National Inventory of Woodland and Trees

England

County Report for

Leicestershire

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 Leicestershire 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 Leicestershire 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 With the statistics becoming increasingly out of date the Forestry Commission decided to undertake a new survey: the *National Inventory of Woodland and Trees.*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 Leicestershire is 9,660 hectares. This represents 3.8% of the land area. (Table 1)

- Broadleaved woodland is the dominant forest type representing 74.6 % of all woodland. Conifer woodland represents 7.2 %, Mixed woodland 7.3 % and Open Space within woodlands 10.3 %. (Table 2)

- The main conifer species is pine covering 508 hectares or 48.4 % of all conifer species. The main broadleaved species is ash covering 2,543 hectares or 33.7 % of all broadleaved species. (Table 3)

- 526 hectares or 6 % of woodland over 2 hectares is owned by or leased to the Forestry Commission, and 7,568 hectares or 94 % of woodland is in Other ownership. (Table 6)

- There are a total of 789 woods over 2 ha within Leicestershire with a mean wood area of 10.5 hectares. (Table 7a) There are a total of 5,063 woods from 0.1 - <2.0 hectares with a mean wood area of 0.31 hectares. (Table 14)

- There are 2 million live trees outside woodland in Leicestershire. (Table 15)

- Woodland land cover increased by over 1,400 hectares from 3.0 % to 3.6 % of the land area between 1980 and 1998. (Table 19)

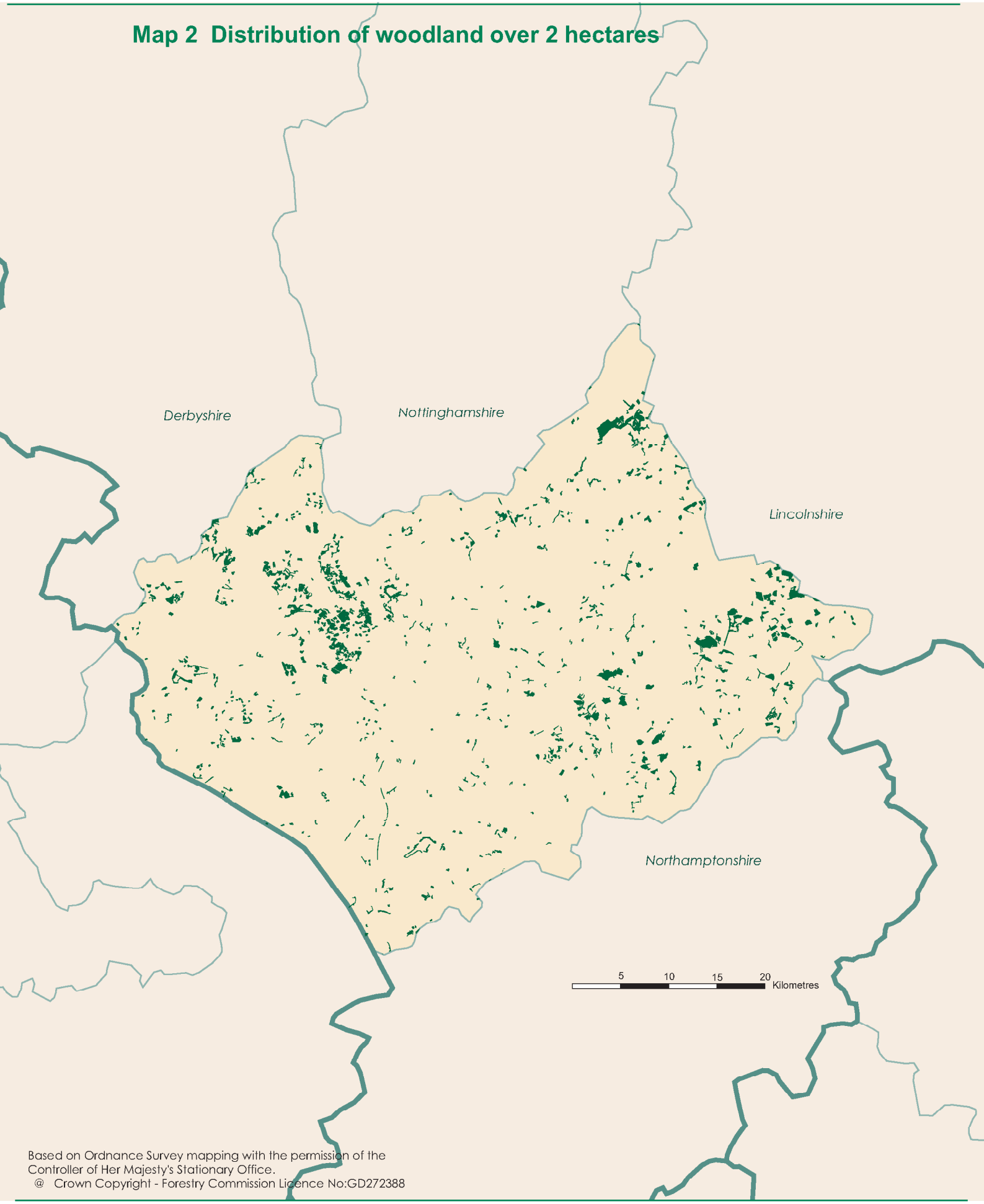
- The area of broadleaves increased by 33 % between 1980 and 1998, with the relative proportion of broadleaves to conifers increasing from 85 % to 88 %. (Table 20)

