



NATIONAL INVENTORY OF WOODLAND AND TREES



ENGLAND

County Report for

CHESHIRE



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 With the statistics becoming increasingly out of date the Forestry Commission decided to undertake a new survey: the *National Inventory of Woodland and Trees*.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

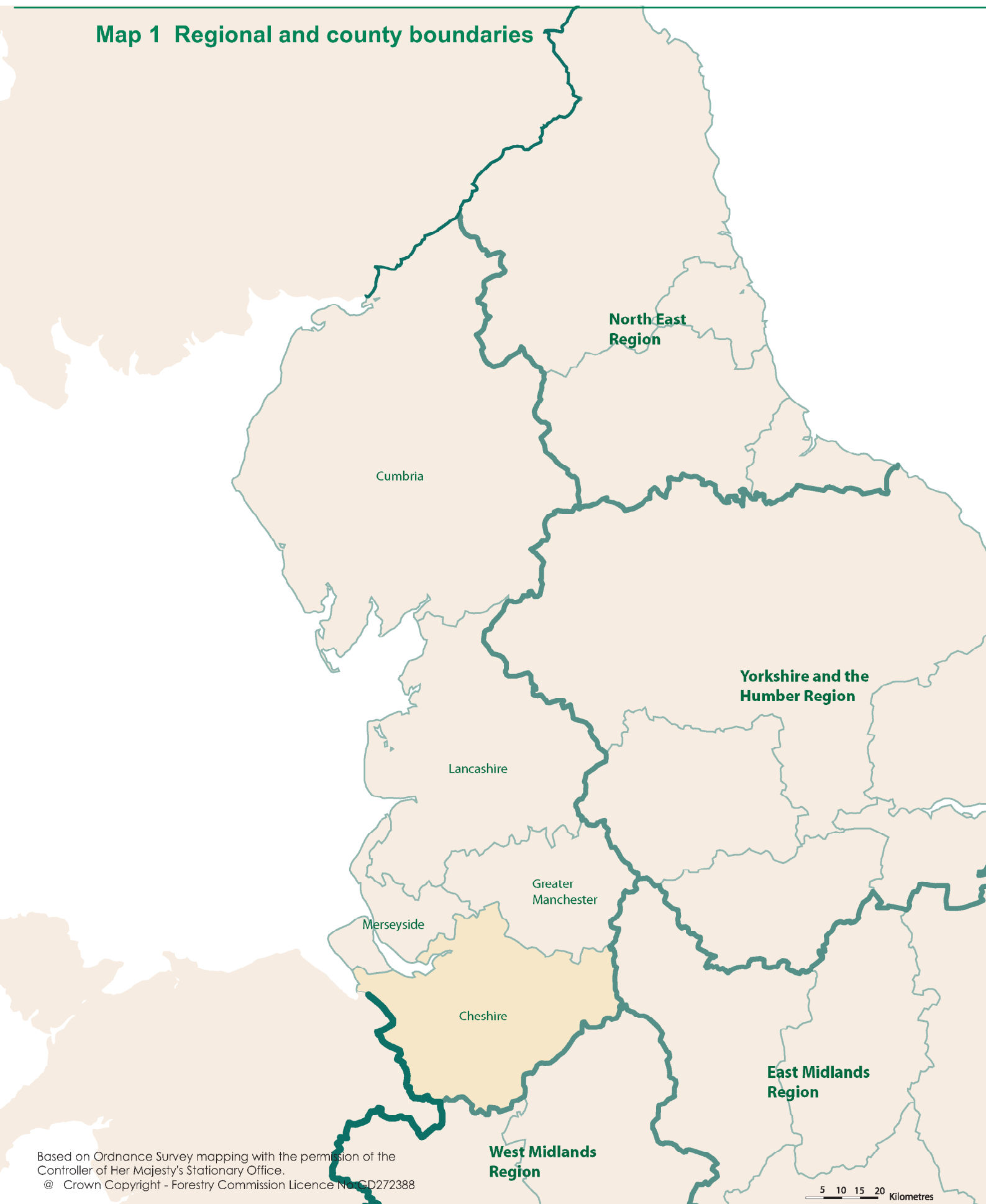
MAIN POINTS FROM THE SURVEY RESULTS

- The total area of woodland of 0.1 hectares and over in Cheshire is 10,337 hectares. This represents 4.4% of the land area. (Table 1)
- Broadleaved woodland is the dominant forest type representing 55.5 % of all woodland. Conifer woodland represents 19.7 %, Mixed woodland 15.7 % and Open Space within woodlands 7.9 %. (Table 2)
- The main conifer species is pine covering 1,429 hectares or 53.4 % of all conifer species. The main broadleaved species is oak covering 1,492 hectares or 22.2 % of all broadleaved species. (Table 3)
- 777 hectares or 8 % of woodland over 2 hectares is owned by or leased to the Forestry Commission, and 8,665 hectares or 92 % of woodland is in Other ownership. (Table 6)
- There are a total of 961 woods over 2 ha within Cheshire with a mean wood area of 9.9 hectares. (Table 7a) There are a total of 4,146 woods from 0.1 - <2.0 hectares with a mean wood area of 0.22 hectares. (Table 14)
- There are 2.8 million live trees outside woodland in Cheshire. (Table 15)
- Woodland land cover increased by over 1,100 hectares from 3.8 % to 4.3 % of the land area between 1980 and 1998. (Table 19)
- The area of broadleaves increased by 9 % between 1980 and 1998, with the relative proportion of broadleaves to conifers decreasing from 74 % to 71 %. (Table 20)

