



NATIONAL INVENTORY OF WOODLAND AND TREES



ENGLAND

County Report for

LINCOLNSHIRE



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 Lincolnshire 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 Lincolnshire from the Forestry Commission National Inventory of Woodland and Trees (NIWT).

The Inventory consists of two separate surveys -

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

BACKGROUND

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 With the statistics becoming increasingly out of date the Forestry Commission decided to undertake a new survey: the *National Inventory of Woodland and Trees*.

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

SURVEY METHODS

Main Woodland Survey

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

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

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

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

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

Survey of Small Woodland and Trees_

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

MAIN POINTS FROM THE SURVEY RESULTS

- The total area of woodland of 0.1 hectares and over in Lincolnshire is 18,903 hectares. This represents 3.2 % of the land area. (Table 1)
- Broadleaved woodland is the dominant forest type representing 60.3 % of all woodland. Conifer woodland represents 15.1 %, Mixed woodland 16.0 % and Open Space within woodlands 7.3 %. (Table 2)
- The main conifer species is pine covering 2,729 hectares or 60.0 % of all conifer species. The main broadleaved species is ash covering 4,135 hectares or 32.5 % of all broadleaved species. (Table 3)
- 5,297 hectares or 30 % of woodland over 2 hectares is owned by or leased to the Forestry Commission, and 12,260 hectares or 70 % of woodland is in Other ownership. (Table 6)
- There are a total of 1,106 woods over 2 ha within Lincolnshire with a mean wood area of 15.9 hectares. (Table 7a) There are a total of 2,714 woods from 0.1 - <2.0 hectares with a mean wood area of 0.50 hectares. (Table 14)
- There are 5.0 million live trees outside woodland in Lincolnshire. (Table 15)
- Woodland land cover has remained the same at 3.2 % of the land area between 1980 and 1998. (Table 19)
- The area of broadleaves increased by 19% between 1980 and 1998, with the relative proportion of broadleaves to conifers increasing from 65 % to 75 %. (Table 20)

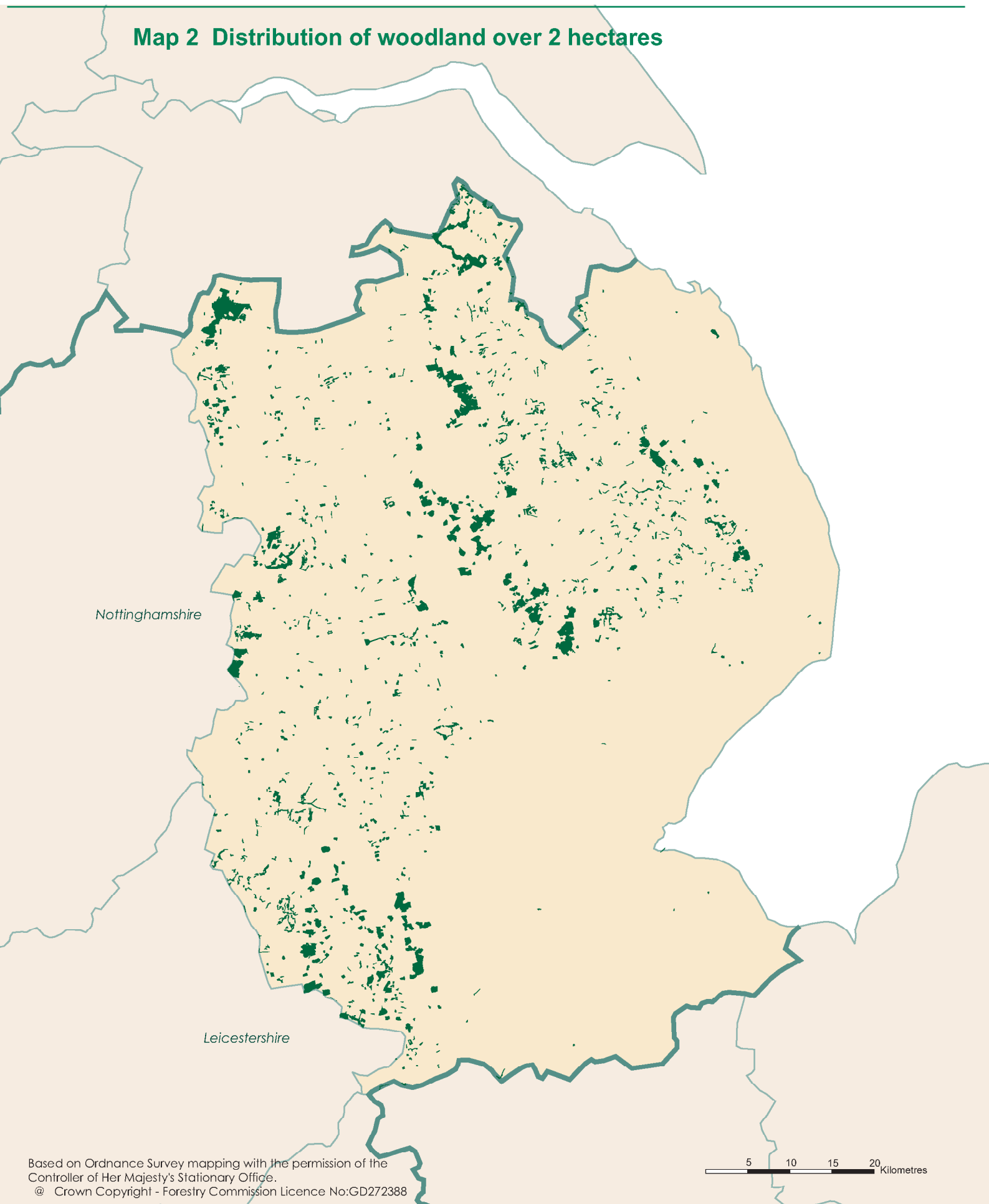
INVENTORY REPORTS

As well as this report for Lincolnshire, 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.

