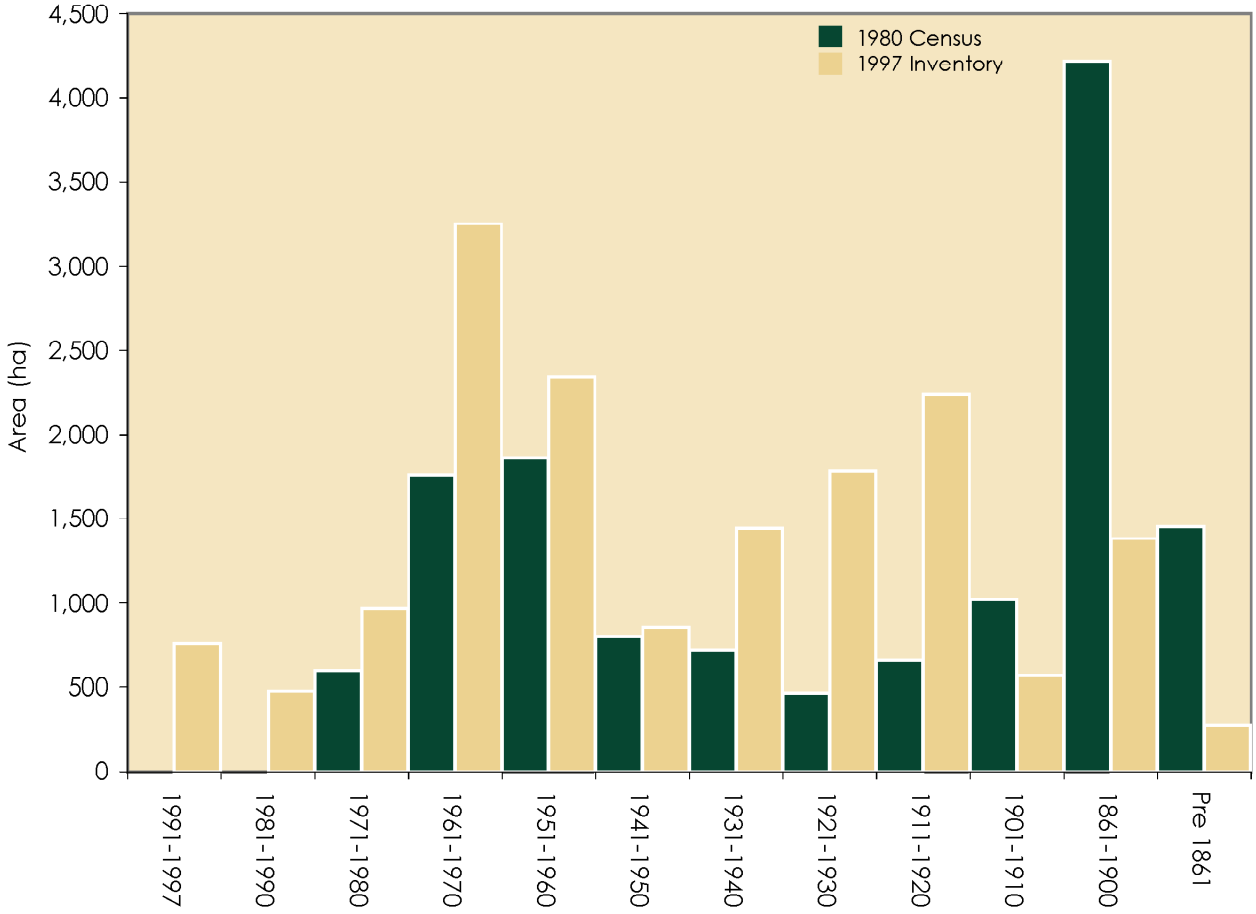


Table 22 Comparison of numbers of live trees outside woodland between 1980 Census and 1997 Inventory (000's)

Tables 22 and 23 have been excluded from this report. The Survey of Small Woodland and trees does not record information referring to tree features (I.e. Individual trees, Groups and Narrow Linear Features) within developed land. In this respect the survey differs markedly from the 1980 Census. Buckinghamshire included a substantial proportion of developed land making comparison inappropriate.

Table 23 Comparison of density of non-woodland features between 1980 Census and 1997 Inventory