INVENTORY REPORTS

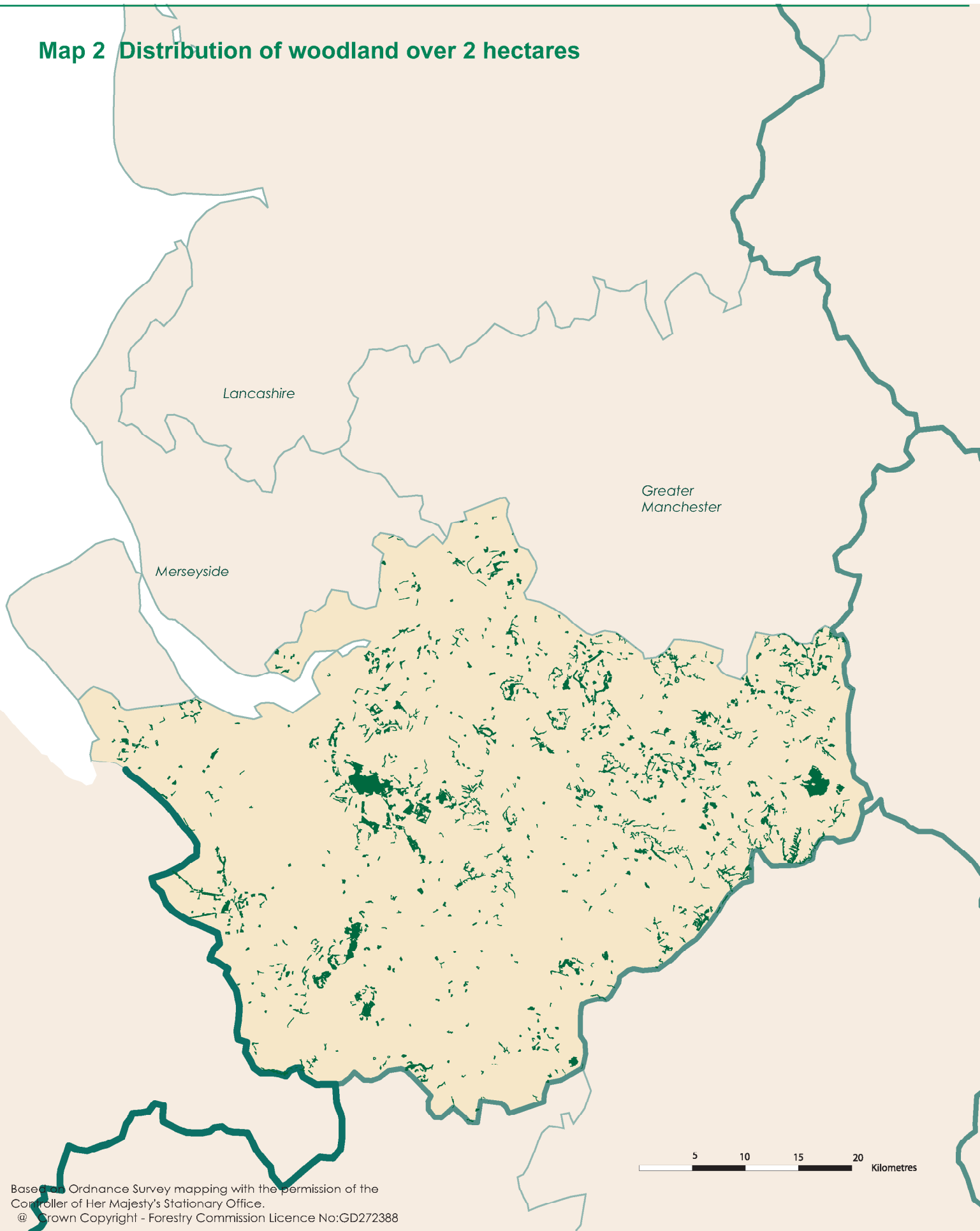
As well as this report for Cheshire, reports are available for the other counties in the region as shown on the map opposite. Also available are region and county reports for England as well as a report for the country as a whole. Wales and Scotland are also covered by reports. Inventory reports can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

Map 1 Regional and county boundaries



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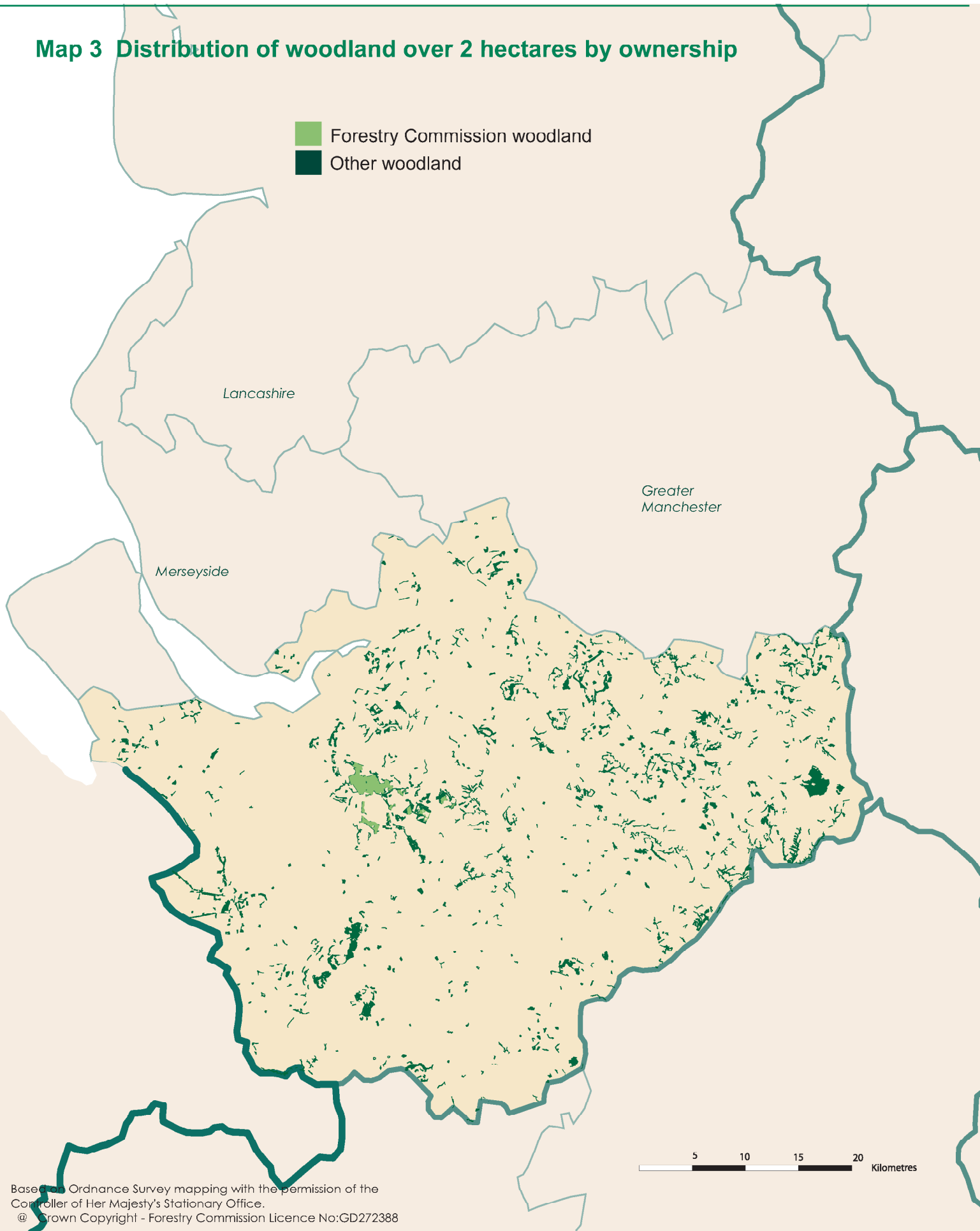
Map 2 Distribution of woodland over 2 hectares