INVENTORY REPORTS

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

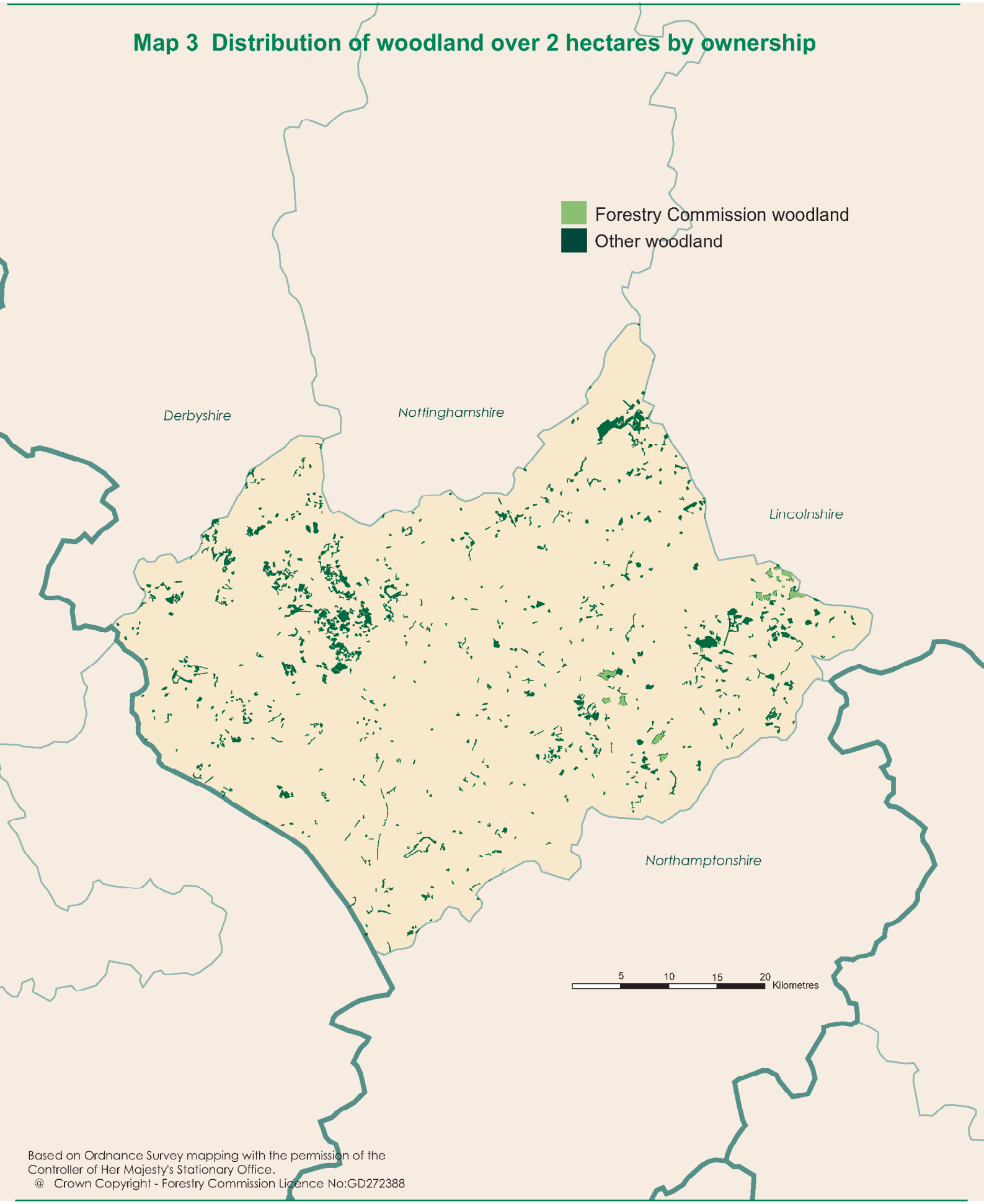
Map 1 Regional and county boundaries

Map 2 Distribution of woodland over 2 hectares

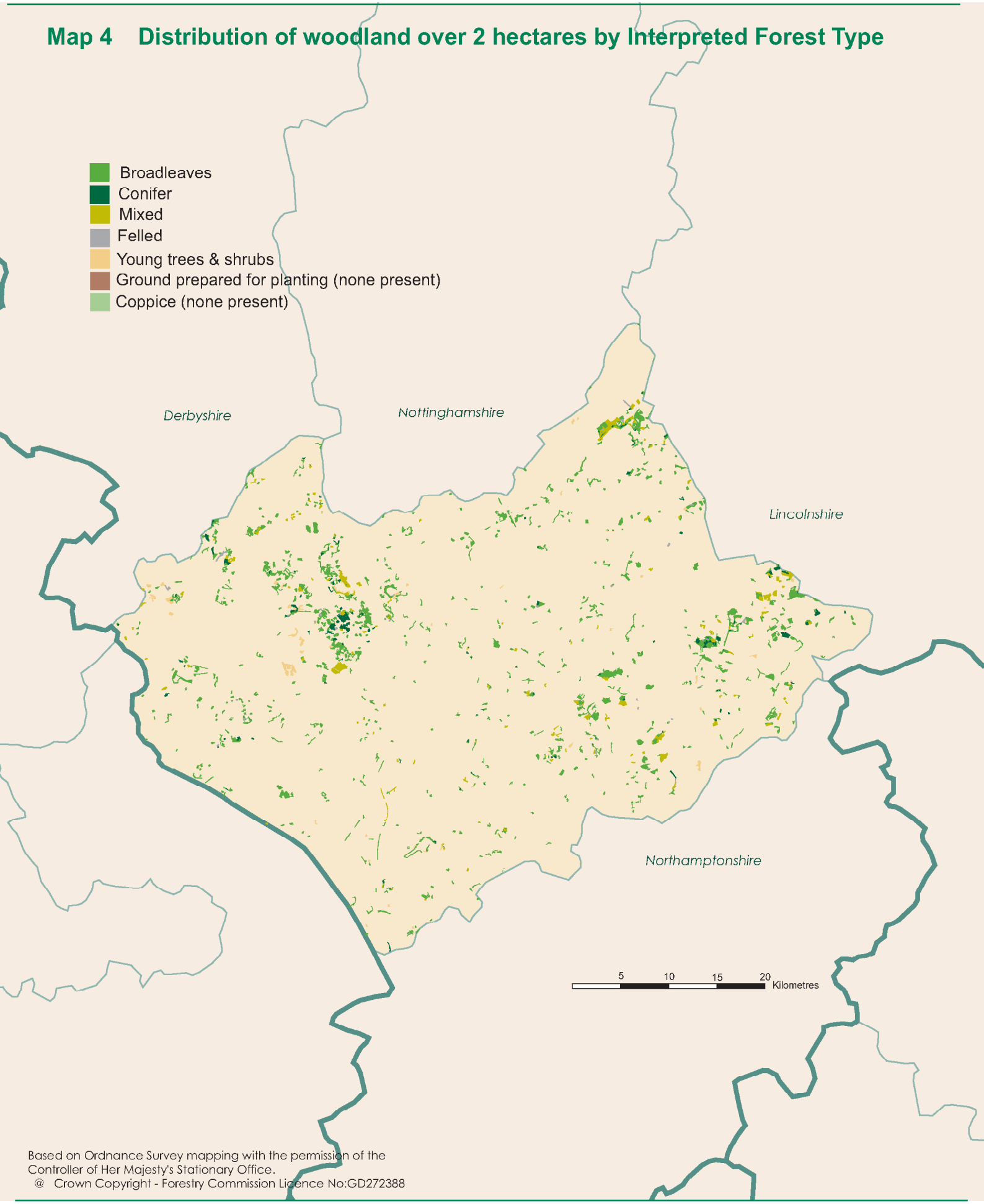


Reference Date 31 March 1998

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 1998

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 Leicestershire.

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	8,094	83.8
0.25 - < 2.00	1,093	11.3
0.10 - < 0.25	473	4.9
Total area of woodland	**9,660**	**100.0**
% Woodland land cover	**3.8**	

1. Area of Leicestershire, including inland water, 255,087 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		
Coniter	533	161	694	7.2
Broadleaved	5,893	1,310	7,203	74.6
Mixed	687	15	702	7.3
Coppiced	4	0	4	0.0
Copp-w-standards	27	0	27	0.3
Windblow	3	0	3	0.0
Felled	27	0	27	0.3
Open Space	919	80	999	10.3
Total	**8,094**	**1,566**	**9,660**	**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	443	65	508	48.4	5.9
Sitka spruce	0	0	0	0.0	0.0
Larch	196	0	196	18.7	2.3
Other conifers	218	95	313	29.8	3.6
Mixed conifers	17	15	32	3.1	0.4
Total conifers	**874**	**175**	**1,049**	**100.0**	**12.2**
Oak	1,764	284	2,048	27.1	23.8
Beech	134	12	146	1.9	1.7
Sycamore	362	102	464	6.1	5.4
Ash	2,242	301	2,543	33.7	29.6
Birch	361	7	368	4.9	4.3
Elm	28	15	43	0.6	0.5
Other broadleaves	1,041	386	1,427	18.9	16.6
Mixed broadleaves	311	204	515	6.8	6.0
Total broadleaves	**6,243**	**1,311**	**7,554**	**100.0**	**87.8**
Total all species* **	**7,116**	**1,486**	**8,602**		**100.0**

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

***Excludes the 1.057ha 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	18%
Broadleaves	4%
Pine	27%
Oak	10%
Ash	10%

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	84,900	392,600	5	154
Narrow Linear Features	42,000	1,465,100	35	574
Individual Trees	195,900	195,900	1	77
Total		**2,053,600**		**805**

1. Land area used to calculate tree density 255,087ha 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	28%
Narrow Linear Features	32%
Individual Trees	16%

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	2,582	252	99
Narrow Linear Features	42,000	2,926	1,147
Total		**3,177**	**1,246**

1. Land area used to calculate tree density 255,087ha 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	69%
Narrow Linear Features	28%

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	526	6
Other	7,568	94
Total area of woodland	**8,094**	**100**

1. Woodland area from aerial photographic interpretation map updated to 31 March 1998

2. See Glossary for definitions of ownership types

Woodland area by ownership

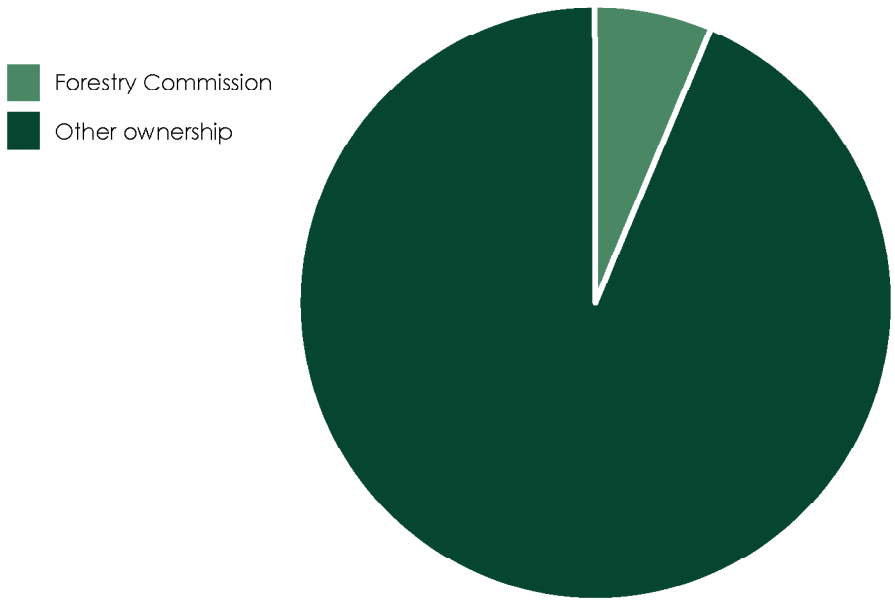


Table 7a Size class distribution of woodland

Size class (ha)	Number of woods	Total area (ha)	Percent of total area	Mean wood area (ha)
<10	622	2,698	33	4.3
10 - <20	78	1,072	13	13.7
20 - <50	65	2,047	25	31.5
50 - <100	16	1,115	13	69.7
<100	**781**	**6,932**	**84**	**8.9**
100 - <500	**8**	**1,349**	**16**	**168.6**
500 and >	**0**	**0**	**0**	**0.0**
All woods	**789**	**8,281**	**100**	**10.5**

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	4	23	0	5.7
	O	639	2,731	33	4.3
10 - <20	FC	2	31	0	15.4
	O	77	1,052	13	13.7
20 - <50	FC	3	103	1	34.5
	O	62	1,947	24	31.4
50 - <100	FC	4	267	3	66.7
	O	13	923	11	71.0
<100	FC	17	424	5	24.9
	O	791	6,652	80	8.4
100 - <500	FC	1	102	1	102.2
	O	6	1,103	13	183.8
500 and >	FC	0	0	0	0.0
	O	0	0	0	0.0
Total	**FC**	**18**	**526**	**6**	**29.2**
	O	**797**	**7,755**	**94**	**9.7**

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 187 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 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	0	0.0	533	7.0	533	6.6
Broadleaved	264	50.2	5,629	74.4	5,893	72.8
Mixed	231	43.9	457	6.0	687	8.5
Coppice	0	0.0	4	0.1	4	0.0
Copp-w-Stds	0	0.0	27	0.4	27	0.3
Windblow	3	0.6	0	0.0	3	0.0
Felled	0	0.0	27	0.4	27	0.3
Open Space	28	5.3	891	11.8	919	11.4
Total	**526**	**100.0**	**7,568**	**100.0**	**8,094**	**100.0**