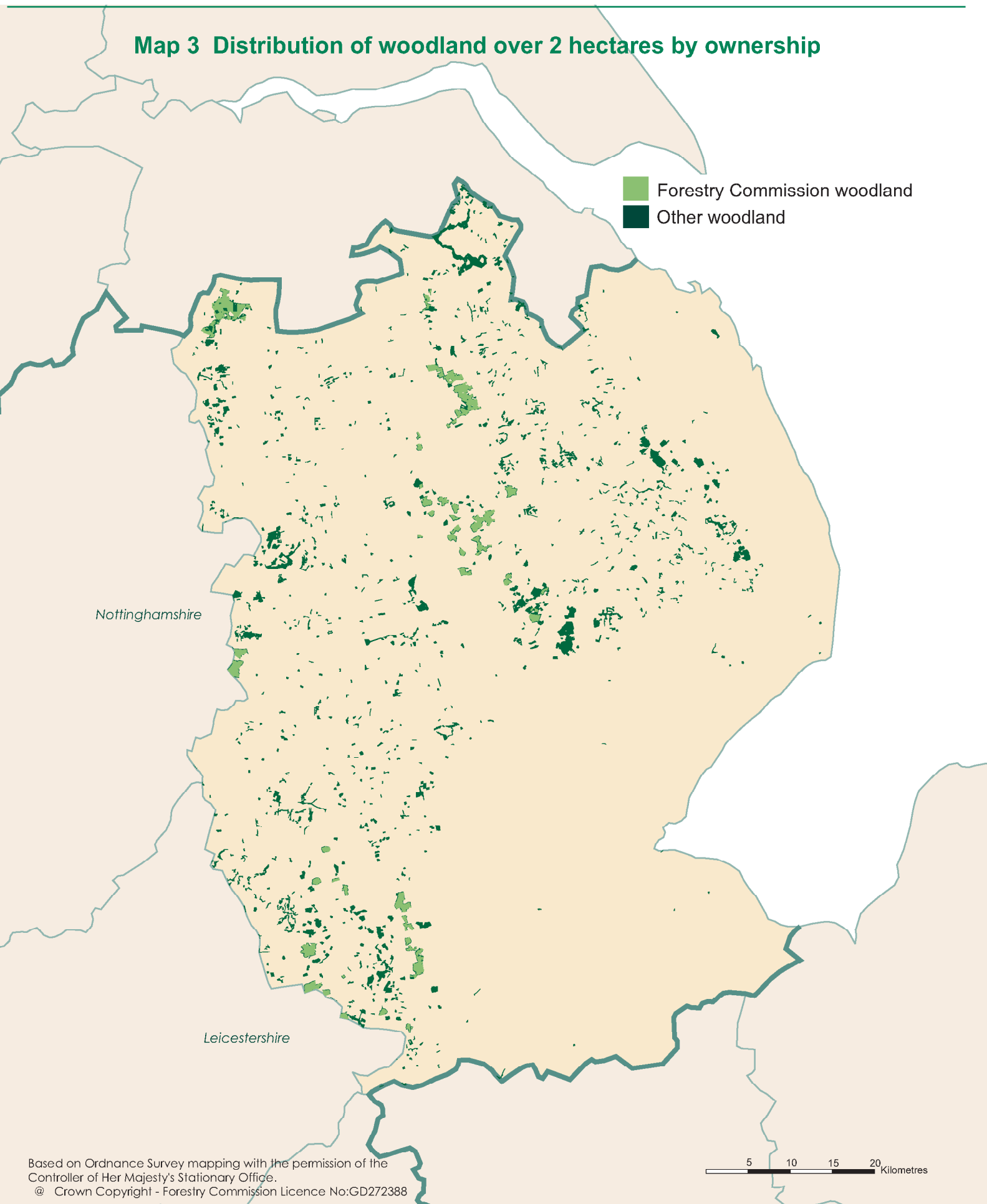
Map 1 Regional and county boundaries



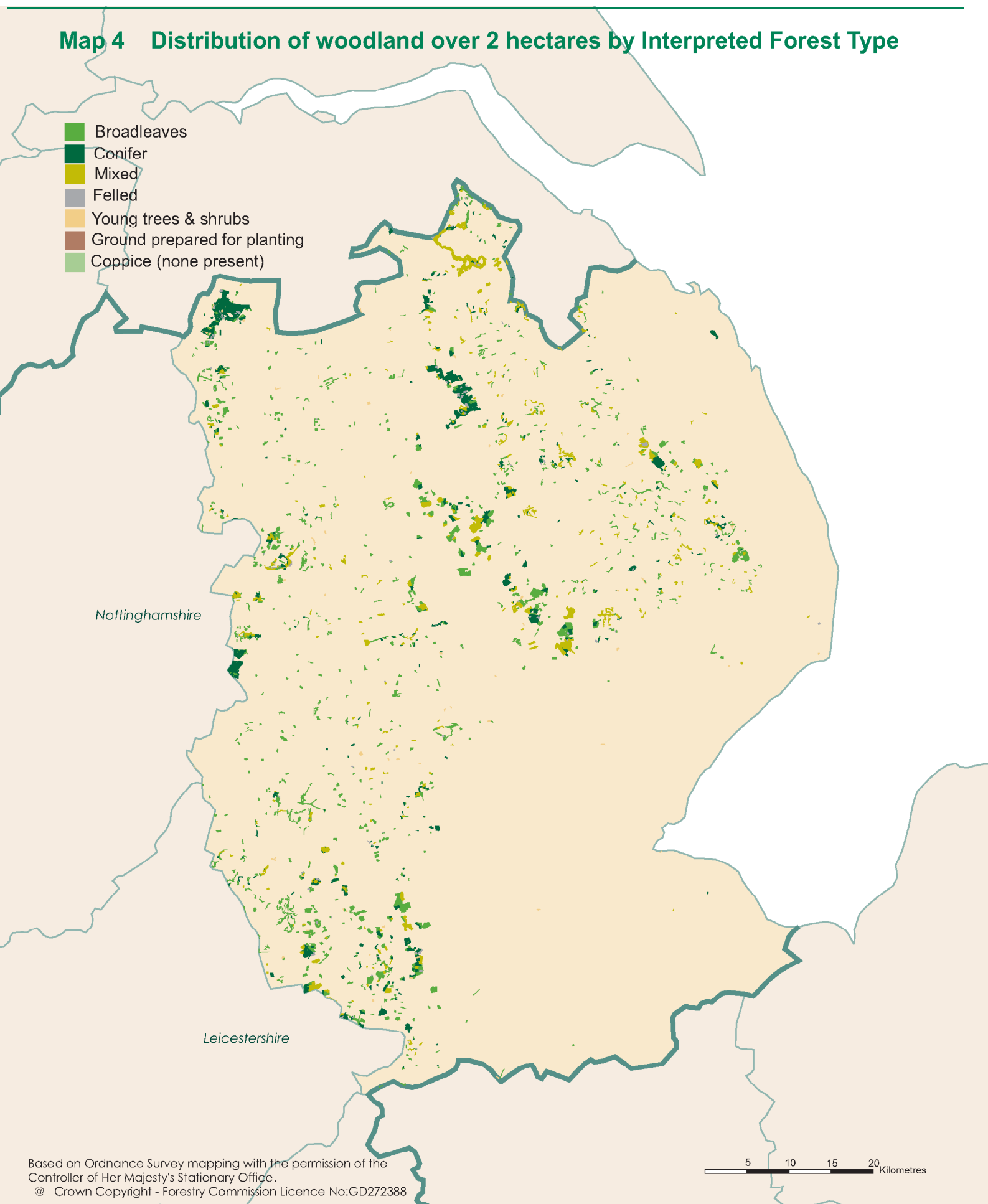
Map 2 Distribution of woodland over 2 hectares



Map 3 Distribution of woodland over 2 hectares by ownership



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



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

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

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	17,557	92.9
0.25 - < 2.00	1,196	6.3
0.10 - < 0.25	150	0.8
Total area of woodland	18,903	100.0
% Woodland land cover	3.2	

1. Area of Lincolnshire, including inland water, 592,091 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	2,678	176	2,854	15.1
Broadleaved	10,329	1,066	11,395	60.3
Mixed	3,008	16	3,024	16.0
Coppiced	25	0	25	0.1
Copp-w-standards	0	0	0	0.0
Windblow	0	0	0	0.0
Felled	225	0	225	1.2
Open Space	1,292	88	1,380	7.3
Total	17,557	1,346	18,903	100

1. See Glossary for definitions of forest types.

Table 3 Woodland area by principal species and woodland size

Species/Groups	Woodland size (ha)		Total area (ha)	Percentage of total area	
	2.0 and over	0.1 -<2.0		Category*	Species**
Pine	2,657	72	2,729	60.0	15.8
Sitka spruce	0	0	0	0.0	0.0
Larch	434	0	434	9.5	2.5
Other conifers	1,252	104	1,356	29.8	7.9
Mixed conifers	10	16	26	0.6	0.2
Total conifers	4,353	192	4,545	100.0	26.3
Oak	3,700	120	3,820	30.0	22.1
Beech	577	13	590	4.6	3.4
Sycamore	1,088	112	1,200	9.4	6.9
Ash	3,806	329	4,135	32.5	23.9
Birch	1,074	8	1,082	8.5	6.3
Elm	10	16	26	0.2	0.2
Other broadleaves	1,318	246	1,564	12.3	9.1
Mixed broadleaves	88	223	311	2.4	1.8
Total broadleaves	11,661	1,067	12,728	100.0	73.7
Total all species***	16,015	1,258	17,273		100.0

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

**Species/group percentage of all species

***Excludes the 1.630 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	8%
Broadleaves	4%
Pine	12%
Oak	7%
Ash	8%
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	202,100	1,415,700	/	239
Narrow Linear Features	59,300	3,164,000	53	534
Individual Trees	444,600	444,600	1	75
Total		5,024,300		849

1. Land area used to calculate tree density 592,091 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	20%
Narrow Linear Features	26%
Individual Trees	14%
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	59,300	4,321	730
Total		4,321	730

1. Land area used to calculate tree density 592,091 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	25%
3. Where the standard errors of these summary measures are 10% or less, the confidence intervals will be approximately symmetrical; the true value is expected to be within +/- one standard error for about 68% (or about two-thirds) of all cases, and within +/- two standard errors for about 95% of all cases. Where percentage standard errors are larger, e.g. for less common species or more variable species composition, the confidence intervals will be less symmetrical (and wider).
4. See Glossary for definitions of feature type .

RESULTS FROM THE MAIN WOODLAND SURVEY (MWS)

Survey Method

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

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

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

Table 6 Summary of woodland area by ownership

Ownership	ha	% woodland
Forestry Commission	5,297	30
Other	12,260	70
Total area of woodland	17,557	100

1. Woodland area from aerial photographic interpretation map updated to 31 March 1998
2. See Glossary for definitions of ownership types

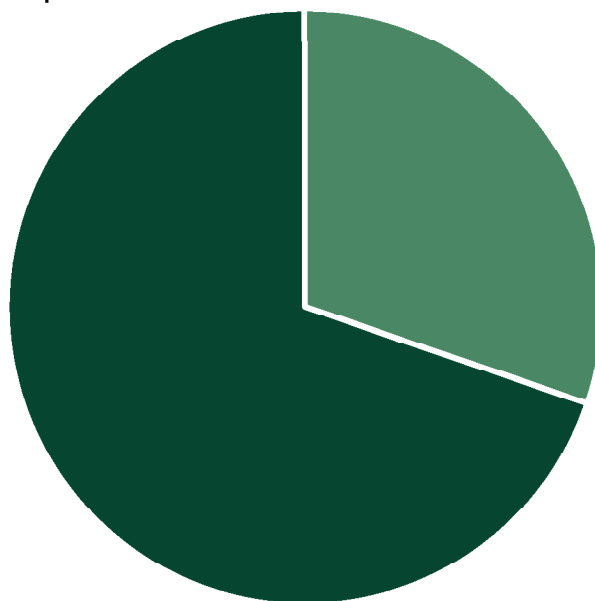
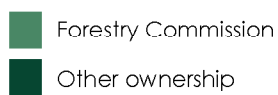
Woodland area by ownership

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	823	3,535	20	4.3
10 - <20	138	1,877	11	13.6
20 - <50	79	2,420	14	30.6
50 - <100	36	2,564	15	71.2
<100	1,076	10,395	59	9.7
100 - <500	29	6,102	35	210.4
500 and >	1	1,060	6	1059.7
All woods	1,106	17,557	100	15.9

Table 7b Size class distribution of woodland by ownership units

Size class (ha)	FC or Other	Number of woods	Total area (ha)	Percent of total area	Mean wood area (ha)
<10	FC	3	2	0	0.7
	O	911	3,731	21	4.1
10 - <20	FC	5	72	0	14.3
	O	141	1,909	11	13.5
20 - <50	FC	14	536	3	38.3
	O	74	2,181	12	29.5
50 - <100	FC	10	690	4	69.0
	O	27	1,938	11	71.8
<100	FC	32	1,299	7	40.6
	O	1,153	9,760	56	8.5
100 - <500	FC	17	3,274	19	192.6
	O	12	2,501	14	208.4
500 and >	FC	1	723	4	723.4
	O	0	0	0	0.0
Total	FC	50	5,297	30	105.9
	O	1,165	12,260	70	10.5