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Map 3 Distribution of woodland over 2 hectares by ownership

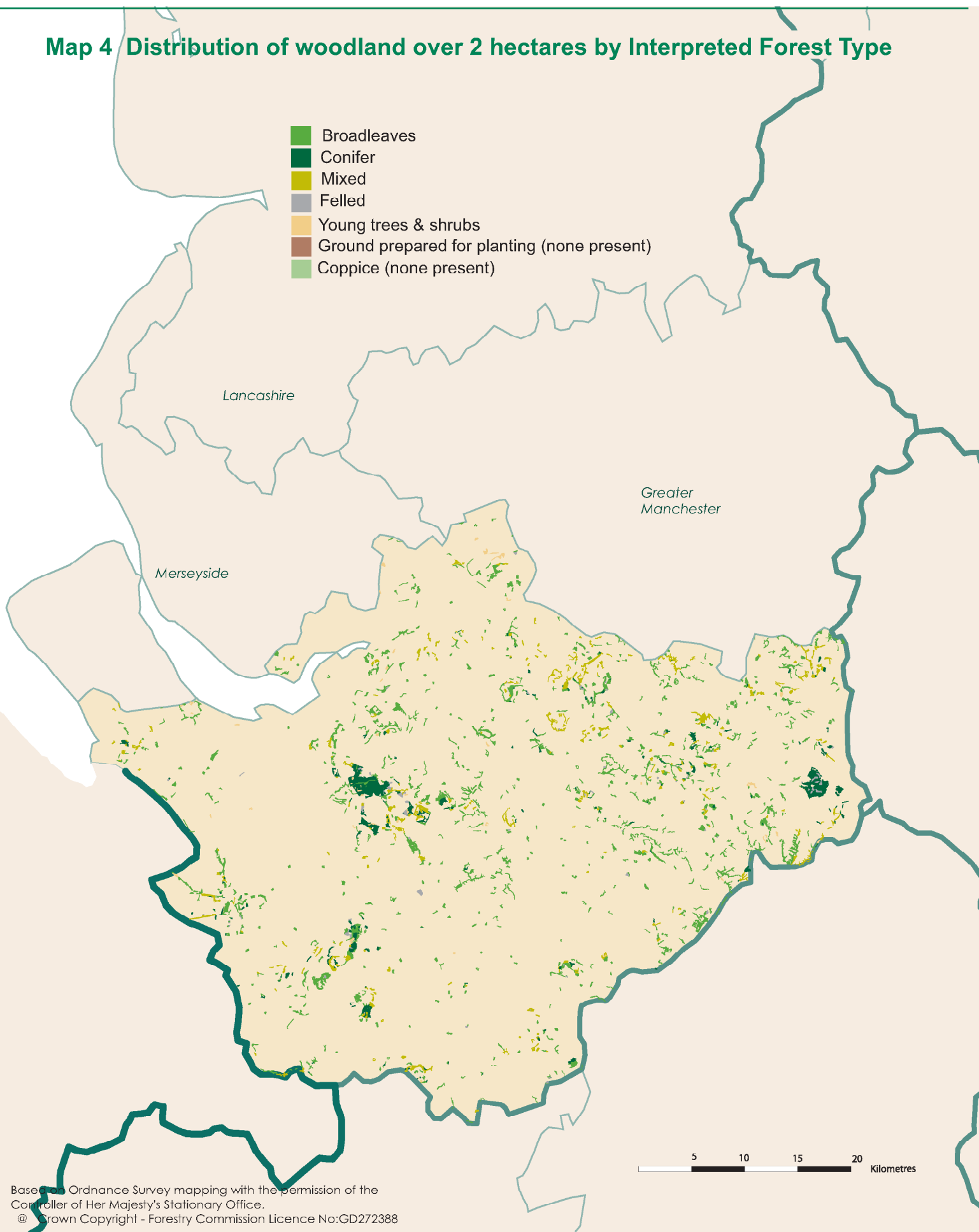
- Forestry Commission woodland
- Other woodland



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

- Broadleaves
- Conifer
- Mixed
- Felled
- Young trees & shrubs
- Ground prepared for planting (none present)
- Coppice (none present)



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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 Cheshire.

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	9,442	91.3
0.25 - < 2.00	571	5.5
0.10 - < 0.25	324	3.1
Total area of woodland	10,337	100.0
% Woodland land cover	4.4	

1. Area of Cheshire, including inland water, 233,107 ha based on digital boundaries used in the 1991 Census of Population

Table 2 Woodland area by forest type and woodland size

Forest type	Woodland size (ha)		Total area (ha)	Percentage of total area
	2.0 and over	0.1 - <2.0		
Conifer	1,863	169	2,032	19.7
Broadleaved	5,202	540	5,742	55.5
Mixed	1,437	187	1,624	15.7
Coppiced	0	0	0	0.0
Copp-w-standards	25	0	25	0.2
Windblow	0	0	0	0.0
Felled	101	0	101	1.0
Open Space	813	0	813	7.9
Total	9,442	895	10,337	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	1,382	47	1,429	53.4	15.2
Sitka spruce	165	47	212	7.9	2.3
Larch	623	55	678	25.3	7.2
Other conifers	229	0	229	8.6	2.4
Mixed conifers	37	90	127	4.7	1.4
Total conifers	2,436	239	2,675	100.0	28.5
Oak	1,368	124	1,492	22.2	15.9
Beech	615	16	631	9.4	6.7
Sycamore	1,167	16	1,183	17.6	12.6
Ash	562	39	601	8.9	6.4
Birch	1,138	55	1,193	17.7	12.7
Elm	40	0	40	0.6	0.4
Other broadleaves	1,079	180	1,259	18.7	13.4
Mixed broadleaves	99	228	327	4.9	3.5
Total broadleaves	6,067	658	6,725	100.0	71.6
Total all species***	8,503	895	9,398		100.0

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

**Species/group percentage of all species

***Excludes the 939ha 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	5%
Pine	12%
Oak	11%
Sycamore	13%
2. Where the standard errors of these summary measures are 10% or less, the confidence intervals will be approximately symmetrical; the true value is expected to be within +/- one standard error for about 68% (or about two-thirds) of all cases, and within +/- two standard errors for about 95% of all cases. Where percentage standard errors are larger, e.g. for less common species or more variable species composition, the confidence intervals will be less symmetrical (and wider).