Area of woodland by forest type

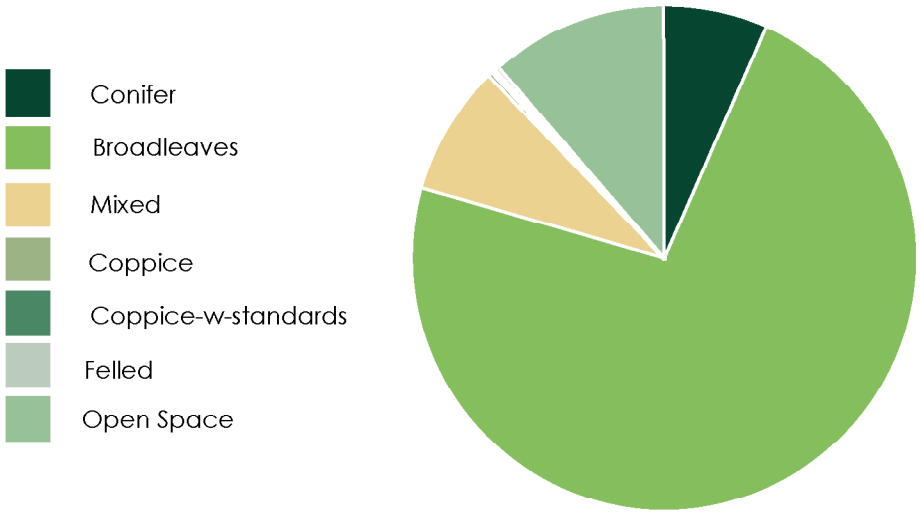


Table 9a Area of High Forest by principal species and ownership

Species	Forestry Commission			Other			All ownerships		
	area (ha)	cat* %	spp** %	area (ha)	cat* %	spp** %	area (ha)	cat* %	spp** %
Scots pine	0	0	0	429	55	6	429	49	6
Corsican pine	7	8	1	8	1	0	14	2	0
Lodgepole pine	0	0	0	0	0	0	0	0	0
Sitka spruce	0	0	0	0	0	0	0	0	0
Norway spruce	12	13	2	120	15	2	133	15	2
European larch	0	0	0	159	20	2	159	18	2
Jap/Hybrid larch	0	0	0	37	5	1	37	4	1
Douglas fir	0	0	0	4	1	0	4	0	0
Other conifers	70	79	14	11	1	0	81	9	1
Mixed conifers	0	0	0	17	2	0	17	2	0
Total conifers	**89**	**100**	**18**	**785**	**100**	**12**	**874**	**100**	**12**
Oak	84	21	17	1,679	29	25	1,764	28	25
Beech	3	1	1	131	2	2	134	2	2
Sycamore	17	4	3	344	6	5	362	6	5
Ash	242	59	49	2,000	34	30	2,242	36	32
Birch	12	3	2	350	6	5	361	6	5
Poplar	0	0	0	210	4	3	210	3	3
Sweet chestnut	0	0	0	30	1	0	30	0	0
Elm	0	0	0	28	0	0	28	0	0
Other broadleaves	46	11	9	755	13	11	801	13	11
Mixed broadleaves	4	1	1	307	5	5	311	5	4
Total broadleaves	**409**	**100**	**82**	**5,834**	**100**	**88**	**6,243**	**100**	**88**
Total - all species	**498**		**100**	**6,619**		**100**	**7,116**		**100**
Felled	**0**			**27**			**27**		
Total High Forest	**498**			**6,646**			**7,143**		

*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 919 ha of other areas integral to the woodland not stocked with tree species.

2. The standard errors of the all ownerships area estimates for the most common species or species groups are as follows;

Conifers	18%
Broadleaves	4%
Scots pine	28%
Oak	10%
Ash	10%

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

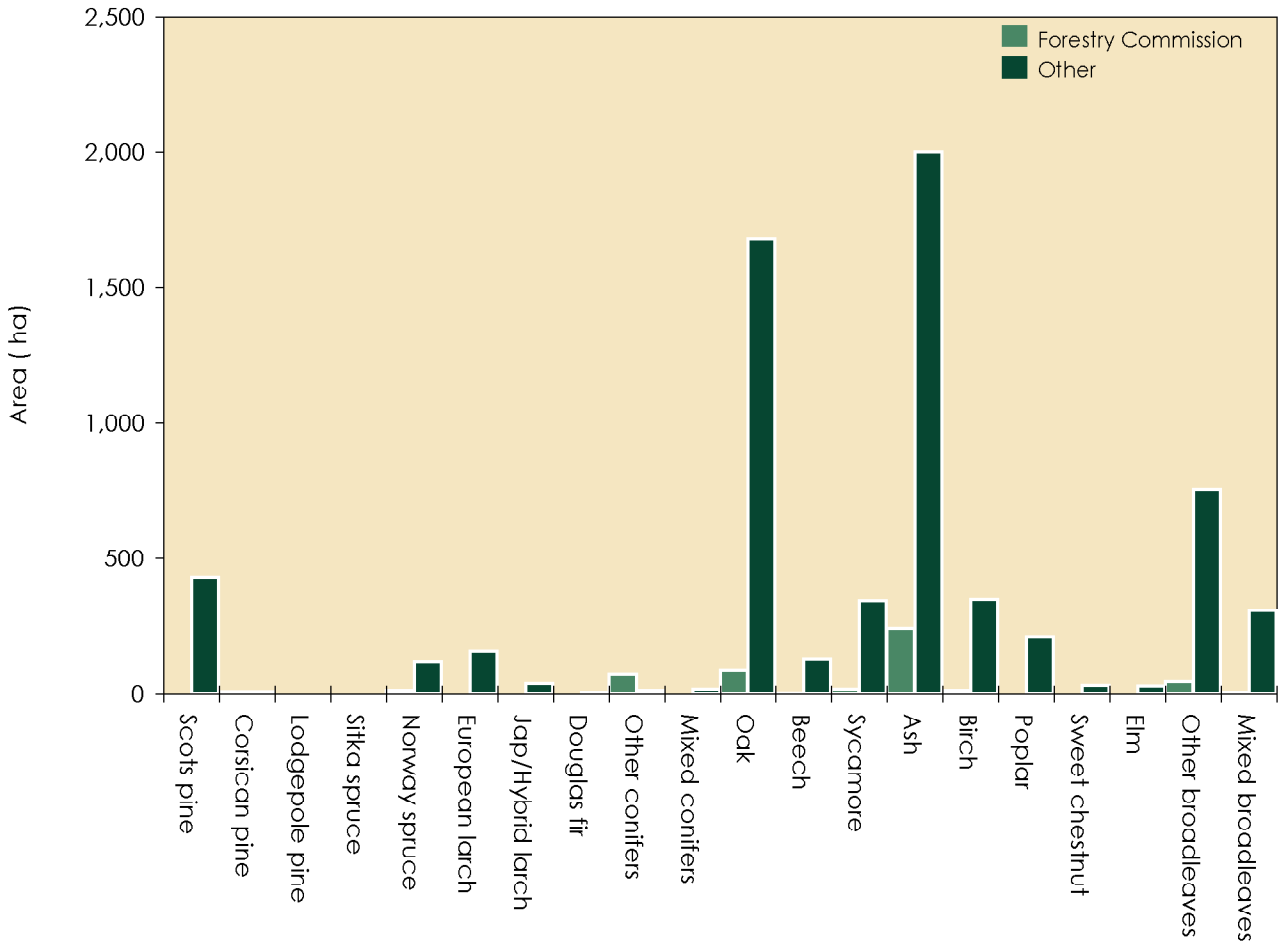


Table 9b Area of High Forest by principal species,ownership and category

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	0	0	0	374	54	429	374	54	429
Corsican pine	7	0	7	8	0	8	14	0	14
Lodgepole pine	0	0	0	0	0	0	0	0	0
Sitka spruce	0	0	0	0	0	0	0	0	0
Norway spruce	0	12	12	117	4	120	117	16	133
European larch	0	0	0	159	0	159	159	0	159
Jap/Hybrid larch	0	0	0	37	0	37	37	0	37
Douglas fir	0	0	0	4	0	4	4	0	4
Other conifers	57	12	70	11	0	11	69	12	81
Mixed conifers	0	0	0	17	0	17	17	0	17
Total conifers	**64**	**25**	**89**	**726**	**58**	**785**	**790**	**83**	**874**
Oak	37	47	84	1,310	369	1,679	1,347	417	1,764
Beech	3	0	3	124	7	131	127	7	134
Sycamore	3	14	17	188	157	344	191	171	362
Ash	183	59	242	1,682	318	2,000	1,866	377	2,242
Birch	3	8	12	75	275	350	78	283	361
Poplar	0	0	0	202	8	210	202	8	210
Sweet chestnut	0	0	0	8	23	30	8	23	30
Elm	0	0	0	17	11	28	17	11	28
Other broadleaves	3	42	46	181	574	755	184	617	801
Mixed broadleaves	4	0	4	180	127	307	184	127	311
Total broadleaves	**237**	**171**	**409**	**3,966**	**1,868**	**5,834**	**4,204**	**2,039**	**6,243**
Total - all species	**301**	**196**	**498**	**4,693**	**1,926**	**6,619**	**4,994**	**2,122**	**7,116**