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 data available from the digital map enable the identification of woodlands according to their ownerships, Forestry Commission or Other. The entries in table 7b cannot be added to derive table 7a as some woods may consist of both Forestry Commission and Other ownership(s)

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

Table 8 Area of woodland by forest type and ownership

Forest type	Forestry Commission		Other		All ownerships	
	ha	%	ha	%	ha	%
Conifer	1,901	35.9	777	6.3	2,678	15.3
Broadleaved	2,182	41.2	8,147	66.5	10,329	58.8
Mixed	644	12.2	2,364	19.3	3,008	17.1
Coppice	0	0.0	25	0.2	25	0.1
Copp-w-Stds	0	0.0	0	0.0	0	0.0
Windblow	0	0.0	0	0.0	0	0.0
Felled	148	2.8	78	0.6	225	1.3
Open Space	422	8.0	870	7.1	1,292	7.4
Total	5,297	100.0	12,260	100.0	17,557	100.0

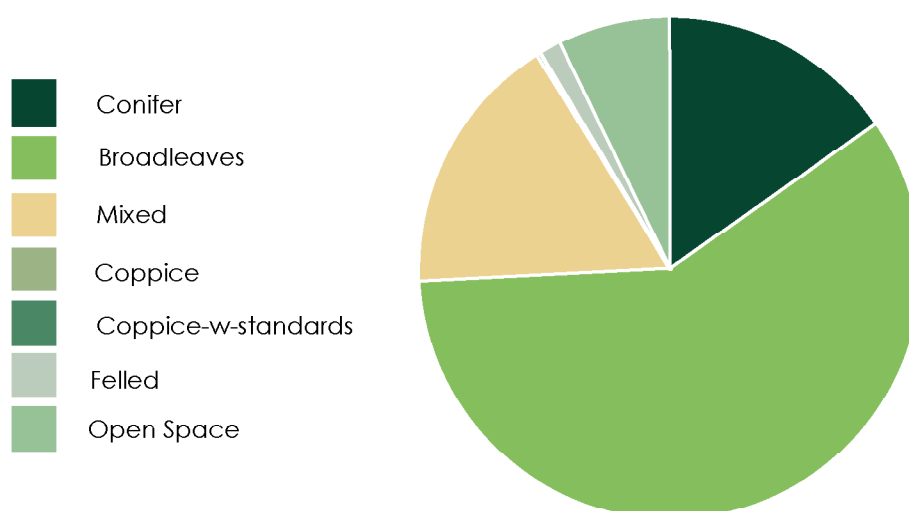
Area of woodland by forest type

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	915	41	19	337	16	3	1,252	29	8
Corsican pine	1,117	50	24	267	13	2	1,384	32	9
Lodgepole pine	21	1	0	0	0	0	21	0	0
Sitka spruce	0	0	0	0	0	0	0	0	0
Norway spruce	56	2	1	636	30	6	692	16	4
European larch	0	0	0	291	14	3	291	7	2
Jap/Hybrid larch	0	0	0	143	7	1	143	3	1
Douglas fir	0	0	0	122	6	1	122	3	1
Other conifers	131	6	3	307	15	3	438	10	3
Mixed conifers	5	0	0	5	0	0	10	0	0
Total conifers	2,245	100	47	2,108	100	19	4,353	100	27
Oak	1,059	43	22	2,641	29	23	3,700	32	23
Beech	27	1	1	550	6	5	577	5	4
Sycamore	21	1	0	1,067	12	9	1,088	9	7
Ash	759	31	16	3,047	33	27	3,806	33	24
Birch	332	13	7	743	8	7	1,074	9	7
Poplar	0	0	0	464	5	4	464	4	3
Sweet chestnut	0	0	0	19	0	0	19	0	0
Elm	0	0	0	10	0	0	10	0	0
Other broadleaves	268	11	6	566	6	5	835	7	5
Mixed broadleaves	16	1	0	73	1	1	88	1	1
Total broadleaves	2,482	100	53	9,180	100	81	11,661	100	73
Total - all species	4,727		100	11,288		100	16,015		100
Felled	148			78			225		
Total High Forest	4,875			11,366			16,240		

*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 1,292 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	8%
Broadleaves	4%
Corsican pine	18%
Oak	7%
Ash	8%
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

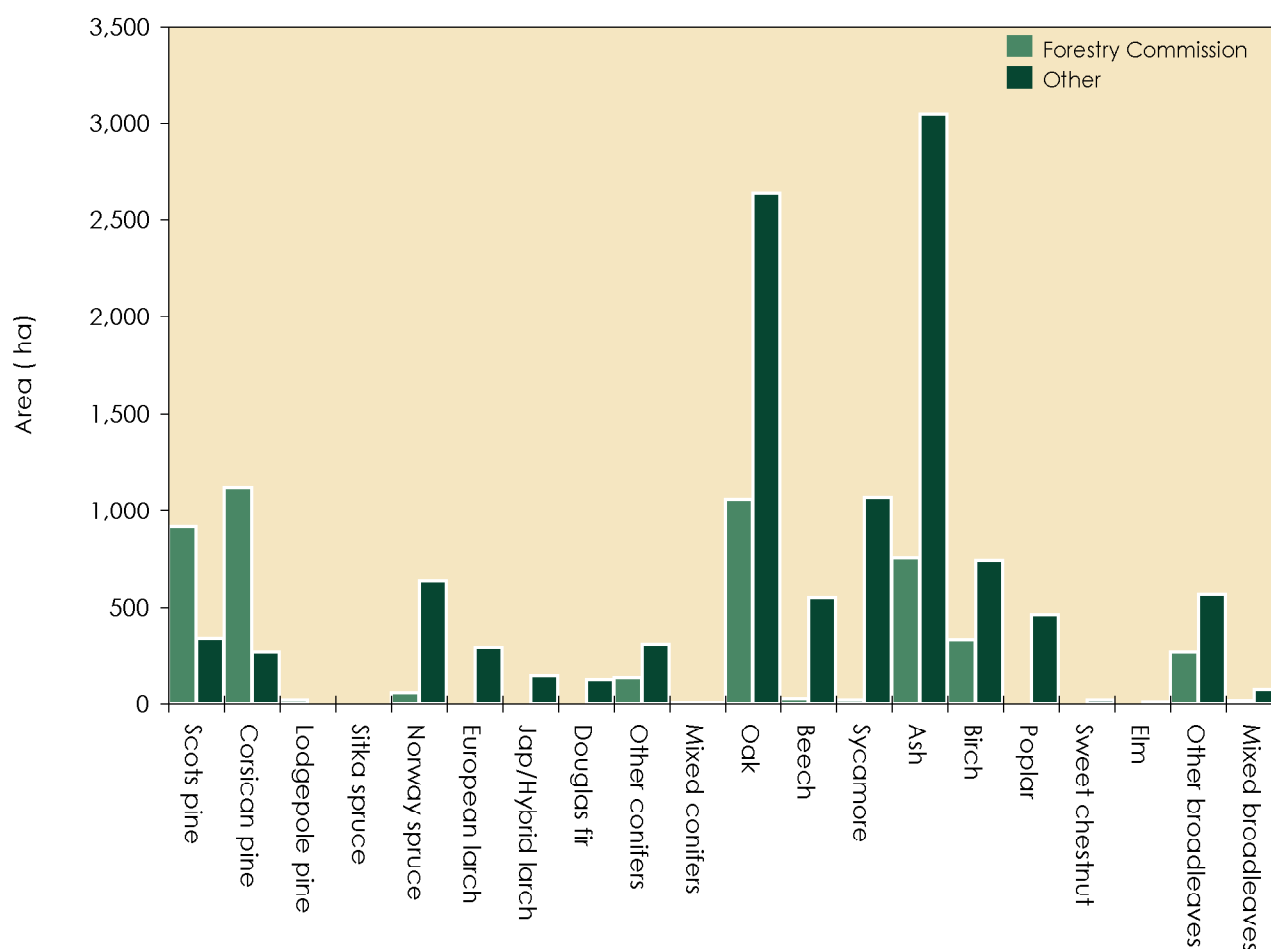


Table 9b Area of High Forest by principal species,ownership and category

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	879	36	915	337	0	337	1,215	36	1,252
Corsican pine	1,117	0	1,117	267	0	267	1,384	0	1,384
Lodgepole pine	21	0	21	0	0	0	21	0	21
Sitka spruce	0	0	0	0	0	0	0	0	0
Norway spruce	56	0	56	631	5	636	687	5	692
European larch	0	0	0	291	0	291	291	0	291
Jap/Hybrid larch	0	0	0	143	0	143	143	0	143
Douglas fir	0	0	0	122	0	122	122	0	122
Other conifers	131	0	131	307	0	307	438	0	438
Mixed conifers	5	0	5	0	5	5	5	5	10
Total conifers	2,209	36	2,245	2,098	10	2,108	4,307	46	4,353
Oak	1,043	16	1,059	2,463	178	2,641	3,506	194	3,700
Beech	27	0	27	539	11	550	566	11	577
Sycamore	10	10	21	1,057	10	1,067	1,067	20	1,088
Ash	744	16	759	2,917	130	3,047	3,661	146	3,806
Birch	252	80	332	433	309	743	685	389	1,074
Poplar	0	0	0	464	0	464	464	0	464
Sweet chestnut	0	0	0	19	0	19	19	0	19
Elm	0	0	0	10	0	10	10	0	10
Other broadleaves	268	0	268	119	447	566	387	447	835
Mixed broadleaves	10	5	16	47	25	73	58	30	88
Total broadleaves	2,355	127	2,482	8,068	1,111	9,180	10,423	1,238	11,661
Total - all species	4,564	163	4,727	10,166	1,122	11,288	14,730	1,285	16,015