Table 4 Numbers of live trees outside woodland by feature type

Feature type	Total number of features	Total number of live trees	Mean number of trees per feature	Tree density (per sq km)
Groups	32,500	156,800	5	67
Narrow Linear Features	19,300	2,404,100	125	1,031
Individual Trees	231,400	231,400	1	99
Total		2,792,300		1,198

1. Land area used to calculate tree density 233,107 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	31%
Narrow Linear Features	25%
Individual Trees	19%
3. Where the standard errors of these summary measures are 10% or less, the confidence intervals will be approximately symmetrical; the true value is expected to be within +/- one standard error for about 68% (or about two-thirds) of all cases, and within +/- two standard errors for about 95% of all cases. Where percentage standard errors are larger, e.g. for less common species or more variable species composition, the confidence intervals will be less symmetrical (and wider).
4. See Glossary for definitions of feature types.

Table 5 Lengths of Linear Features

Feature type	Total number of features	Total length of features (km)	Density of features (m per sq km)
Wide Linear Features	1,330	156	67
Narrow Linear Features	19,300	2,349	1,008
Total		2,505	1,075

1. Land area used to calculate tree density 233,107 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	68%
Narrow Linear Features	17%
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	777	8
Other	8,665	92
Total area of woodland	9,442	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

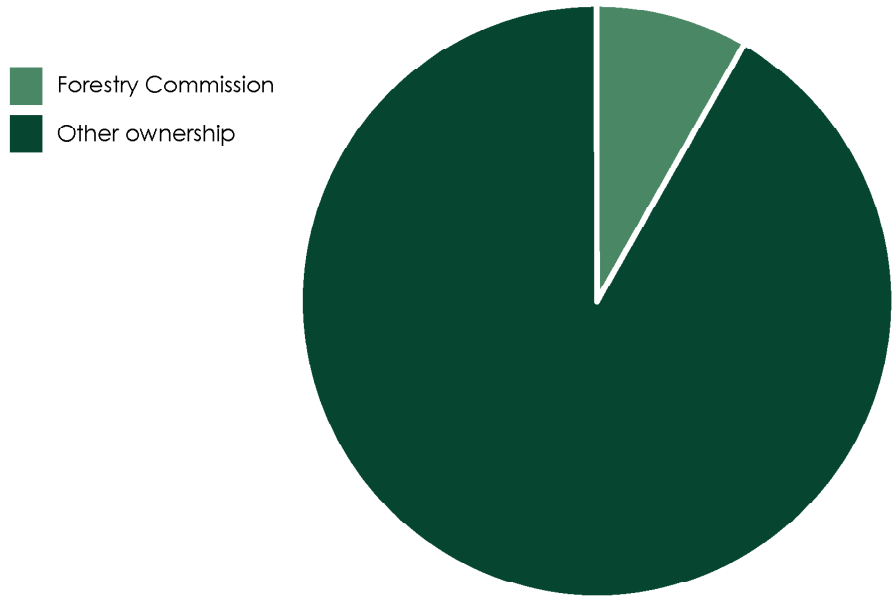


Table 7a Size class distribution of woodland

Size class (ha)	Number of woods	Total area (ha)	Percent of total area	Mean wood area (ha)
<10	770	3,265	34	4.2
10 - <20	102	1,394	15	13.7
20 - <50	66	1,961	21	29.7
50 - <100	17	1,242	13	73.1
<100	955	7,862	83	8.2
100 - <500	5	954	10	190.9
500 and >	1	698	7	698.4
All woods	961	9,515	100	9.9

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	14	0	4.8
	O	788	3,309	35	4.2
10 - <20	FC	2	27	0	13.3
	O	107	1,474	15	13.8
20 - <50	FC	5	140	1	28.1
	O	64	1,919	20	30.0
50 - <100	FC	1	97	1	96.7
	O	16	1,120	12	70.0
<100	FC	11	278	3	25.3
	O	975	7,822	82	8.0
100 - <500	FC	0	0	0	0.0
	O	4	843	9	210.7
500 and >	FC	1	571	6	571.0
	O	0	0	0	0.0
Total	FC	12	849	9	70.8
	O	979	8,665	91	8.9

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

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

Table 8 Area of woodland by forest type and ownership

Forest type	Forestry Commission		Other		All ownerships	
	ha	%	ha	%	ha	%
Conifer	428	55.1	1,435	16.6	1,863	19.7
Broadleaved	139	17.9	5,064	58.4	5,202	55.1
Mixed	43	5.5	1,394	16.1	1,437	15.2
Coppice	0	0.0	0	0.0	0	0.0
Copp-w-Stds	0	0.0	25	0.3	25	0.3
Windblow	0	0.0	0	0.0	0	0.0
Felled	96	12.4	5	0.1	101	1.1
Open Space	72	9.3	741	8.6	813	8.6
Total	777	100.0	8,665	100.0	9,442	100.0