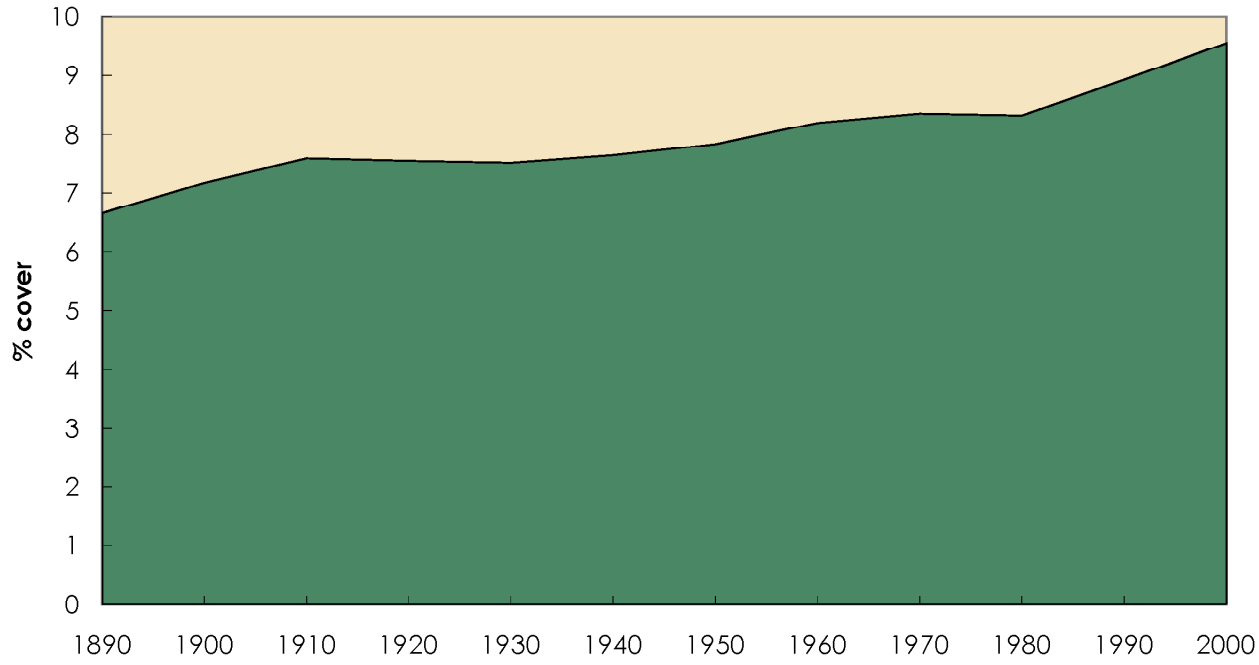
Tables 22 and 23 have been excluded from this report. The Survey of Small Woodland and trees does not record information referring to tree features (I.e. Individual trees, Groups and Narrow Linear Features) within developed land. In this respect the survey differs markedly from the 1980 Census. Buckinghamshire included a substantial proportion of developed land making comparison inappropriate.

WOODLAND COVER

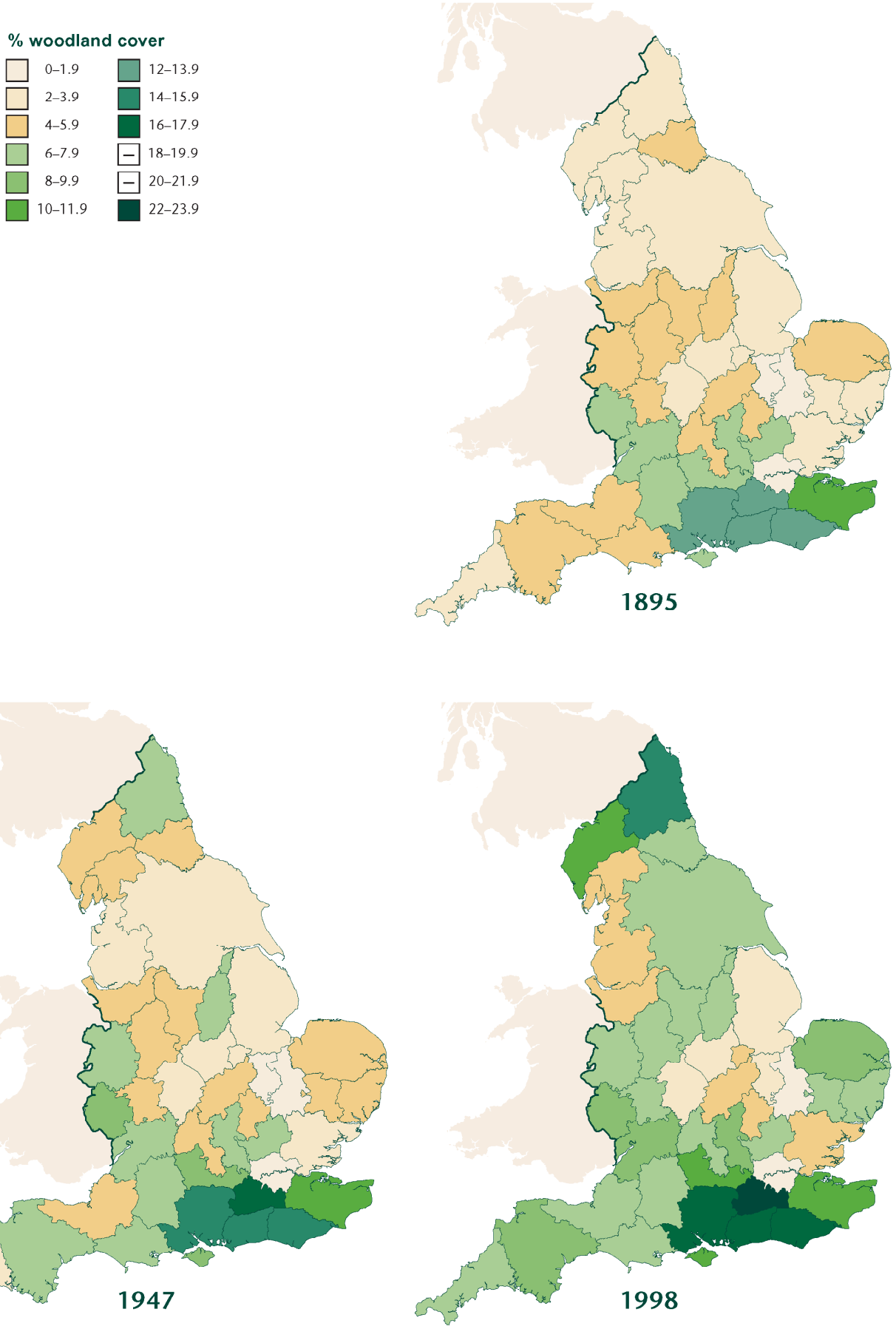
Woodland area data is available from Ministry of Agriculture surveys since 1871, and from Forestry Commission national woodland inventories since 1924. The following chart and maps show the changes in woodland area through time.

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)



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 16 m or less)
- Wide Linear Features (with a width greater than 16 m)

NOTES

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