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

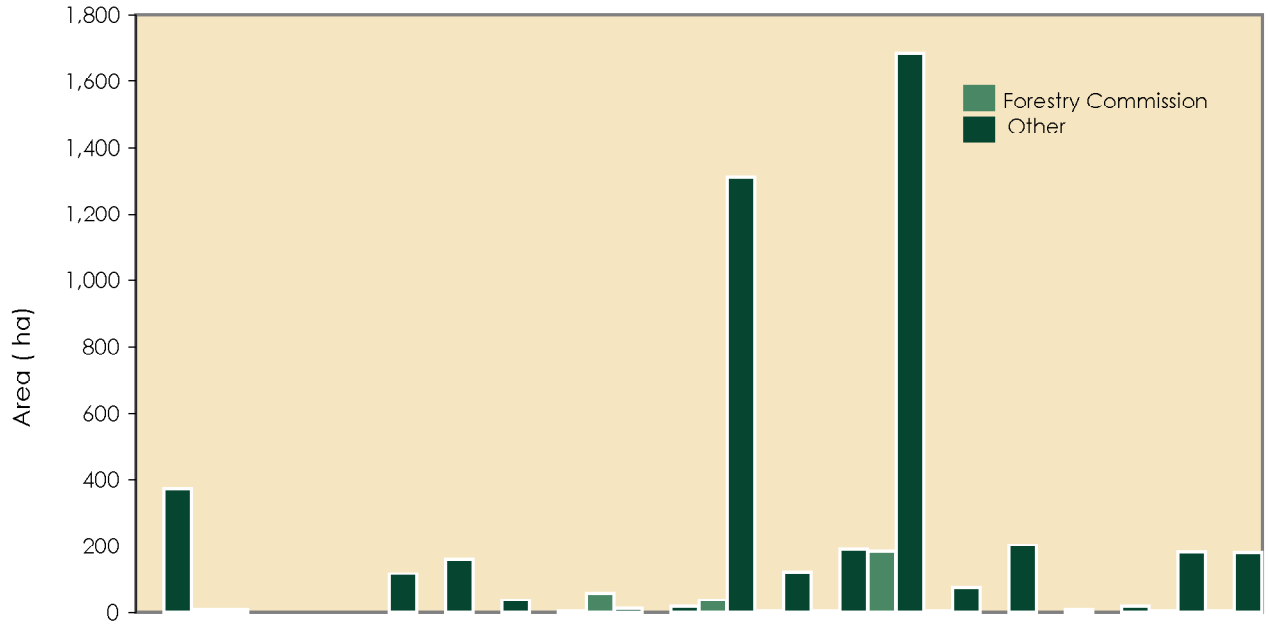
	Category 1*	Category 2*	Total High Forest
Conifers	19%	64%	18%
Broadleaves	6%	9%	4%
Scots pine	29%	93%	28%
Oak	11%	19%	10%
Ash	11%	27%	10%

*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

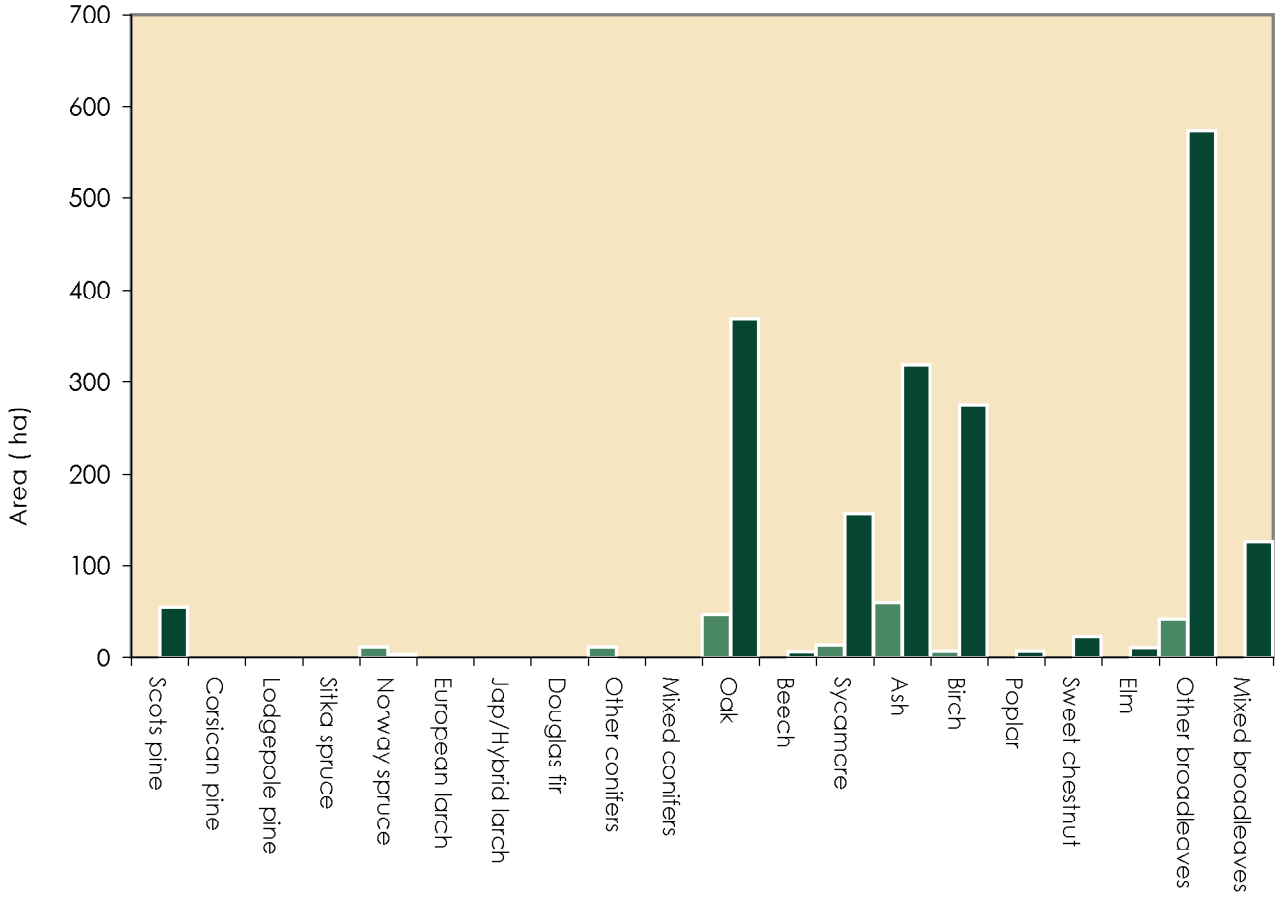
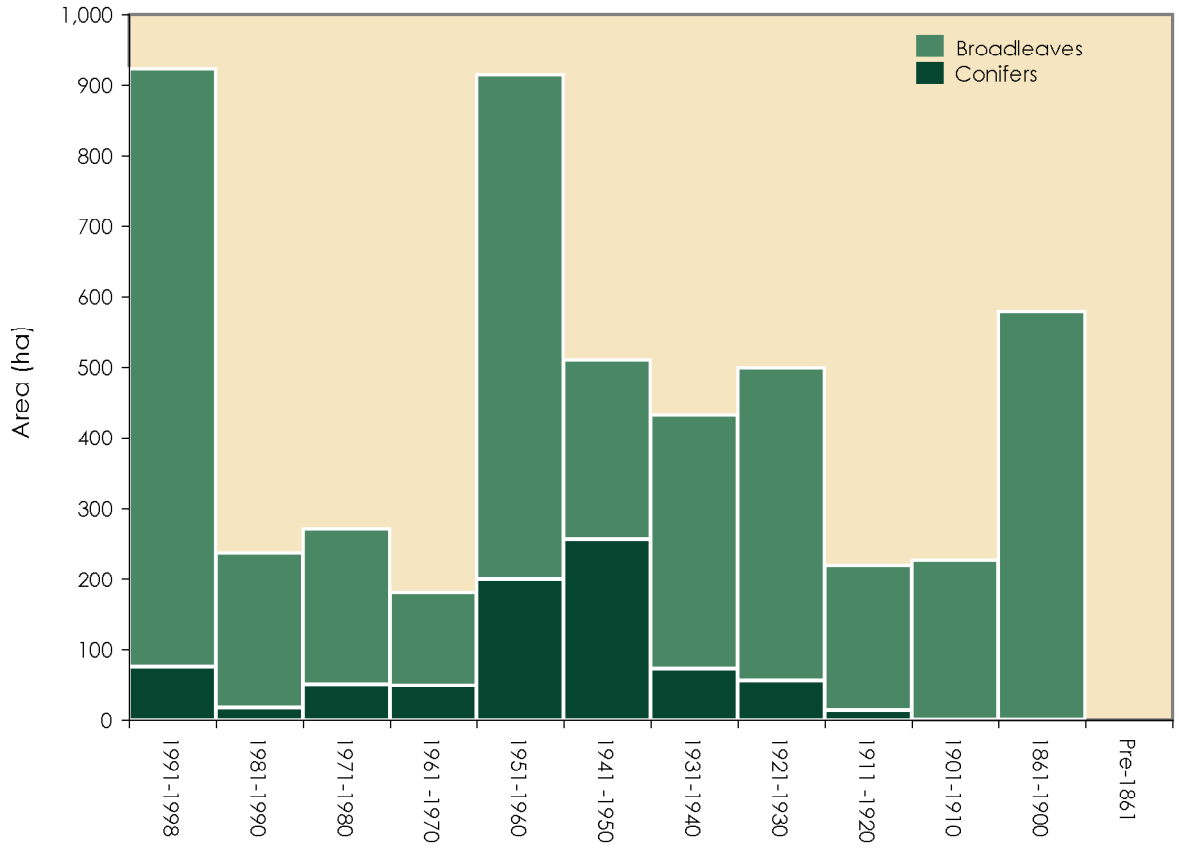


Table 10a High Forest Category 1 - Area by principal species and planting year class

Species	Planting year class*												Total (ha)
	1991-1998	1981-1990	1971-1980	1961-1970	1951-1960	1941-1950	1931-1940	1921-1930	1911-1920	1901-1910	1861-1900	Pre-1861	
Scots pine	61	2	0	6	59	230	2	14	0	0	0	0	374
Corsican pine	0	0	0	7	0	0	0	8	0	0	0	0	14
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	8	29	30	42	0	8	0	0	0	0	0	117
European larch	0	0	0	2	40	23	59	35	0	0	0	0	159
Jap/Hybrid larch	11	8	11	0	3	0	5	0	0	0	0	0	37
Douglas fir	0	0	0	0	0	4	0	0	0	0	0	0	4
Other conifers	0	0	12	3	54	0	0	0	0	0	0	0	69
Mixed conifers	3	0	0	0	0	0	0	0	14	0	0	0	17
Total conifers	**75**	**17**	**51**	**49**	**199**	**256**	**73**	**56**	**14**	**0**	**0**	**0**	**790**
Oak	322	75	36	3	171	28	79	27	106	28	471	0	1,347
Beech	8	8	11	11	58	15	0	8	0	3	5	0	127
Sycamore	12	0	19	2	47	42	31	26	11	0	0	0	191
Ash	195	64	72	90	357	128	223	358	81	196	102	0	1,866
Birch	15	8	3	7	29	14	0	3	0	0	0	0	78
Poplar	8	34	57	7	43	27	23	4	0	0	0	0	202
Sweet chestnut	4	4	0	0	0	0	0	0	0	0	0	0	8
Elm	14	0	0	0	2	0	0	0	0	0	0	0	17
Other broadleaves	139	6	16	7	3	0	3	11	0	0	0	0	184
Mixed broadleaves	132	22	6	4	5	0	0	6	8	0	0	0	184
Total broadleaves	**848**	**220**	**219**	**132**	**716**	**254**	**359**	**443**	**206**	**227**	**579**	**0**	**4,204**
Total - all species	**923**	**238**	**271**	**180**	**915**	**511**	**432**	**499**	**220**	**227**	**579**	**0**	**4,994**