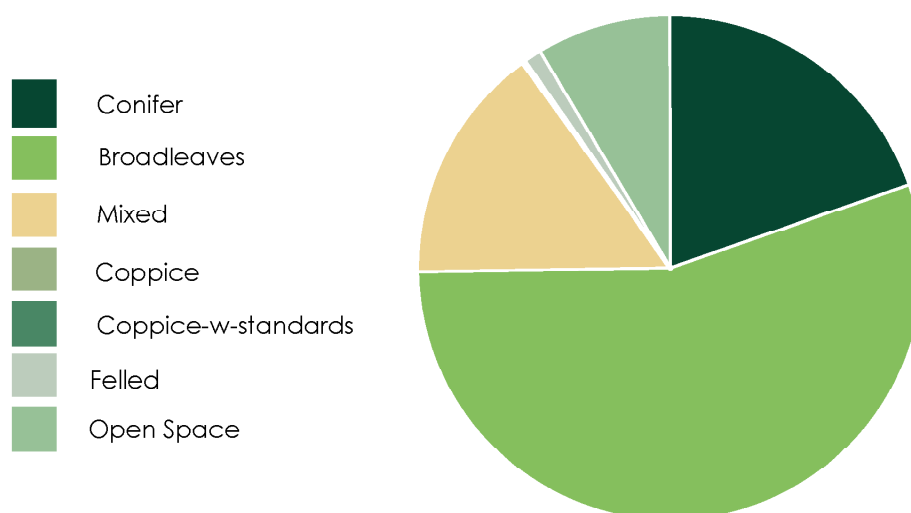
Area of woodland by forest type

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	178	42	29	895	44	11	1,073	44	13
Corsican pine	181	43	30	26	1	0	207	8	2
Lodgepole pine	2	0	0	101	5	1	102	4	1
Sitka spruce	0	0	0	165	8	2	165	7	2
Norway spruce	20	5	3	107	5	1	127	5	1
European larch	0	0	0	4	0	0	4	0	0
Jap/Hybrid larch	21	5	3	599	30	8	619	25	7
Douglas fir	0	0	0	16	1	0	16	1	0
Other conifers	20	5	3	66	3	1	86	4	1
Mixed conifers	4	1	1	34	2	0	37	2	0
Total conifers	424	100	70	2,012	100	25	2,436	100	29
Oak	34	18	6	1,334	23	17	1,368	23	16
Beech	16	9	3	599	10	8	615	10	7
Sycamore	0	0	0	1,167	20	15	1,167	19	14
Ash	0	0	0	562	10	7	562	9	7
Birch	100	54	16	1,039	18	13	1,138	19	13
Poplar	0	0	0	82	1	1	82	1	1
Sweet chestnut	0	0	0	14	0	0	14	0	0
Elm	0	0	0	40	1	1	40	1	0
Other broadleaves	32	17	5	951	16	12	983	16	12
Mixed broadleaves	3	2	0	95	2	1	99	2	1
Total broadleaves	185	100	30	5,881	100	75	6,067	100	71
Total - all species	609		100	7,893		100	8,503		100
Felled	96			5			101		
Total High Forest	705			7,898			8,604		

*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 813 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	5%
Scots pine	14%
Oak	11%
Sycamore	13%
3. Mixtures: where possible the species in mixtures have been separately recorded. Where this has not been possible they were described as 'Mixed conifers' or 'Mixed broadleaves'.
4. Confidence Intervals: where the standard errors of these summary measures are 10% or less, the confidence intervals will be approximately symmetrical; the true value is expected to be within +/- one standard error for about 68% (or about two-thirds) of all cases, and within +/- two standard errors for about 95% of all cases. Where percentage standard errors are larger, e.g. for less common species or more variable species composition, the confidence intervals will be less symmetrical (and wider).