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

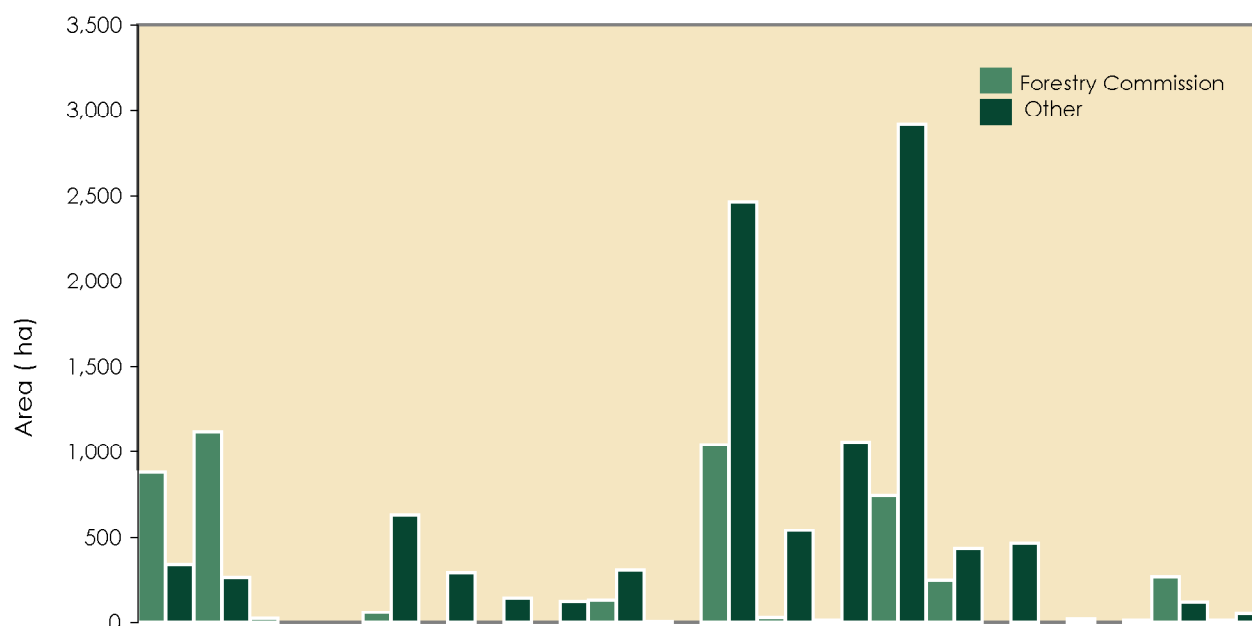
	Category 1*	Category 2*	Total High Forest
Conifers	8%	80%	8%
Broadleaves	4%	13%	4%
Corsican pine	15%	-	18%
Oak	8%	21%	7%
Ash	8%	39%	8%

*See Glossary for Category 1 and Category 2 descriptions

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

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

High Forest Category 1 - Area by principal species and ownership



High Forest Category 2 - Area by principal species and ownership

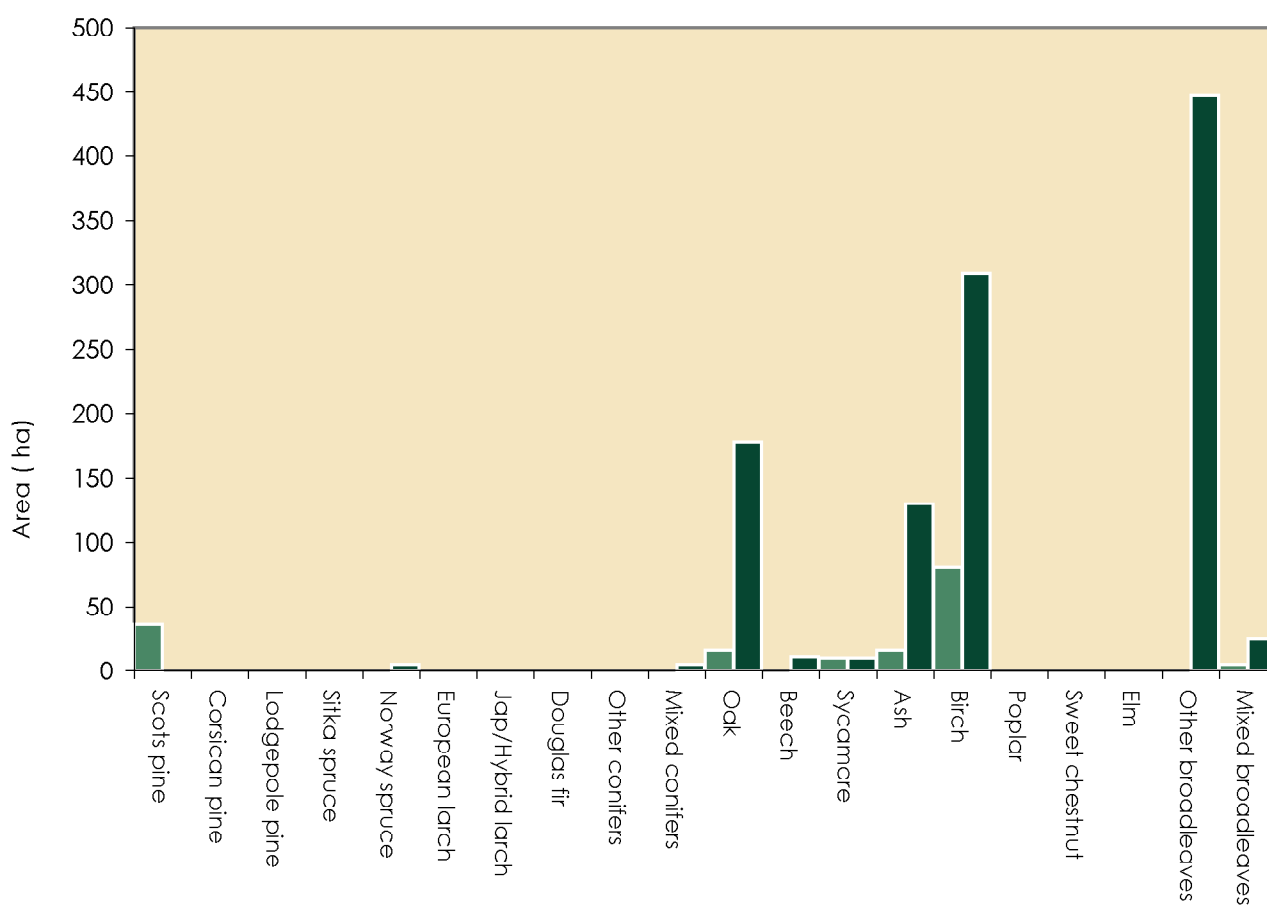
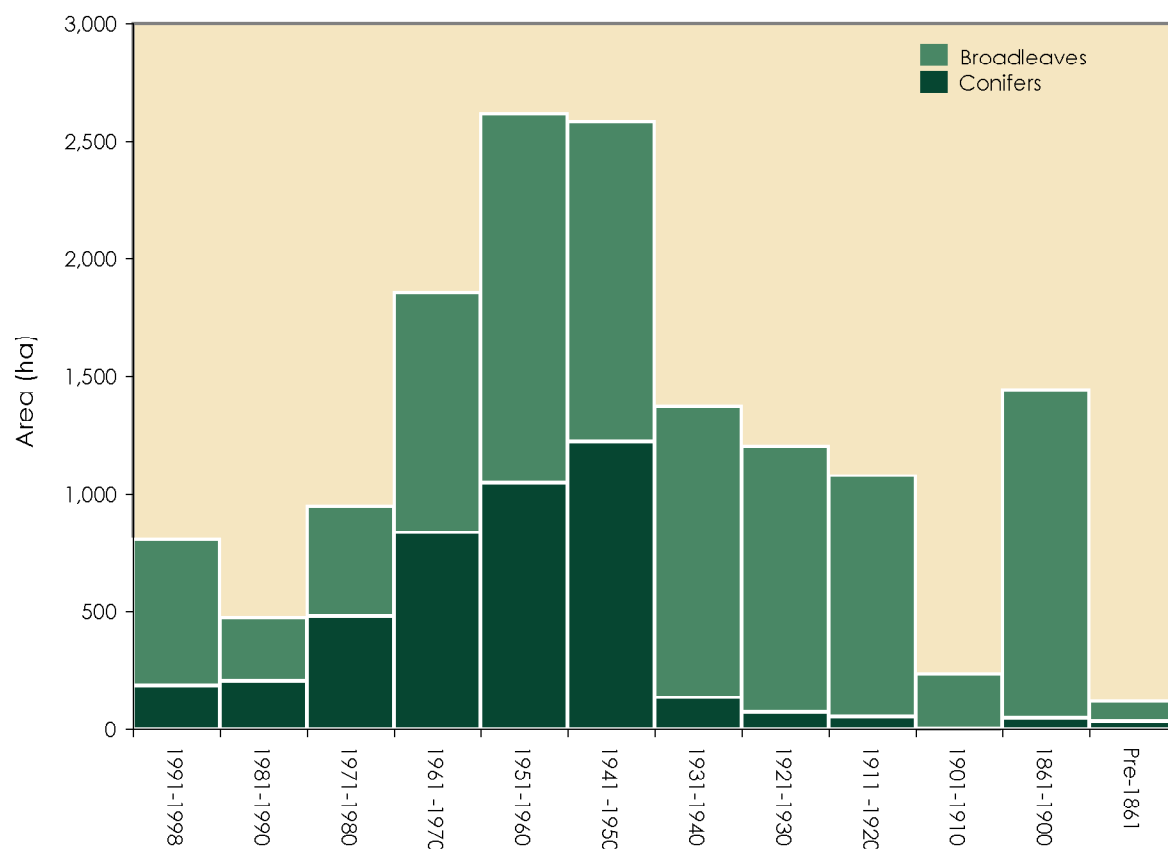