*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



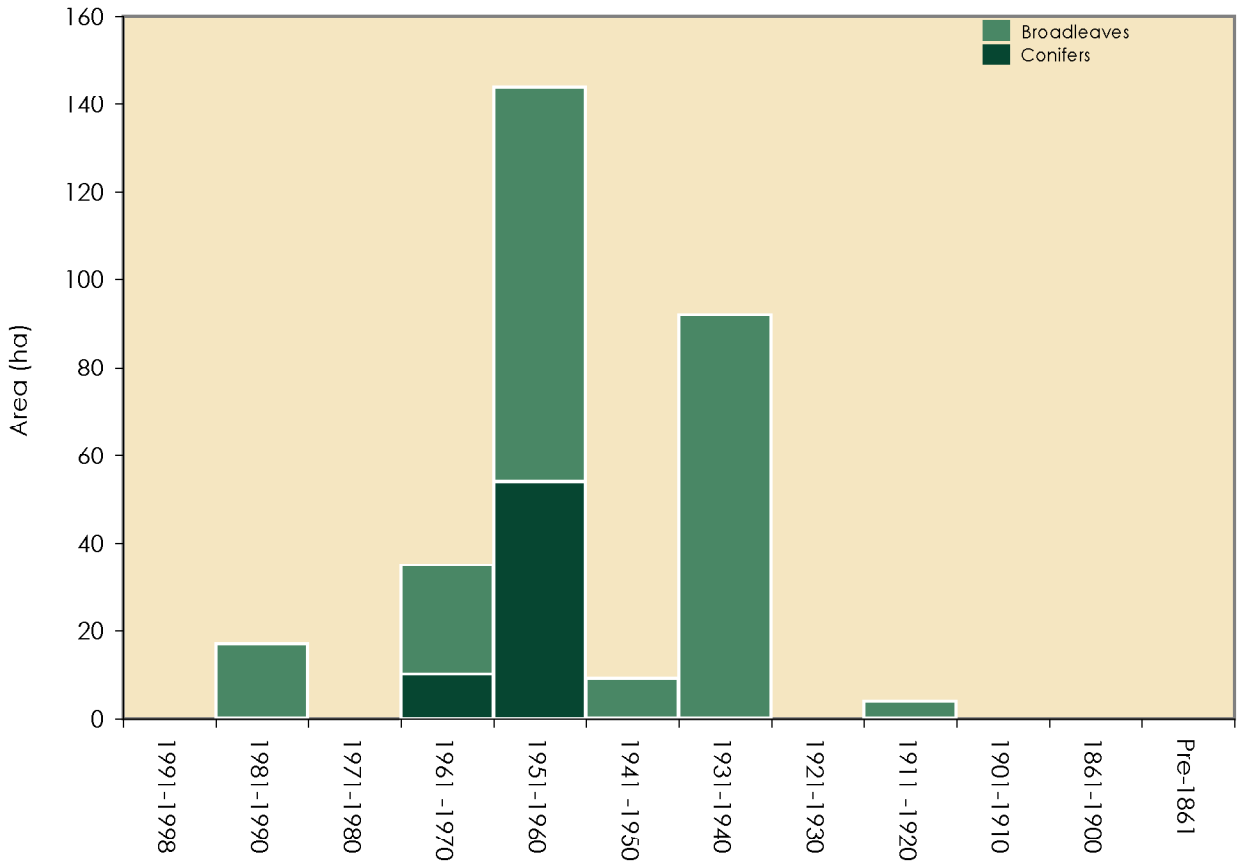
1. Most of the planting year classes cover 10 years, 1991-1998 is 8 years, and the classes prior to 1901 are 40 years or more.

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

Species	Planting year class*												Total (ha)
	1991-1998	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	0	0	0	0	0	0	0	0	0	0
Corsican pine	0	0	0	7	0	0	0	0	0	0	0	0	7
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	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0
Other coniters	0	0	0	3	54	0	0	0	0	0	0	0	57
Mixed conifers	0	0	0	0	0	0	0	0	0	0	0	0	0
Total conifers	**0**	**0**	**0**	**10**	**54**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Oak	0	0	0	3	16	9	4	0	4	0	0	0	37
Beech	0	0	0	3	0	0	0	0	0	0	0	0	3
Sycamore	0	0	0	0	3	0	0	0	0	0	0	0	3
Ash	0	17	0	7	71	0	88	0	0	0	0	0	183
Birch	0	0	0	3	0	0	0	0	0	0	0	0	3
Poplar	0	0	0	0	0	0	0	0	0	0	0	0	0
Sweet chestnut	0	0	0	0	0	0	0	0	0	0	0	0	0
Elm	0	0	0	0	0	0	0	0	0	0	0	0	0
Other broadleaves	0	0	0	3	0	0	0	0	0	0	0	0	3
Mixed broadleaves	0	0	0	4	0	0	0	0	0	0	0	0	4
Total broadleaves	**0**	**17**	**0**	**25**	**90**	**9**	**92**	**0**	**4**	**0**	**0**	**0**	**237**
Total - all species	**0**	**17**	**0**	**35**	**144**	**9**	**92**	**0**	**4**	**0**	**0**	**0**	**301**

*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



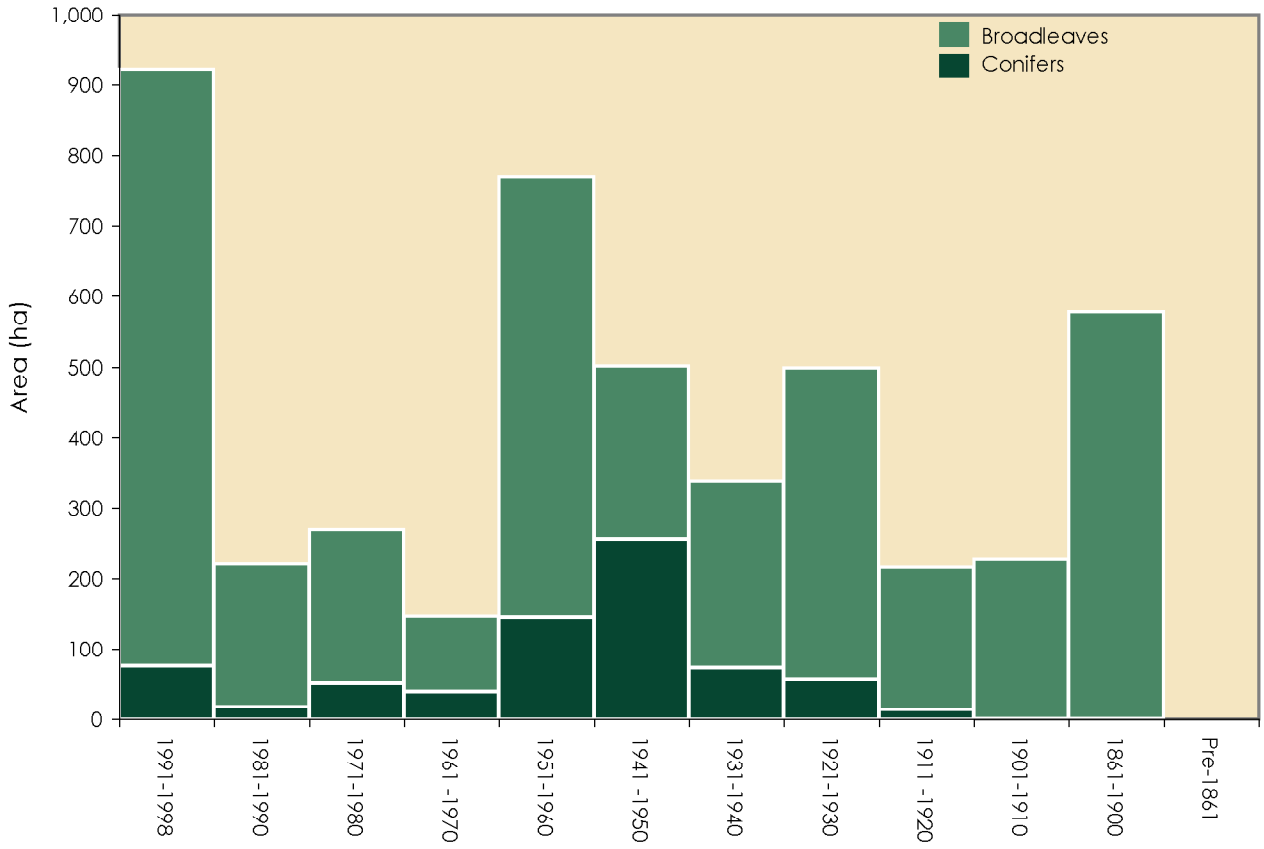
1. Most of the planting year classes cover 10 years, 1991-1998 is 8 years, and the classes prior to 1901 are 40 years or more.