Area of High Forest by principal species and ownership

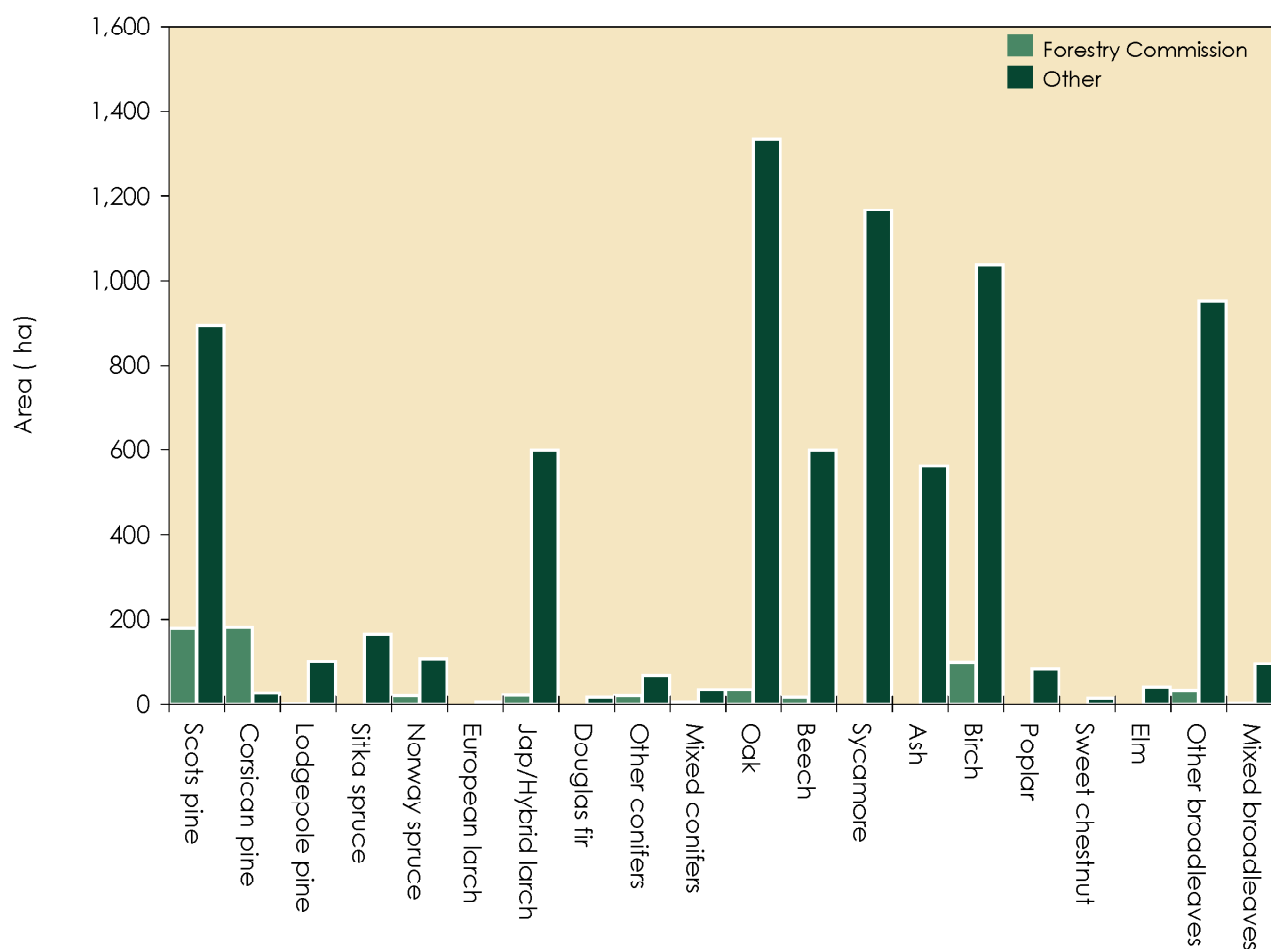


Table 9b Area of High Forest by principal species,ownership and category

Species	Forestry Commission			Other			All ownerships		
	cat. 1	cat. 2	Total (ha)	cat. 1	cat. 2	Total (ha)	cat. 1	cat. 2	Total (ha)
Scots pine	178	0	178	802	93	895	980	93	1,073
Corsican pine	181	0	181	26	0	26	207	0	207
Lodgepole pine	2	0	2	101	0	101	102	0	102
Sitka spruce	0	0	0	165	0	165	165	0	165
Norway spruce	20	0	20	107	0	107	127	0	127
European larch	0	0	0	0	4	4	0	4	4
Jap/Hybrid larch	21	0	21	599	0	599	619	0	619
Douglas fir	0	0	0	16	0	16	16	0	16
Other conifers	20	0	20	42	24	66	62	24	86
Mixed conifers	4	0	4	34	0	34	37	0	37
Total conifers	424	0	424	1,891	121	2,012	2,315	121	2,436
Oak	6	28	34	479	854	1,334	485	882	1,368
Beech	5	11	16	186	412	599	192	423	615
Sycamore	0	0	0	666	501	1,167	666	501	1,167
Ash	0	0	0	263	299	562	263	299	562
Birch	79	21	100	277	761	1,039	357	782	1,138
Poplar	0	0	0	82	0	82	82	0	82
Sweet chestnut	0	0	0	0	14	14	0	14	14
Elm	0	0	0	22	18	40	22	18	40
Other broadleaves	23	9	32	217	734	951	240	743	983
Mixed broadleaves	2	1	3	45	50	95	47	52	99
Total broadleaves	115	70	185	2,237	3,644	5,881	2,352	3,714	6,067
Total - all species	539	70	609	4,128	3,766	7,893	4,667	3,836	8,503

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

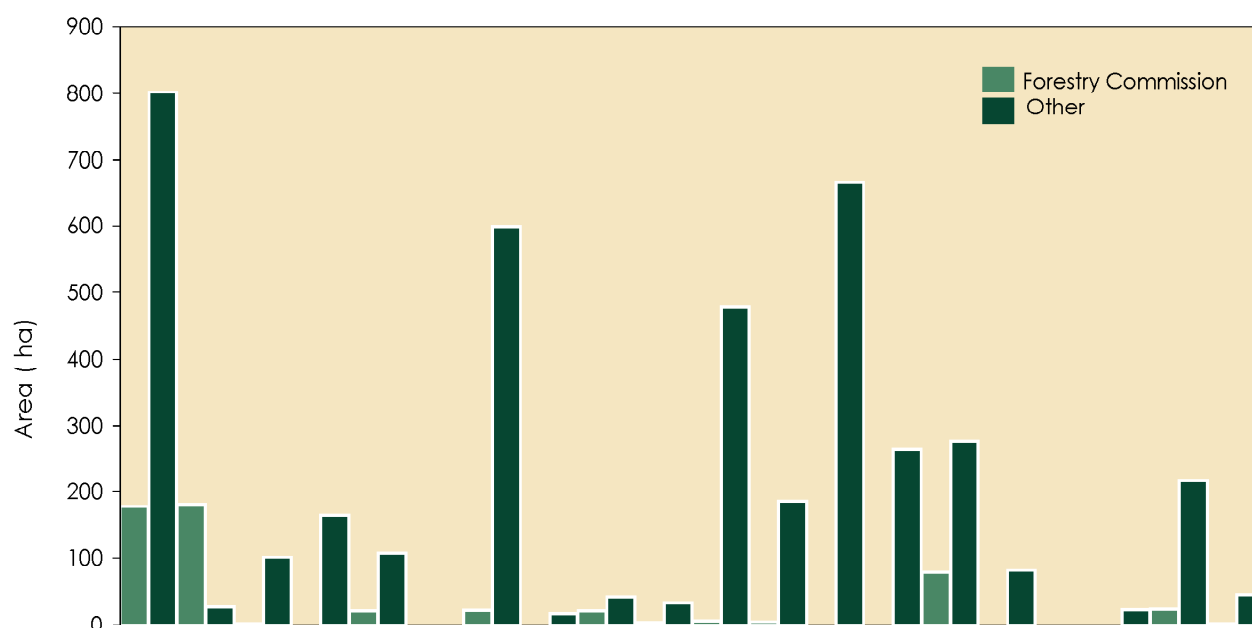
	Category 1*	Category 2*	Total High Forest
Conifers	9%	37%	8%
Broadleaves	9%	6%	5%
Scots pine	15%	40%	14%
Oak	24%	12%	11%
Sycamore	19%	18%	13%