Table 10a High Forest Category 1 - Area by principal species and planting year class

Species	Planting year class*												Total (ha)
	1991-1998	1981-1990	1971-1980	1961-1970	1951-1960	1941-1950	1931-1940	1921-1930	1911-1920	1901-1910	1861-1900	Pre-1861	
Scots pine	35	80	111	206	163	472	52	64	31	0	0	0	1,215
Corsican pine	53	60	108	112	574	399	78	0	0	0	0	0	1,384
Lodgepole pine	0	10	0	10	0	0	0	0	0	0	0	0	21
Sitka spruce	0	0	0	0	0	0	0	0	0	0	0	0	0
Norway spruce	19	24	63	241	195	144	0	0	0	0	0	0	687
European larch	17	0	72	59	19	104	0	8	12	0	0	0	291
Jap/Hybrid larch	0	10	5	81	23	19	4	0	0	0	0	0	143
Douglas fir	19	0	0	0	24	69	0	0	10	0	0	0	122
Other conifers	40	20	119	119	46	16	0	0	0	0	45	32	438
Mixed conifers	0	0	0	5	0	0	0	0	0	0	0	0	5
Total conifers	184	205	478	835	1,045	1,222	134	72	53	0	45	32	4,307
Oak	191	45	63	390	311	321	220	428	346	229	937	25	3,506
Beech	26	5	38	22	228	53	54	56	0	0	35	48	566
Sycamore	18	51	149	86	218	175	128	135	8	0	100	0	1,067
Ash	129	64	159	181	608	347	776	431	670	5	289	0	3,661
Birch	78	80	0	59	77	269	45	78	0	0	0	0	685
Poplar	83	13	47	251	30	39	0	0	0	0	0	0	464
Sweet chestnut	19	0	0	0	0	0	0	0	0	0	0	0	19
Elm	0	0	0	0	10	0	0	0	0	0	0	0	10
Other broadleaves	42	0	12	20	91	155	14	5	0	0	37	10	387
Mixed broadleaves	35	12	0	10	0	0	0	0	0	0	0	0	58
Total broadleaves	622	270	469	1,019	1,573	1,359	1,238	1,132	1,024	234	1,399	84	10,423
Total - all species	806	475	947	1,854	2,618	2,581	1,372	1,204	1,077	234	1,444	116	14,730

*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



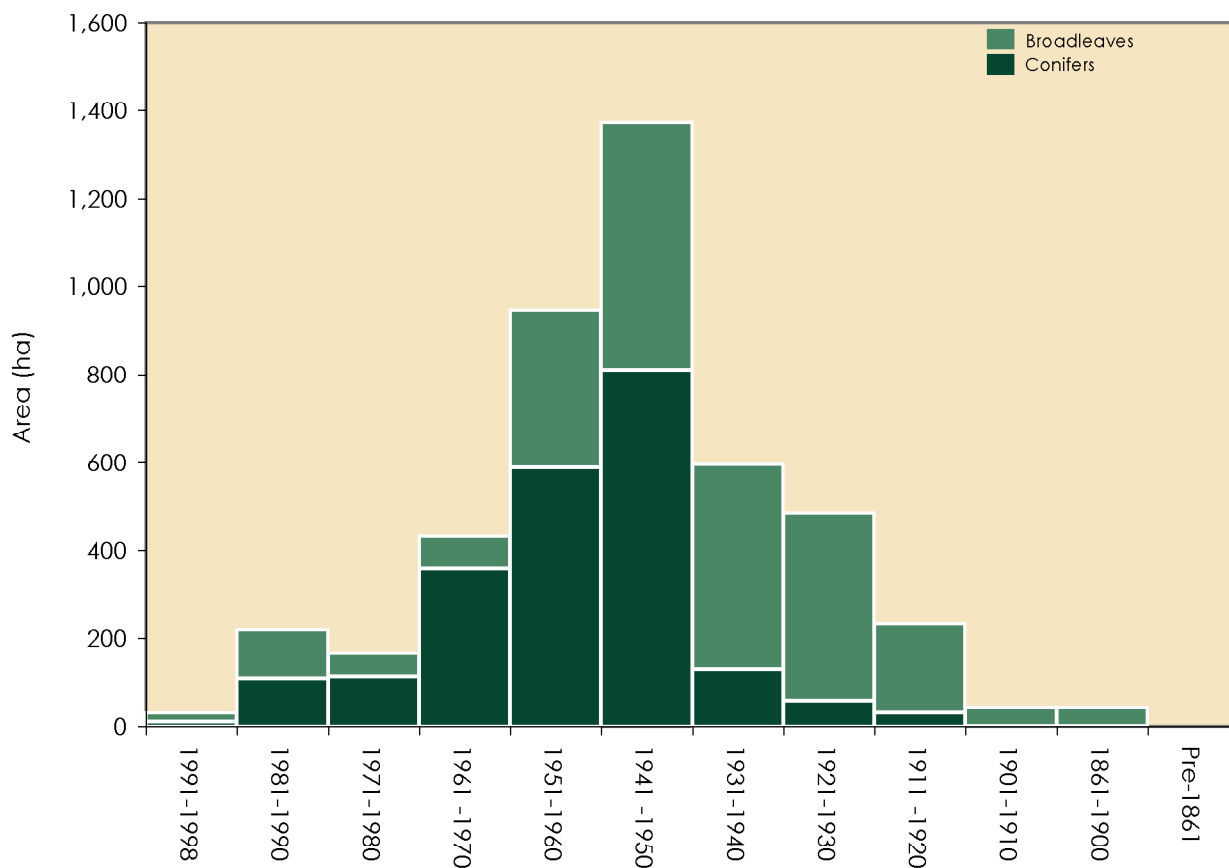
1. Most of the planting year classes cover 10 years, 1991-1998 is 8 years, and the classes prior to 1901 are 40 years or more.

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	80	10	127	88	433	52	57	31	0	0	0	879
Corsican pine	10	19	104	102	485	319	78	0	0	0	0	0	1,117
Lodgepole pine	0	10	0	10	0	0	0	0	0	0	0	0	21
Sitka spruce	0	0	0	0	0	0	0	0	0	0	0	0	0
Norway spruce	0	0	0	0	15	42	0	0	0	0	0	0	56
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 conifers	0	0	0	115	0	16	0	0	0	0	0	0	131
Mixed conifers	0	0	0	5	0	0	0	0	0	0	0	0	5
Total conifers	10	109	114	360	588	809	130	57	31	0	0	0	0
Oak	0	10	37	0	181	185	113	235	203	36	42	0	1,043
Beech	0	0	0	10	0	5	0	11	0	0	0	0	27
Sycamore	0	0	0	0	0	10	0	0	0	0	0	0	10
Ash	7	30	7	22	82	86	327	177	0	5	0	0	744
Birch	12	70	0	9	14	122	25	0	0	0	0	0	252
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	7	20	81	155	0	5	0	0	0	0	268
Mixed broadleaves	0	0	0	10	0	0	0	0	0	0	0	0	10
Total broadleaves	20	110	52	72	358	564	465	429	203	42	42	0	2,355
Total - all species	30	219	166	432	945	1,373	595	486	234	42	42	0	4,564