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

Species	Planting year class*												Total (ha)
	1991-1998	1981-1990	1971-1980	1961-1970	1951-1960	1941-1950	1931-1940	1921-1930	1911-1920	1901-1910	1861-1900	Pre-1861	
Scots pine	61	2	0	6	59	230	2	14	0	0	0	0	374
Corsican pine	0	0	0	0	0	0	0	8	0	0	0	0	8
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	8	29	30	42	0	8	0	0	0	0	0	117
European larch	0	0	0	2	40	23	59	35	0	0	0	0	159
Jap/Hybrid larch	11	8	11	0	3	0	5	0	0	0	0	0	37
Douglas fir	0	0	0	0	0	4	0	0	0	0	0	0	4
Other conifers	0	0	12	0	0	0	0	0	0	0	0	0	11
Mixed conifers	3	0	0	0	0	0	0	0	14	0	0	0	17
Total conifers	**75**	**17**	**51**	**39**	**144**	**256**	**73**	**56**	**14**	**0**	**0**	**0**	**726**
Oak	322	75	36	0	155	19	75	27	102	28	471	0	1,310
Beech	8	8	11	8	58	15	0	8	0	3	5	0	124
Sycamore	12	0	19	2	44	42	31	26	11	0	0	0	188
Ash	195	47	72	82	287	128	135	358	81	196	102	0	1,682
Birch	15	8	3	4	29	14	0	3	0	0	0	0	75
Poplar	8	34	57	7	43	27	23	4	0	0	0	0	202
Sweet chestnut	4	4	0	0	0	0	0	0	0	0	0	0	8
Elm	14	0	0	0	2	0	0	0	0	0	0	0	17
Other broadleaves	139	6	16	4	3	0	3	11	0	0	0	0	181
Mixed broadleaves	132	22	6	0	5	0	0	6	8	0	0	0	180
Total broadleaves	**848**	**204**	**219**	**107**	**626**	**245**	**266**	**443**	**202**	**227**	**579**	**0**	**3,966**
Total - all species	**923**	**221**	**271**	**145**	**771**	**502**	**340**	**499**	**216**	**227**	**579**	**0**	**4,693**

*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, 1991-1998 is 8 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	%
1991-98	Oak	27	Other broadleaves	24	Mixed broadleaves	20
1981-90	Oak	27	Ash	23	Poplar	12
1971-80	Ash	23	Poplar	18	Other broadleaves	15
1961-70	Ash	25	Birch	18	Sycamore	15
1951-60	Ash	34	Oak	18	Birch	8
1941-50	Ash	28	Scots pine	22	Other broadleaves	17
1931-40	Ash	48	Oak	15	European larch	11
1921-30	Ash	58	Oak	18	Other broadleaves	8
1911-20	Oak	59	Ash	28	Mixed conifers	4
1901-10	Ash	85	Oak	13	Beech	1
1861-1900	Oak	77	Ash	16	Other broadleaves	2
Pre 1861	Oak	73	Sweet chestnut	27	-	
All years	**Ash**	**32**	**Oak**	**25**	**Other broadleaves**	**11**

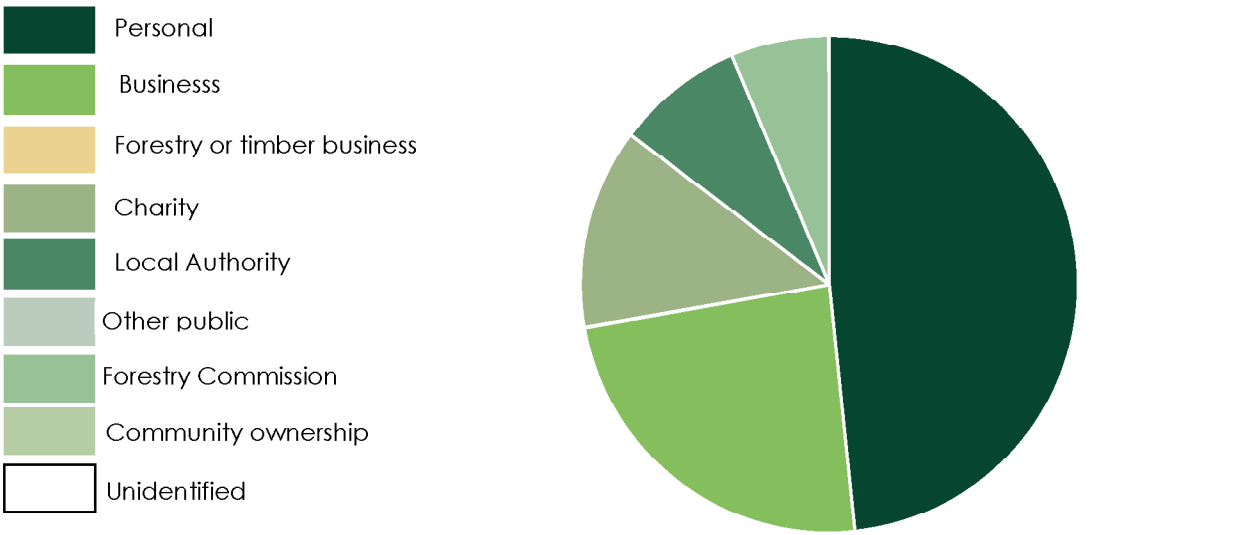
1. Principal species as a percentage of area in the planting year class.

Table 12 Ownership type* by area and percentage

Ownership type	Area (ha)	%
Personal	3,921	48.4
Business	1,925	23.8
Forestry or timber business	0	0.0
Charity	1,056	13.0
Local Authority	666	8.2
Other public (not FC)	0	0.0
Forestry Commission	526	6.5
Community ownership or common land	0	0.0
Unidentified	0	0.0
Total	**8,094**	**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	2,481	1,230	Area (ha)
Wide Linear Features	2,582	336	Area (ha)
Wide Linear Features	2,582	252	Length (Km)
Narrow Linear Features	42,000	2,926	Length (Km)
Narrow Linear Features	42,000	1,465,100	Number of live trees
Groups	84,900	392,600	Number of live trees
Individual Trees	195,900	195,900	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	137	1,093	1,230	2,481	0.50
Wide Linear Features	336	0	336	2,582	0.13
Total	**473**	**1,093**	**1,566**	**5,063**	**0.31**

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	0.8	0.0	0.0	9.7	10.5	14.6	0.5
Spruce	0.4	0.4	0.0	1.9	2.7	3.8	0.1
Larch	0.8	0.0	0.8	2.6	4.2	5.9	0.2
Cypress	0.8	0.0	11.4	20.0	32.2	44.9	1.6
Other conifers	0.0	0.0	0.8	21.3	22.1	30.8	1.1
Total conifers	**2.8**	**0.4**	**13.1**	**55.5**	**71.7**	**100.0**	**3.5**
Oak	30.2	11.4	64.5	91.6	197.7	10.0	9.6
Beech	3.3	2.4	12.2	1.9	19.8	1.0	1.0
Sycamore	0.8	0.0	3.3	9.7	13.8	0.7	0.7
Ash	52.2	4.9	48.2	123.3	228.6	11.5	11.1
Birch	2.1	1.1	11.4	17.4	32.0	1.6	1.6
Poplar	0.8	0.0	2.4	1.3	4.5	0.2	0.2
Sweet chestnut	0.0	0.8	0.0	0.0	0.8	0.0	0.0
Horse chestnut	0.8	4.9	2.4	1.3	9.4	0.5	0.5
Alder	1.6	0.0	0.0	4.5	6.1	0.3	0.3
Lime	4.1	0.8	1.6	3.9	10.4	0.5	0.5
Elm	9.8	0.0	30.2	69.7	109.7	5.5	5.3
Willow	4.9	1.6	14.7	103.3	124.5	6.3	6.1
Other broadleaves	30.1	23.0	188.6	981.7	1223.4	61.8	59.6
Total broadleaves	**140.8**	**50.8**	**379.6**	**1409.6**	**1980.7**	**100.0**	**96.5**
Total - all species	**143.2**	**51.2**	**392.7**	**1465.1**	**2053.6**		**99.9**

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	16%
Groups	28%
Narrow Linear Features	32%

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	0.6	0.6	100.0	2.4
Total conifers	**0.0**	**0.0**	**0.0**	**0.6**	**0.6**	**100.0**	**2.4**
Oak	0.8	0.0	2.4	0.0	3.2	13.4	13.1
Beech	0.0	0.8	0.0	0.0	0.8	3.3	3.3
Sycamore	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ash	1.6	0.0	1.6	0.6	3.8	15.9	15.5
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	0.6	0.6	2.5	2.4
Lime	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Elm	0.0	0.0	4.1	4.5	8.6	36.0	35.1
Willow	0.0	0.0	0.0	0.6	0.6	2.5	2.4
Other broadleaves	0.0	2.4	1.6	1.9	5.9	24.7	24.1
Total broadleaves	**2.4**	**3.3**	**9.8**	**8.4**	**23.9**	**100.0**	**97.6**
Total - all species	**2.4**	**3.3**	**9.8**	**9.0**	**24.5**		**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	2.6	2.8	3.9	1.3	10.6
Spruce	0.8	1.9	0.0	0.0	2.7
Larch	3.6	0.0	0.6	0.0	4.2
Cypress	16.2	16.0	0.0	0.0	32.2
Other conifers	18.1	3.2	0.8	0.0	22.1
Total conifers	**41.3**	**23.9**	**5.3**	**1.3**	**71.8**
Oak	12.7	141.6	30.4	13.1	197.8
Beech	3.9	7.8	7.3	0.8	19.8
Sycamore	1.6	12.3	0.6	0.0	14.5
Ash	38.8	162.5	25.7	1.6	228.6
Birch	2.1	30.0	0.0	0.0	32.1
Poplar	0.0	2.1	2.4	0.0	4.5
Sweet chestnut	0.0	0.0	0.8	0.0	0.8
Horse chestnut	3.3	2.1	2.4	1.6	9.4
Alder	3.4	2.8	0.0	0.0	6.2
Lime	4.7	4.9	0.8	0.0	10.4
Elm	63.3	46.4	0.0	0.0	109.7
Willow	64.8	58.9	0.8	0.0	124.5
Other broadleaves	849.7	373.6	0.0	0.0	1,223.3
Total broadleaves	**1,048.3**	**845.0**	**71.2**	**17.1**	**1,981.6**
Total - all species	**1,089.5**	**868.9**	**76.8**	**18.4**	**2,053.6**