*See Glossary for Category 1 and Category 2 descriptions

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

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

High Forest Category 1 - Area by principal species and ownership



High Forest Category 2 - Area by principal species and ownership

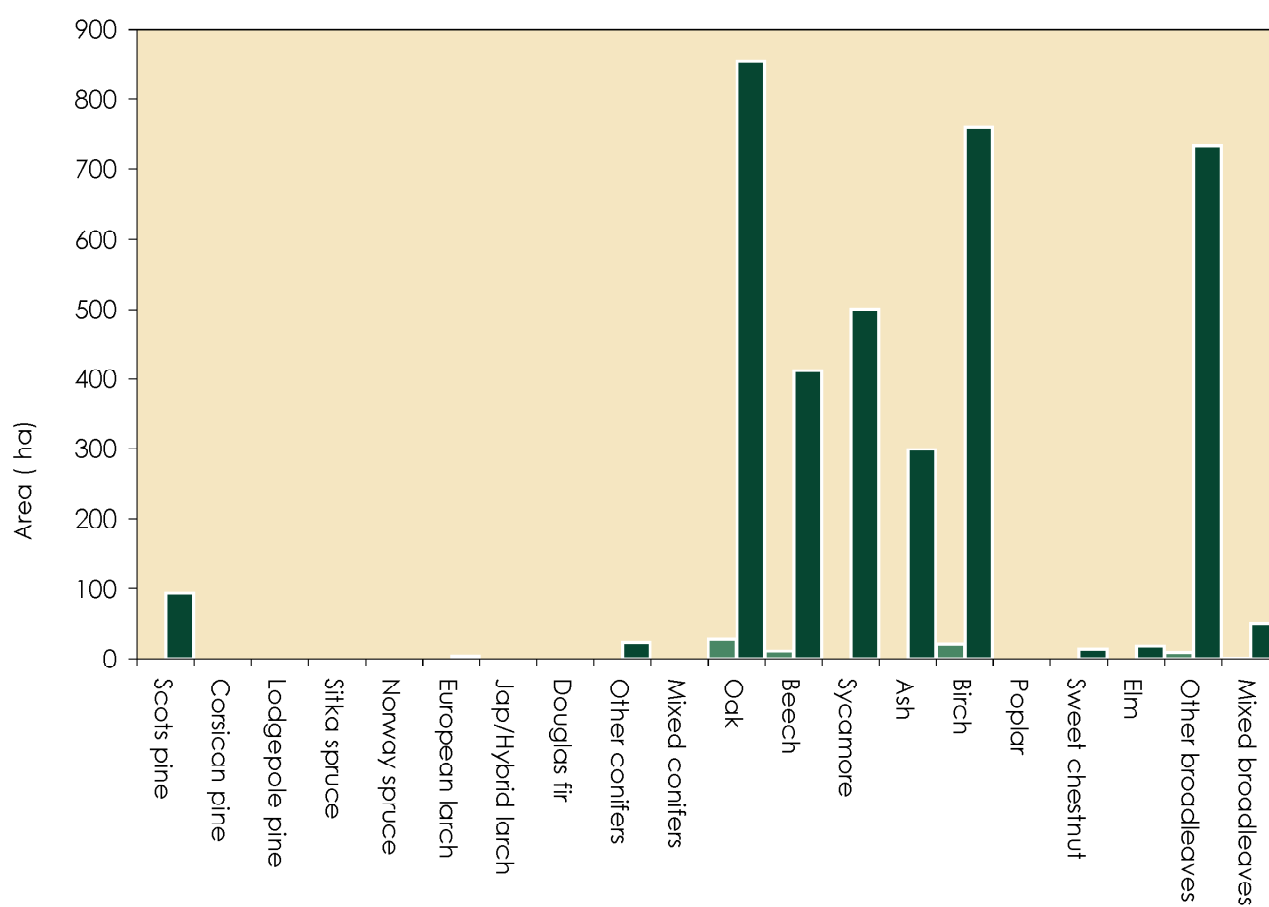
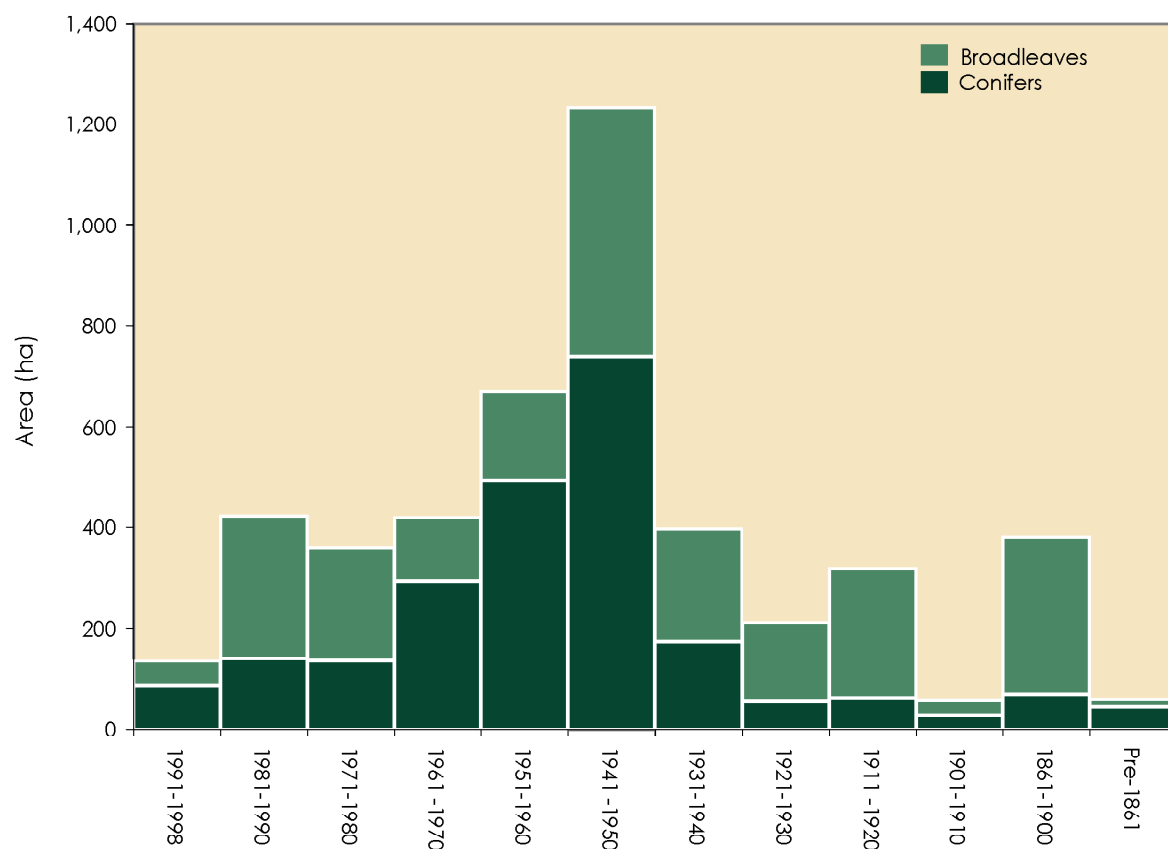


Table 10a High Forest Category 1 - Area by principal species and planting year class