*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



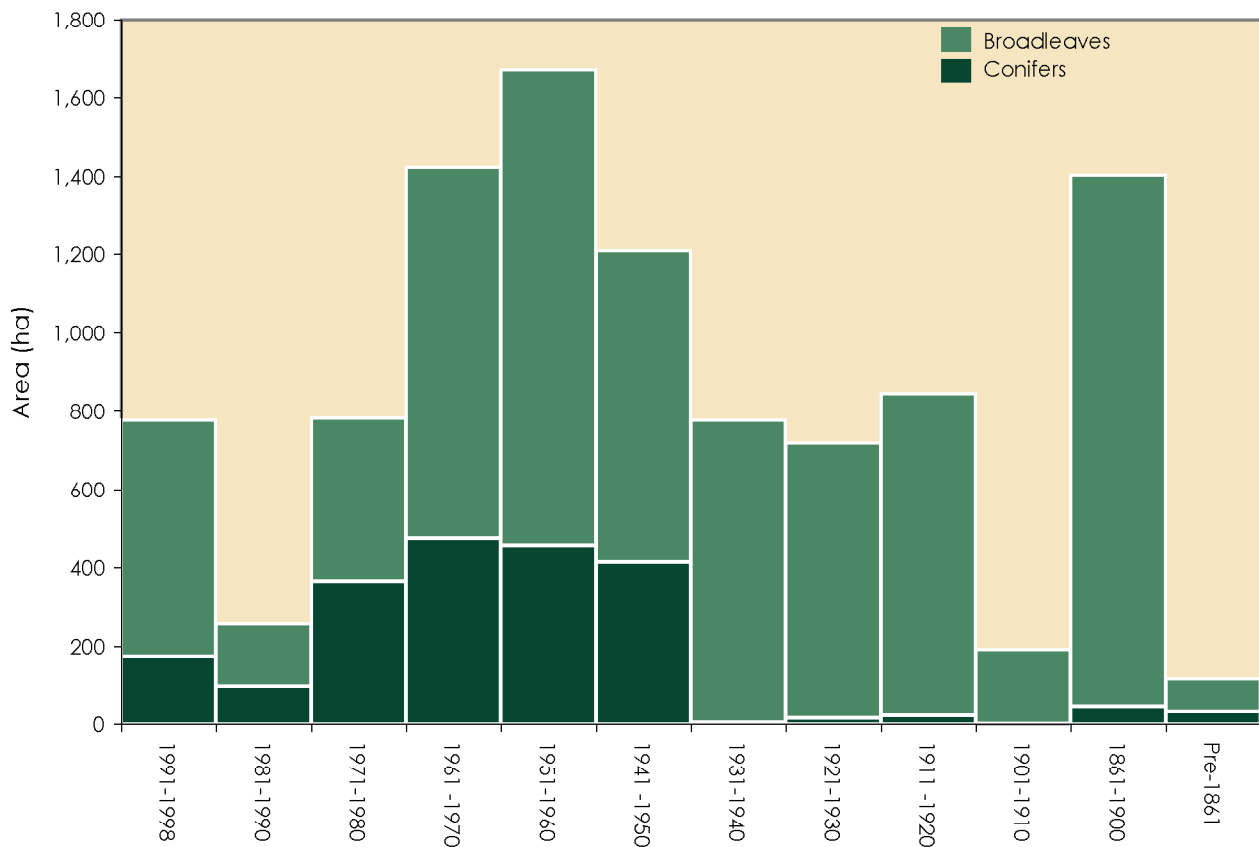
1. Most of the planting year classes cover 10 years, 1991-1998 is 8 years, and the classes prior to 1901 are 40 years or more.

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	35	0	101	80	75	39	0	7	0	0	0	0	337
Corsican pine	42	41	4	10	90	80	0	0	0	0	0	0	267
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	19	24	63	241	180	103	0	0	0	0	0	0	631
European larch	17	0	72	59	19	104	0	8	12	0	0	0	291
Jap/Hybrid larch	0	10	5	81	23	19	4	0	0	0	0	0	143
Douglas fir	19	0	0	0	24	69	0	0	10	0	0	0	122
Other conifers	40	20	119	4	46	0	0	0	0	0	45	32	307
Mixed conifers	0	0	0	0	0	0	0	0	0	0	0	0	0
Total conifers	173	96	364	476	457	413	4	15	22	0	45	32	2,098
Oak	191	34	25	390	130	136	107	192	143	192	896	25	2,463
Beech	26	5	38	12	228	47	54	44	0	0	35	48	539
Sycamore	18	51	149	86	218	164	128	135	8	0	100	0	1,057
Ash	122	34	152	159	526	261	449	254	670	0	289	0	2,917
Birch	65	10	0	49	63	147	20	78	0	0	0	0	433
Poplar	83	13	47	251	30	39	0	0	0	0	0	0	464
Sweet chestnut	19	0	0	0	0	0	0	0	0	0	0	0	19
Elm	0	0	0	0	10	0	0	0	0	0	0	0	10
Other broadleaves	42	0	5	0	10	0	14	0	0	0	37	10	119
Mixed broadleaves	35	12	0	0	0	0	0	0	0	0	0	0	47
Total broadleaves	603	160	417	947	1,215	795	773	703	821	192	1,357	84	8,068
Total - all species	776	256	781	1,423	1,673	1,208	777	718	843	192	1,403	116	10,166

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

High Forest Category 1 - 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	23	Ash	16	Poplar	10
1981-90	Birch	20	Scots pine	15	Ash	12
1971-80	Ash	16	Sycamore	16	Other conifers	12
1961-70	Oak	20	Poplar	13	Norway spruce	12
1951-60	Ash	22	Corsican pine	21	Oak	11
1941-50	Scots pine	16	Birch	14	Corsican pine	14
1931-40	Ash	53	Oak	15	Birch	10
1921-30	Oak	35	Ash	32	Sycamore	10
1911-20	Ash	62	Oak	31	Scots pine	3
1901-10	Oak	98	Ash	2	-	
1861-1900	Oak	60	Ash	20	Other broadleaves	7
Pre 1861	Beech	37	Oak	30	Other conifers	25
All years	Ash	24	Oak	23	Corsican pine	9

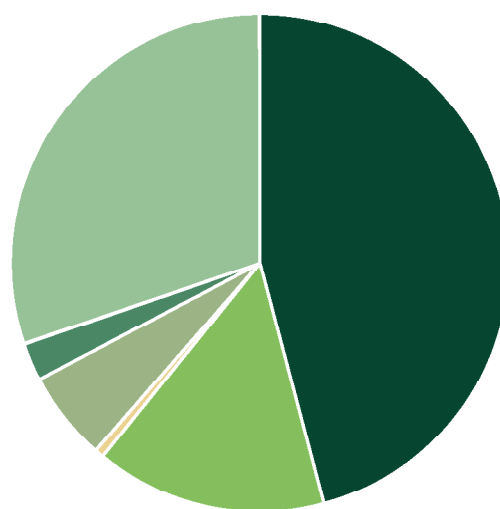
1. Principal species as a percentage of area in the planting year class.

Table 12 Ownership type* by area and percentage

Ownership type	Area (ha)	%
Personal	8,052	45.9
Business	2,638	15.0
Forestry or timber business	90	0.5
Charity	999	5.7
Local Authority	482	2.7
Other public (not FC)	0	0.0
Forestry Commission	5,297	30.2
Community ownership or common land	0	0.0
Unidentified	0	0.0
Total	17,557	100.0

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

Ownership type by area



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

Survey Method

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

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

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

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

Feature type	Number of features	Total	Unit
Small Woods	2,714	1,346	Area (ha)
Wide Linear Features	0	0	Area (ha)
Wide Linear Features	0	0	Length (Km)
Narrow Linear Features	59,300	4,321	Length (Km)
Narrow Linear Features	59,300	3,164,000	Number of live trees
Groups	202,100	1,415,700	Number of live trees
Individual Trees	444,600	444,600	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	150	1,196	1,346	2,714	0.50
Wide Linear Features	0	0	0	0	0.00
Total	150	1,196	1,346	2,714	0.50

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	2.4	0.0	9.5	0.0	11.9	2.3	0.2
Spruce	0.8	0.8	1.6	0.0	3.2	0.6	0.1
Larch	0.8	0.0	0.0	0.0	0.8	0.2	0.0
Cypress	10.3	0.0	39.6	437.2	487.1	94.5	9.7
Other conifers	1.6	1.6	9.5	0.0	12.7	2.5	0.3
Total conifers	15.9	2.4	60.2	437.2	515.7	100.0	10.3
Oak	29.3	4.0	13.5	109.6	156.4	3.5	3.1
Beech	0.0	0.0	5.5	1.1	6.6	0.1	0.1
Sycamore	49.1	1.6	66.6	127.5	244.8	5.4	4.9
Ash	118.8	4.1	226.7	354.4	704.0	15.6	14.0
Birch	11.1	0.0	23.0	104.0	138.1	3.1	2.7
Poplar	6.3	0.8	34.9	100.6	142.6	3.2	2.8
Sweet chestnut	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Horse chestnut	4.7	0.9	1.6	15.7	22.9	0.5	0.5
Alder	3.2	0.0	42.8	14.5	60.5	1.3	1.2
Lime	7.1	0.0	1.6	59.3	68.0	1.5	1.4
Elm	1.6	0.0	65.0	112.9	179.5	4.0	3.6
Willow	10.3	7.9	68.2	335.4	421.8	9.4	8.4
Other broadleaves	125.9	39.8	806.2	1,392.0	2,363.9	52.4	47.0
Total broadleaves	367.4	59.1	1,355.5	2,726.9	4,509.1	100.0	89.7
Total - all species	383.3	61.5	1,415.7	3,164.1	5,024.3		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 14%
 Groups 20%
 Narrow Linear Features 26%

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	1.6	0.0	2.4	2.2	6.2	14.3	14.3
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	1.6	0.0	1.6	4.5	7.7	17.8	17.8
Birch	0.0	0.0	0.0	1.1	1.1	2.5	2.5
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	2.4	0.0	2.4	5.5	5.5
Lime	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Elm	0.0	0.0	2.4	1.1	3.5	8.1	8.1
Willow	0.0	0.0	0.0	1.1	1.1	2.5	2.5
Other broadleaves	1.6	0.0	11.9	7.8	21.3	49.2	49.2
Total broadleaves	4.8	0.0	20.6	17.9	43.3	100.0	100.0
Total - all species	4.8	0.0	20.6	17.9	43.3		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	1.6	9.5	0.8	0.0	11.9
Spruce	3.2	0.0	0.0	0.0	3.2
Larch	0.8	0.0	0.0	0.0	0.8
Cypress	110.5	375.8	0.8	0.0	487.1
Other conifers	1.6	8.7	1.6	0.8	12.7
Total conifers	117.7	394.0	3.2	0.8	515.7
Oak	66.0	78.0	12.4	0.0	156.4
Beech	0.0	4.3	1.6	0.8	6.7
Sycamore	75.3	146.5	22.2	0.8	244.8
Ash	236.9	440.6	22.5	4.0	704.0
Birch	42.1	95.9	0.0	0.0	138.0
Poplar	12.2	82.2	48.2	0.0	142.6
Sweet chestnut	0.0	0.0	0.0	0.0	0.0
Horse chestnut	5.4	17.4	0.0	0.0	22.8
Alder	7.0	51.1	2.4	0.0	60.5
Lime	38.3	20.7	8.9	0.0	67.9
Elm	143.8	35.7	0.0	0.0	179.5
Willow	78.1	341.0	1.9	0.8	421.8
Other broadleaves	1,841.4	522.4	0.0	0.0	2,363.8
Total broadleaves	2,546.5	1,835.8	120.1	6.4	4,508.8
Total - all species	2,664.2	2,229.9	123.3	7.1	5,024.3