Table 18 Number of Groups by group size

Number of trees per Group*	Number of Groups (000's)
2	24
3-5	34
6-10	15
11-20	7
21-50	3
51-100	2
>100	0
Total	**85**

*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 1998 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 1998 Inventory
Table 20:	Comparison of High Forest area by species between 1980 Census and 1998 Inventory
Chart:	Comparison of High Forest area by species between 1980 Census and 1998 Inventory
Table 21:	Comparison of High Forest Category 1 area by planting year class between 1980 Census and 1998 Inventory
Chart:	Comparison of High Forest Category 1 area by planting year class between 1980 Census and 1998 Inventory
Table 22:	Comparison of numbers of live trees outside woodland between 1980 Census and 1998 Inventory
Table 23:	Comparison of density of non-woodland features between 1980 Census and 1998 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 1998 Inventory

Woodland size (ha)	1980 Census woodland area		1998 Inventory woodland area		Change (%)
	(ha)	(%)	(ha)	(%)	(%)
2.0 or more	6,550	84.6	8,094	88.1	24
0.25 - <2.0	1,191	15.4	1,093	11.9	-8
Total	**7,741**		**9,187**		**19**
% Woodland land cover	**3.0**		**3.6**		

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

2. The above figures from the 1998 Inventory exclude woodland between 0.1 and <0.25 ha, thereby matching the scope of the 1980 Census. The 1998 figures above will therefore not match those in the previous sections of the report.

3. Land area used to calculate woodland cover percent (1998), 255,087 ha, was based on the 1991 Census of Population digital boundaries.

4. Land area used to calculate woodland cover percent (1980), 255,293 ha, (Ordnance Survey data)

Table 20 Comparison of High Forest area by species between 1980 Census and 1998 Inventory

Species	1980 Census woodland area (ha)	1998 Inventory woodland area (ha)	Change (%)
Scots pine	207	465	125
Corsican pine	54	14	-74
Lodgepole pine	5	0	-100
Sitka spruce	4	0	-100
Norway spuce	280	228	-18
European larch	191	159	-17
Jap/Hybrid larch	35	37	6
Douglas fir	6	4	-36
Other conifers	92	81	-12
Mixed conifers	138	32	-77
Total conifers	**1,013**	**1,020**	**1**
Oak	1,452	1,873	29
Beech	310	134	-57
Sycamore	366	464	27
Ash	1,208	2,528	109
Birch	339	368	9
Poplar	196	210	7
Sweet chestnut	25	30	20
Elm	52	43	-17
Other broadleaves	1,254	973	-22
Mixed broadleaves	664	1,162	75
Total broadleaves	**5,866**	**7,785**	**33**
Total all species	**6,879**	**8,805**	**28**
Felled	**48**	**27**	**-43**
Total High Forest	**6,927**	**8,832**	**28**

1. Ditterences in sampling methodology may account tor some ot the apparent ditterences.

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 10.3% (Table 2). To obtain meaningful comparisons between the two datasets the 1980 Census data have therefore been reduced by 10.3%.

3. The above figures from the 1998 Inventory exclude woodland between 0.1 and <0.25 ha, thereby matching the scope of the 1980 Census.
The 1998 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 1998 Inventory

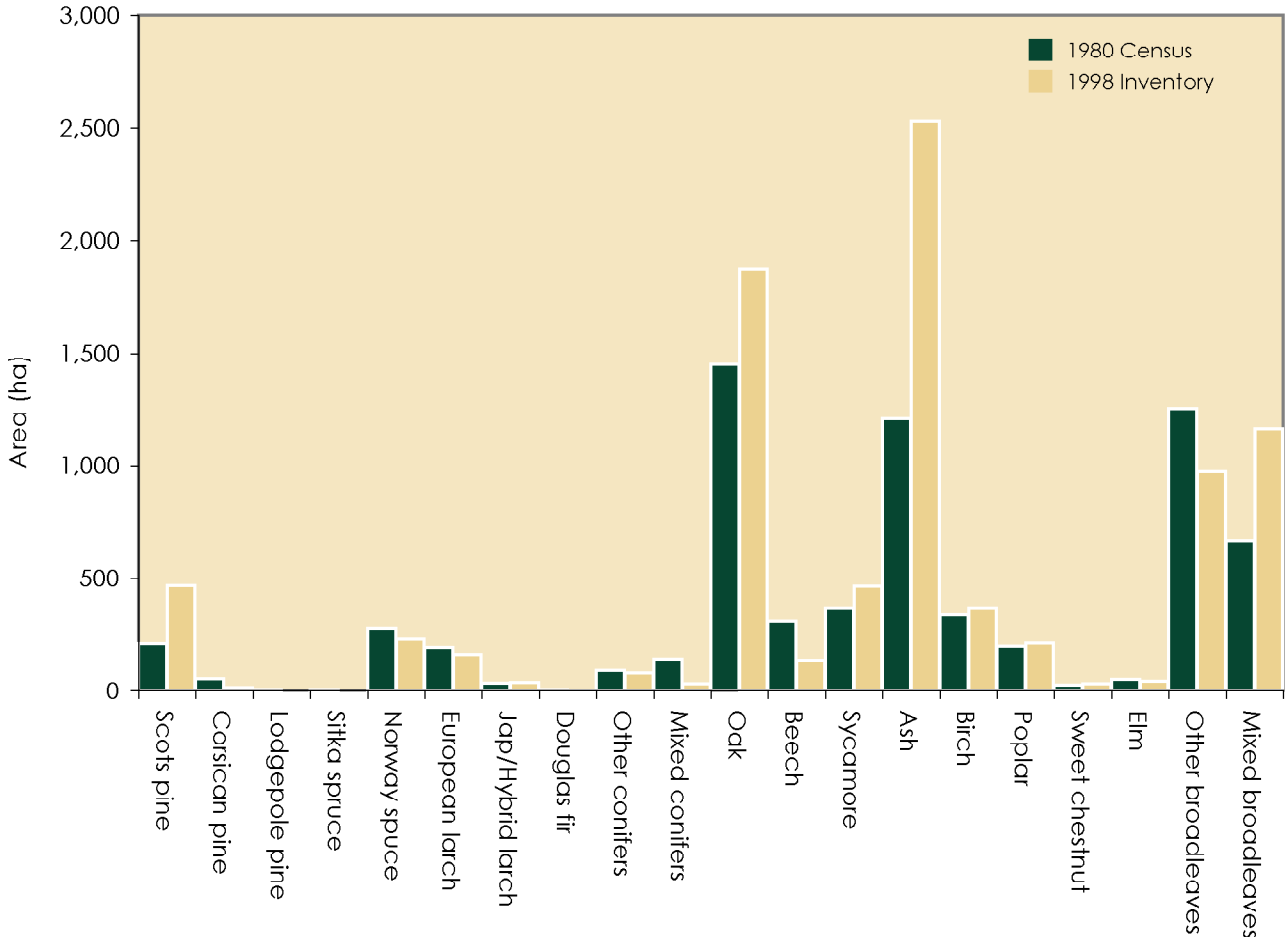


Table 21 Comparison of High Forest Category 1 area by planting year class between 1980 Census and 1998 Inventory

Planting year class	1980 Census woodland area (ha)	1998 Inventory woodland area (ha)	Change (%)
1991-1998	0	1,302	see note
1981-1990	0	266	see note
1971-1980	272	330	21
1961-1970	496	181	-63
1951-1960	626	915	46
1941-1950	1,086	583	-46
1931-1940	845	432	-49
1921-1930	464	499	8
1911-1920	285	322	13
1901-1910	128	227	77
1861-1900	1,106	594	-46
Pre 1861	445	0	-100
Total all years	**5,752**	**5,651**	**-2**