Table 18 Number of Groups by group size

Number of trees per Group*	Number of Groups (000's)
2	25
3-5	77
6-10	45
11-20	35
21-50	18
51-100	2
>100	1
Total	202

*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	17,344	92.4	17,557	93.6	1
0.25 - <2.0	1,430	7.6	1,196	6.4	-16
Total	18,774		18,753		0
% Woodland land cover	3.2		3.2		

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), 592,091 ha, was based on the 1991 Census of Population digital boundaries.
4. Land area used to calculate woodland cover percent (1980), 591,484 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	2,065	1,292	-37
Corsican pine	1,387	1,384	0
Lodgepole pine	3	21	655
Sitka spruce	15	0	-100
Norway spruce	1,150	796	-31
European larch	292	291	0
Jap/Hybrid larch	49	143	191
Douglas fir	131	122	-7
Other conifers	353	438	24
Mixed conifers	450	26	-94
Total conifers	5,895	4,513	-23
Oak	1,894	3,820	102
Beech	431	577	34
Sycamore	644	1,200	86
Ash	2,436	4,119	69
Birch	1,828	1,082	-41
Poplar	244	464	90
Sweet chestnut	6	19	193
Elm	243	26	-89
Other broadleaves	670	1,023	53
Mixed broadleaves	2,756	956	-65
Total broadleaves	11,153	13,286	19
Total all species	17,047	17,799	4
Felled	295	225	-24
Total High Forest	17,342	18,024	4

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 7.3% (Table 2). To obtain meaningful comparisons between the two datasets the 1980 Census data have therefore been reduced by 7.3%.
3. The above figures from the 1999 Inventory exclude woodland between 0.1 and <0.25 ha, thereby matching the scope of the 1980 Census. The 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

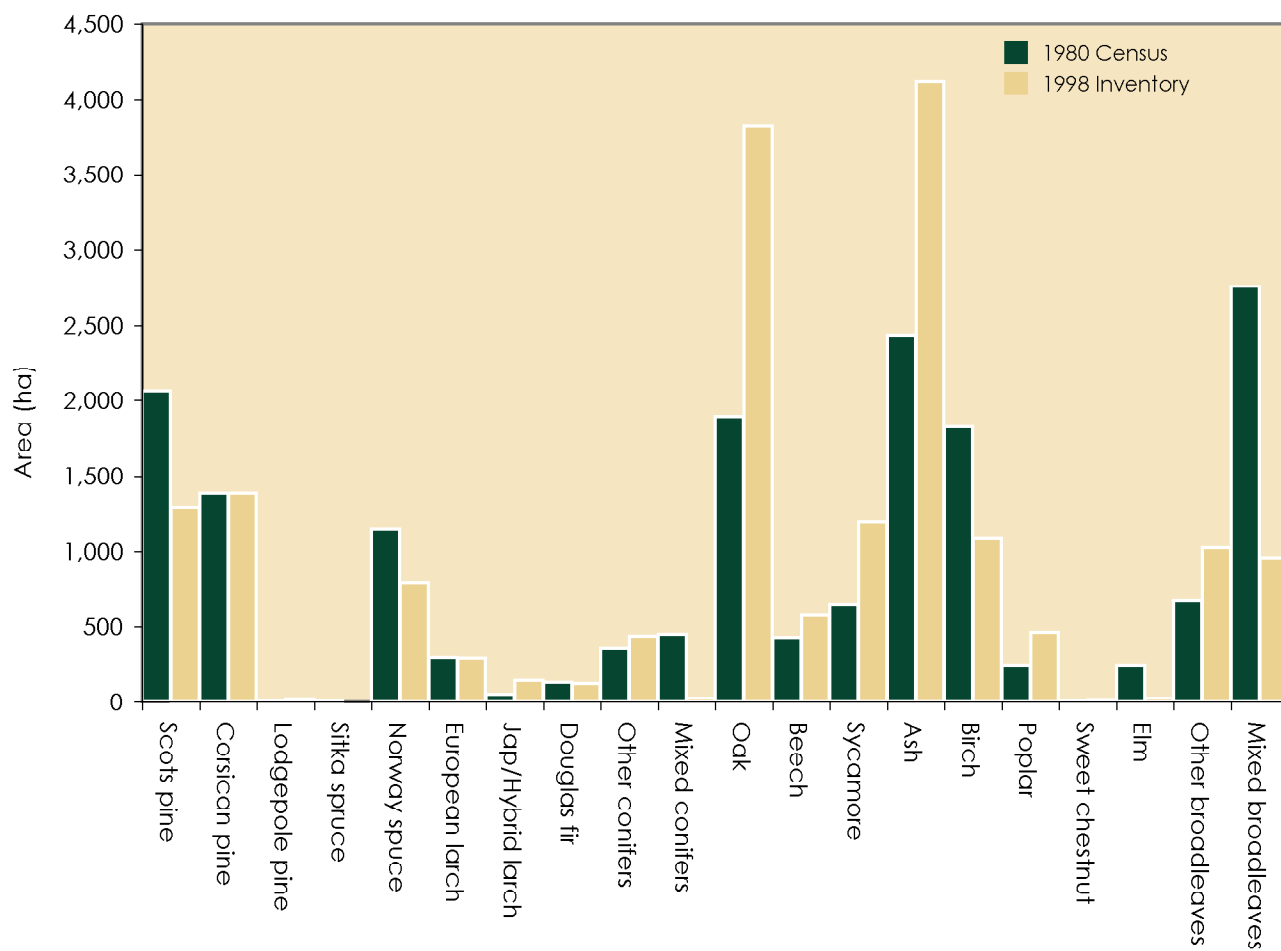


Table 21 Comparison of High Forest Category 1 area by planting year class
between 1980 Census and 1998 Inventory

Planting year class	1980 Census woodland area (ha)	1998 Inventory woodland area (ha)	Change (%)
1991-1998	0	1,221	see note
1981-1990	0	507	see note
1971-1980	1,025	1,012	-1
1961-1970	2,036	1,854	-9
1951-1960	2,925	2,618	-10
1941-1950	3,244	2,661	-18
1931-1940	2,629	1,372	-48
1921-1930	967	1,204	25
1911-1920	655	1,189	81
1901-1910	724	234	-68
1861-1900	1,589	1,460	-8
Pre 1861	396	116	-71
Total all years	16,190	15,448	-5

1. The first 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

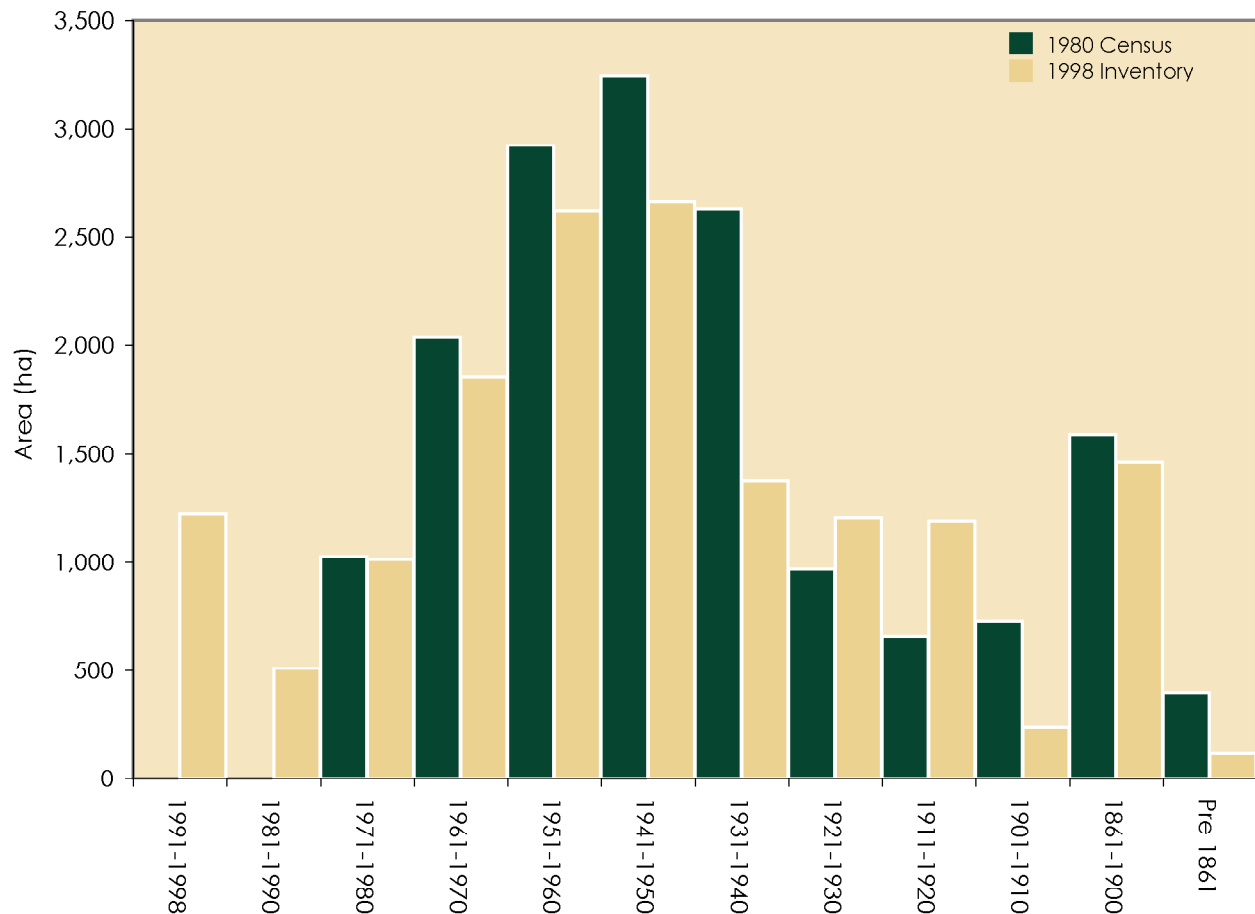


Table 22 Comparison of numbers of live trees outside woodland
between 1980 Census and 1998 Inventory (000's)