1. The tirst two classes, 1991-1998 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 1998 Inventory

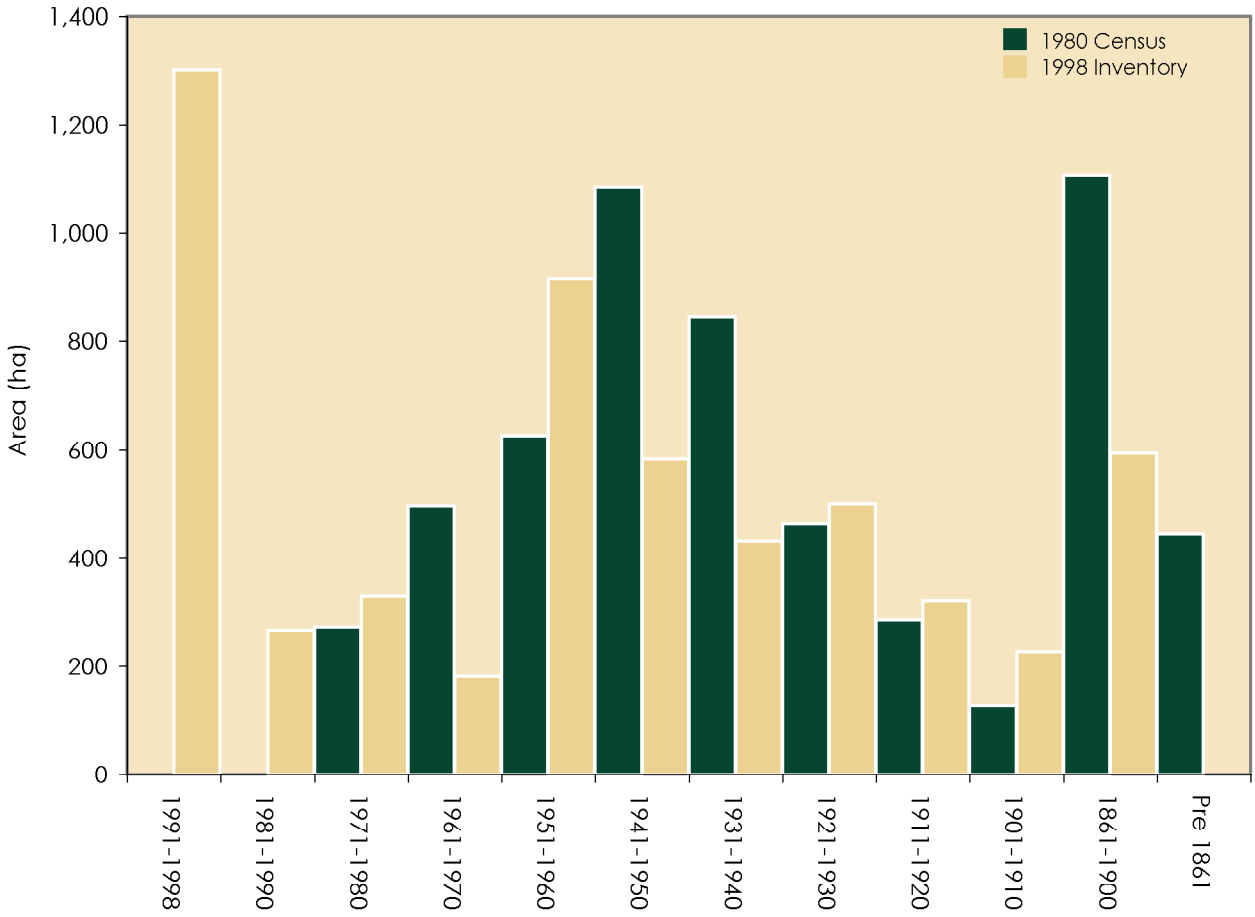


Table 22 Comparison of numbers of live trees outside woodland between 1980 Census and 1998 Inventory (000's)

Feature type	1980 Census	1998 Inventory	Change (%)
Boundary Tree	247	130	-47
Middle Tree	96	33	-66
Total Individual Trees	343	163	-52
Groups	230	230	0
Linear Features	346	622	80
Total	**919**	**1,016**	**10**

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 1998 Inventory figures have been adjusted accordingly. The 1998 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 1998 Inventory, the two surveys are not directly comparable - 1980 used 7cm diameter at breast height, and 1998 used 2m height, as minimum criteria for inclusion.
4. See Glossary for definitions of feature type.

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

Feature type	1980 Census	1998 Inventory	Change (%)
Individual Trees (per sq km)	134.4	64.0	-52
Groups (per sq km)	31.5	25.3	-20
Linear Features (m per sq km)	477.9	1,061.1	122

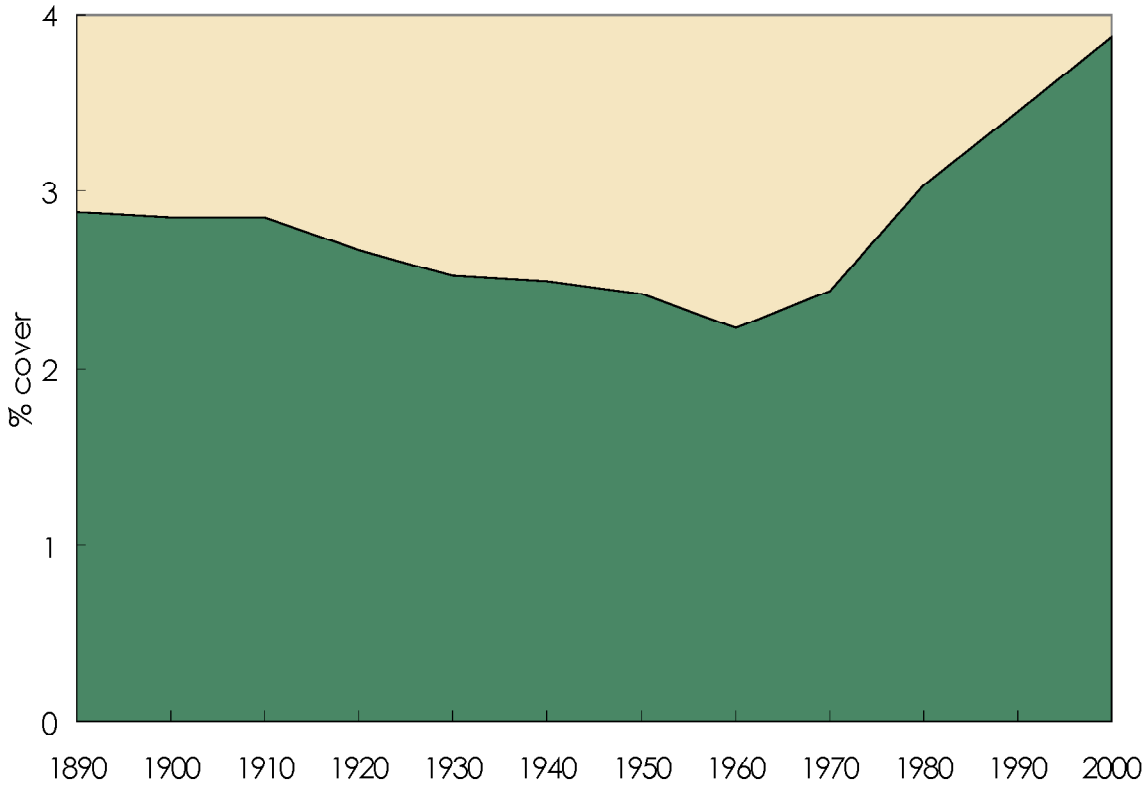
1. The Survey of Small Woodland and Trees did not record information referring to tree features (I.e. Individual trees, Groups and Narrow Linear Features) within developed land.
2. In the 1980 Census hazel, hawthorn, blackthorn and goat willow were excluded, the 1998 Inventory figures have been adjusted accordingly. The 1998 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 1998 Inventory, the two surveys are not directly comparable - 1980 used 7cm diameter at breast height, and 1998 used 2m height, as minimum criteria for inclusion.
4. See Glossary for definitions of feature type.

WOODLAND COVER

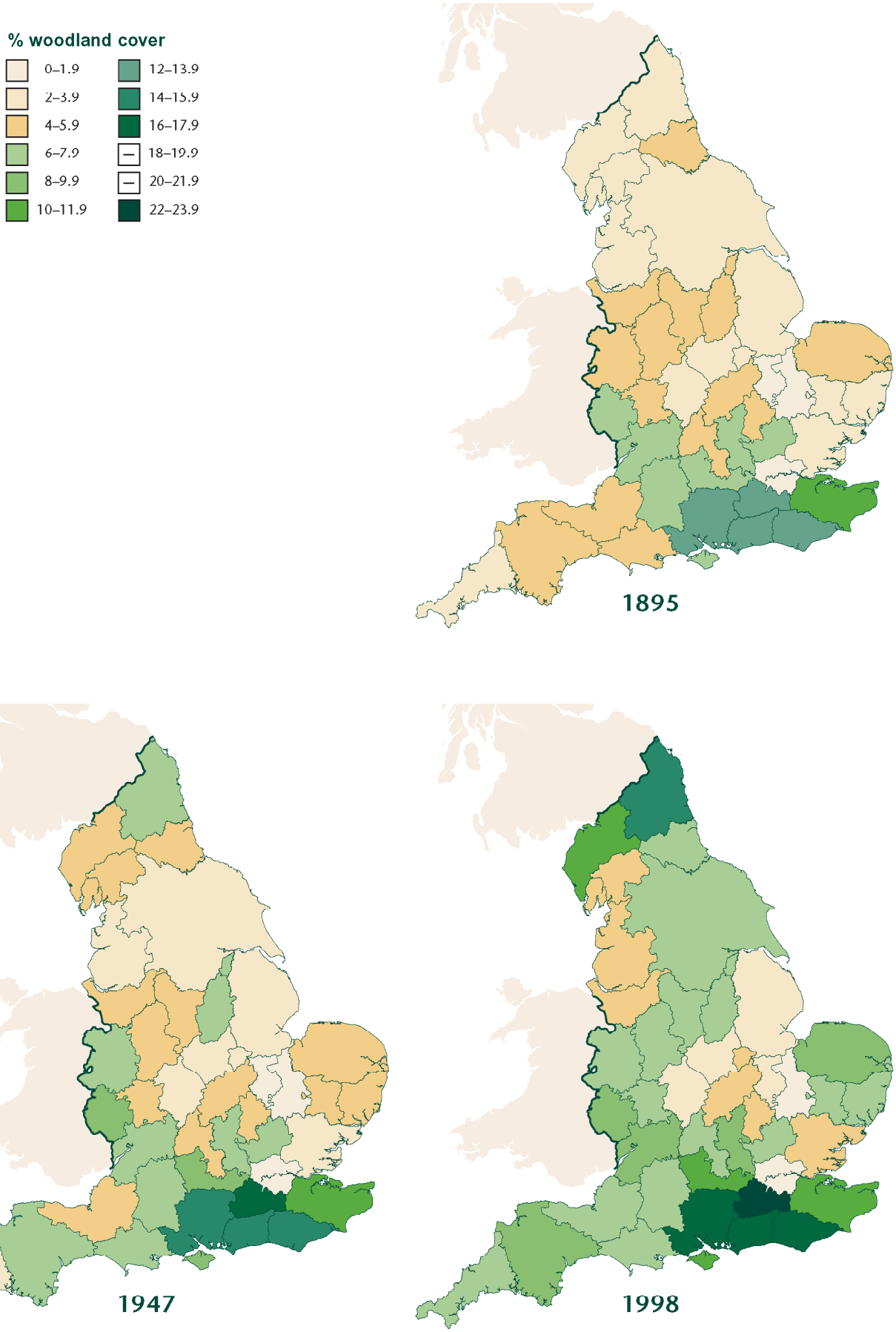
Woodland area data is available from Ministry of Agriculture surveys since 1871, and from Forestry Commission national woodland inventories since 1924. The following chart and maps show the changes in woodland area through time.

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)



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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