Feature type	1980 Census	1998 Inventory	Change (%)
Boundary Tree	199	319	60
Middle Tree	325	34	-90
Total Individual Trees	525	353	-33
Groups	343	679	98
Linear Features	163	1,996	1,122
Total	1,031	3,028	194

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)	88.7	59.6	-33
Groups (per sq km)	10.0	19.3	92
Linear Features (m per sq km)	115.0	680.4	492

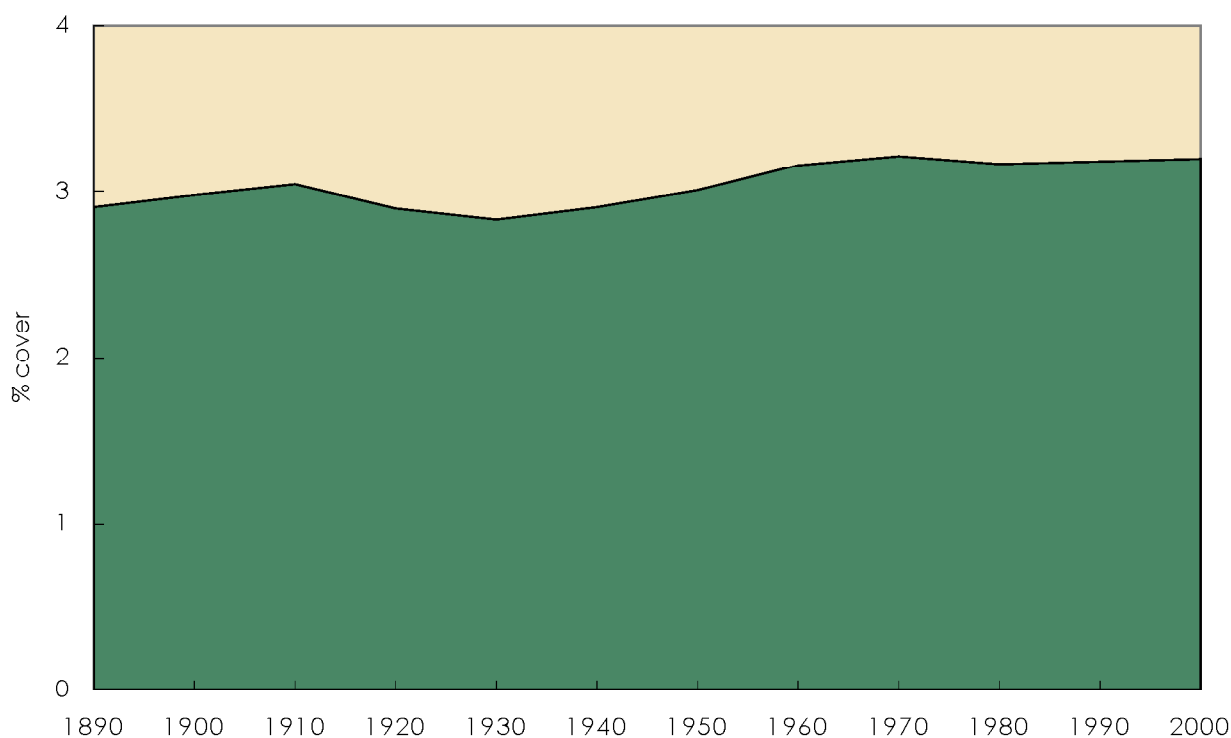
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WOODLAND COVER

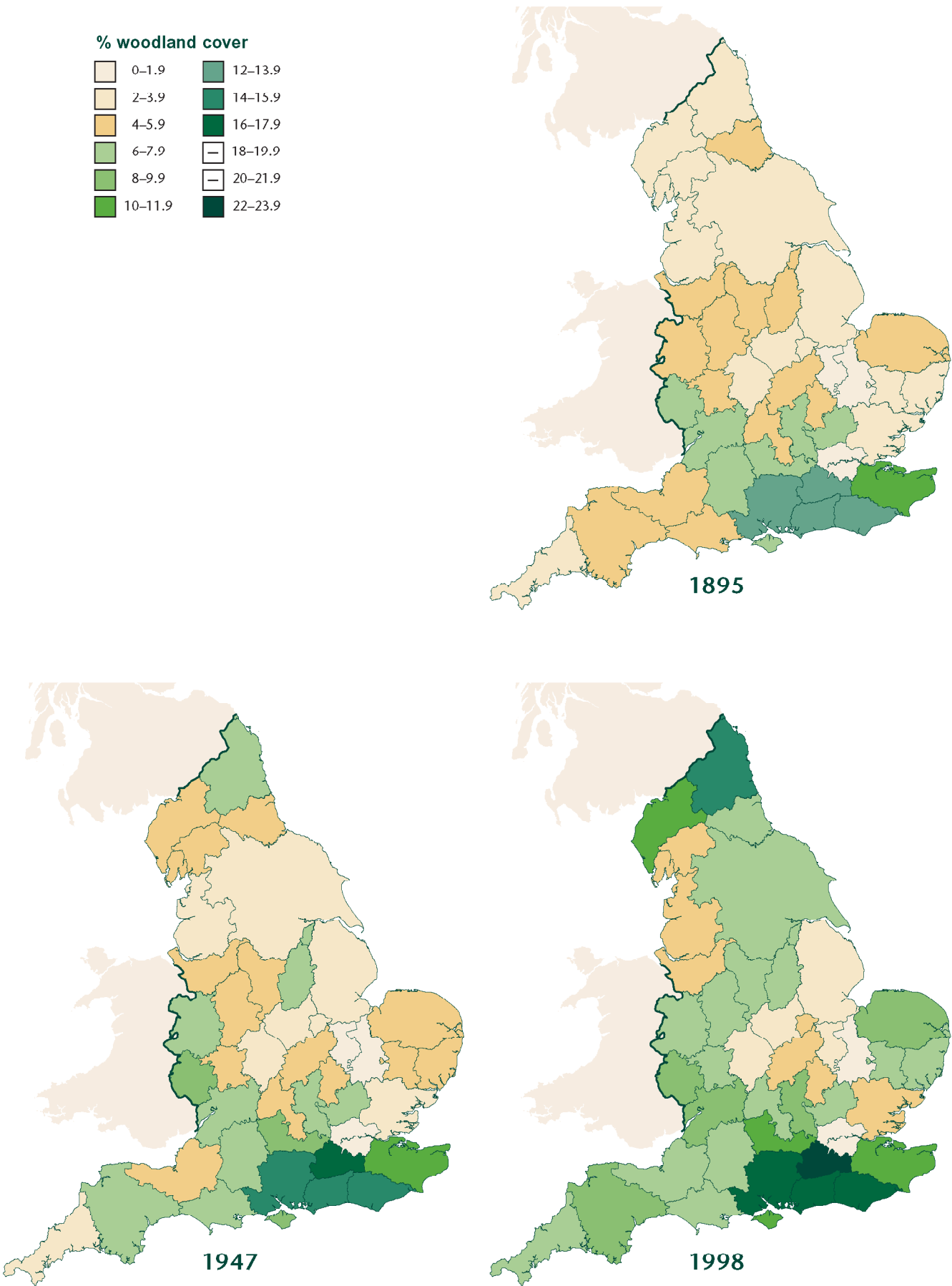
Woodland area data is available from Ministry of Agriculture surveys since 1871, and from Forestry Commission national woodland inventories since 1924. The following chart and maps show the changes in woodland area through time.

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

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



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



GLOSSARY

Woodland

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

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

Interpreted Forest Types

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

High Forest

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

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

Mixtures

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

Forest Types

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

- **Coppice**

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

- **Coppice with Standards**

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

- **Felled**

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

- **Windblow**

Areas of blown woodland which remain uncleared and not regenerated.

- **Open Space**

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

Ownership types

- **Other Ownership**

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

- **Personal**

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

- **Private forestry or timber business**

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

- **Other private business**

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

- **Local Authority**

Region, County, District or other Council

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

Government department/agency, nationalised industry, etc.

- **Charitable organisations**

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

- Community ownership or common land

the common property of all members of the community.

- **Forestry Commission**

Land owned by or land leased to the Forestry Commission

Feature types

- **Small Wood**

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

- **Group**

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

- **Individual Tree**

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

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

- **Linear Feature**

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

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

NOTES



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