Species	Planting year class*												Total (ha)
	1991-1998	1981-1990	1971-1980	1961-1970	1951-1960	1941-1950	1931-1940	1921-1930	1911-1920	1901-1910	1861-1900	Pre-1861	
Scots pine	20	16	94	132	202	275	33	29	61	27	46	45	980
Corsican pine	7	75	8	21	24	68	0	4	0	0	0	0	207
Lodgepole pine	0	0	0	0	68	35	0	0	0	0	0	0	102
Sitka spruce	0	0	0	68	31	61	5	0	0	0	0	0	165
Norway spruce	48	41	2	0	5	30	0	0	0	0	0	0	127
European larch	0	0	0	0	0	0	0	0	0	0	0	0	0
Jap/Hybrid larch	10	8	31	34	135	254	125	23	0	0	0	0	619
Douglas fir	0	0	0	0	5	0	10	0	0	0	0	0	16
Other conifers	0	0	0	33	11	18	0	0	0	0	0	0	62
Mixed conifers	0	0	0	4	12	0	0	0	0	0	22	0	37
Total conifers	85	140	135	292	493	740	173	55	61	27	68	45	2,315
Oak	7	153	21	5	7	47	12	0	57	20	148	8	485
Beech	7	30	41	23	0	0	0	4	30	0	57	0	192
Sycamore	0	15	48	9	63	255	19	140	70	10	30	5	666
Ash	0	15	27	16	24	117	0	10	21	0	32	0	263
Birch	0	30	48	5	42	40	130	0	50	0	11	0	357
Poplar	0	29	0	35	18	0	0	0	0	0	0	0	82
Sweet chestnut	0	0	0	0	0	0	0	0	0	0	0	0	0
Elm	0	0	22	0	0	0	0	0	0	0	0	0	22
Other broadleaves	5	0	17	36	23	33	64	0	25	0	36	0	240
Mixed broadleaves	30	12	0	0	0	0	0	2	3	0	0	0	47
Total broadleaves	50	283	224	129	177	493	224	156	258	30	313	14	2,352
Total - all species	136	423	359	421	670	1,232	398	212	319	57	381	59	4,667

*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

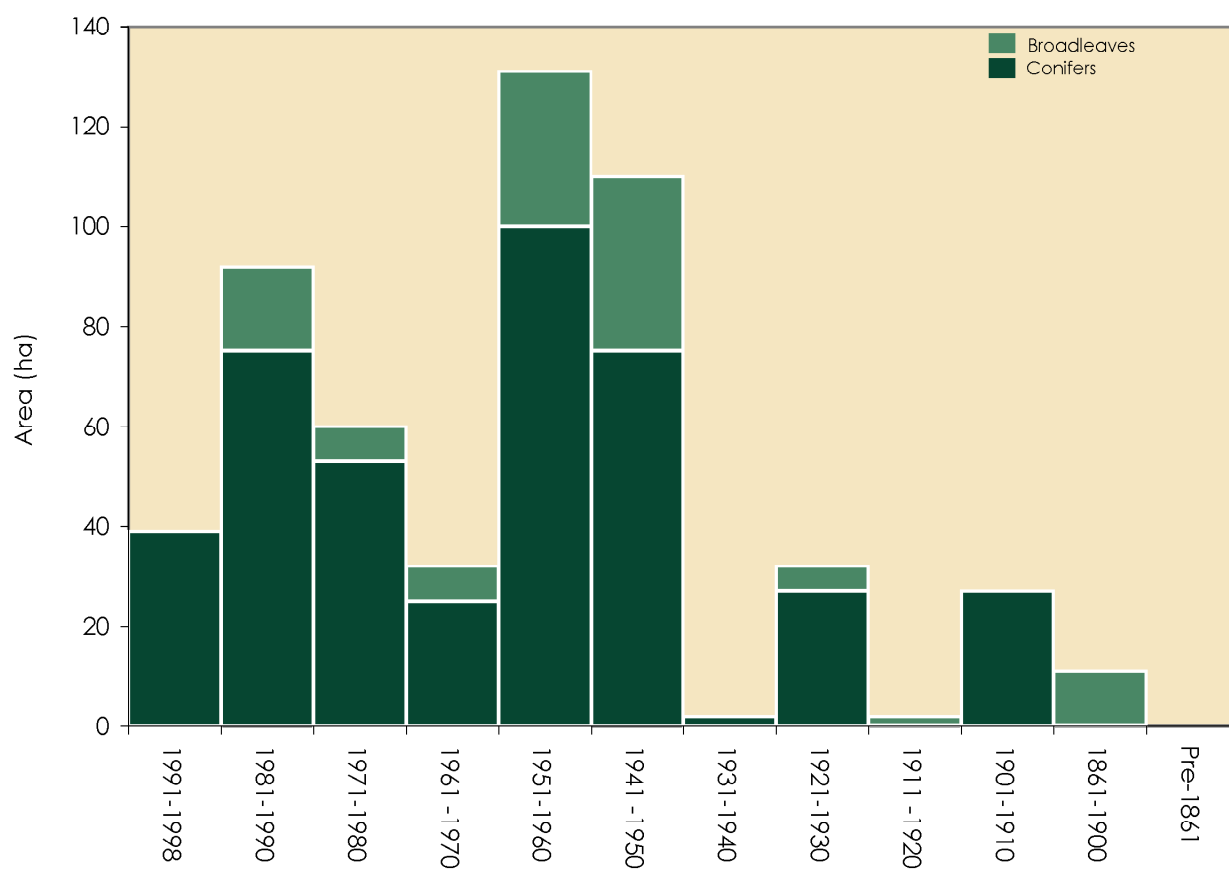


1. Most of the planting year classes cover 10 years, 1991-1998 is 8 years, and the classes prior to 1901 are 40 years or more.

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	14	0	42	3	54	12	2	23	0	27	0	0	178
Corsican pine	7	75	8	16	19	52	0	4	0	0	0	0	181
Lodgepole pine	0	0	0	0	2	0	0	0	0	0	0	0	2
Sitka spruce	0	0	0	0	0	0	0	0	0	0	0	0	0
Norway spruce	18	0	2	0	0	0	0	0	0	0	0	0	20
European larch	0	0	0	0	0	0	0	0	0	0	0	0	0
Jap/Hybrid larch	0	0	2	0	15	4	0	0	0	0	0	0	21
Douglas fir	0	0	0	0	0	0	0	0	0	0	0	0	0
Other conifers	0	0	0	2	11	7	0	0	0	0	0	0	20
Mixed conifers	0	0	0	4	0	0	0	0	0	0	0	0	4
Total conifers	39	75	53	25	100	75	2	27	0	27	0	0	424
Oak	0	0	0	0	0	4	0	0	2	0	0	0	6
Beech	0	2	0	0	0	0	0	4	0	0	0	0	5
Sycamore	0	0	0	0	0	0	0	0	0	0	0	0	0
Ash	0	0	0	0	0	0	0	0	0	0	0	0	0
Birch	0	16	7	5	27	13	0	0	0	0	11	0	79
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	2	3	18	0	0	0	0	0	0	23
Mixed broadleaves	0	0	0	0	0	0	0	2	0	0	0	0	2
Total broadleaves	0	17	7	7	31	35	0	5	2	0	11	0	115
Total - all species	39	92	60	32	131	110	2	33	2	27	11	0	539

*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

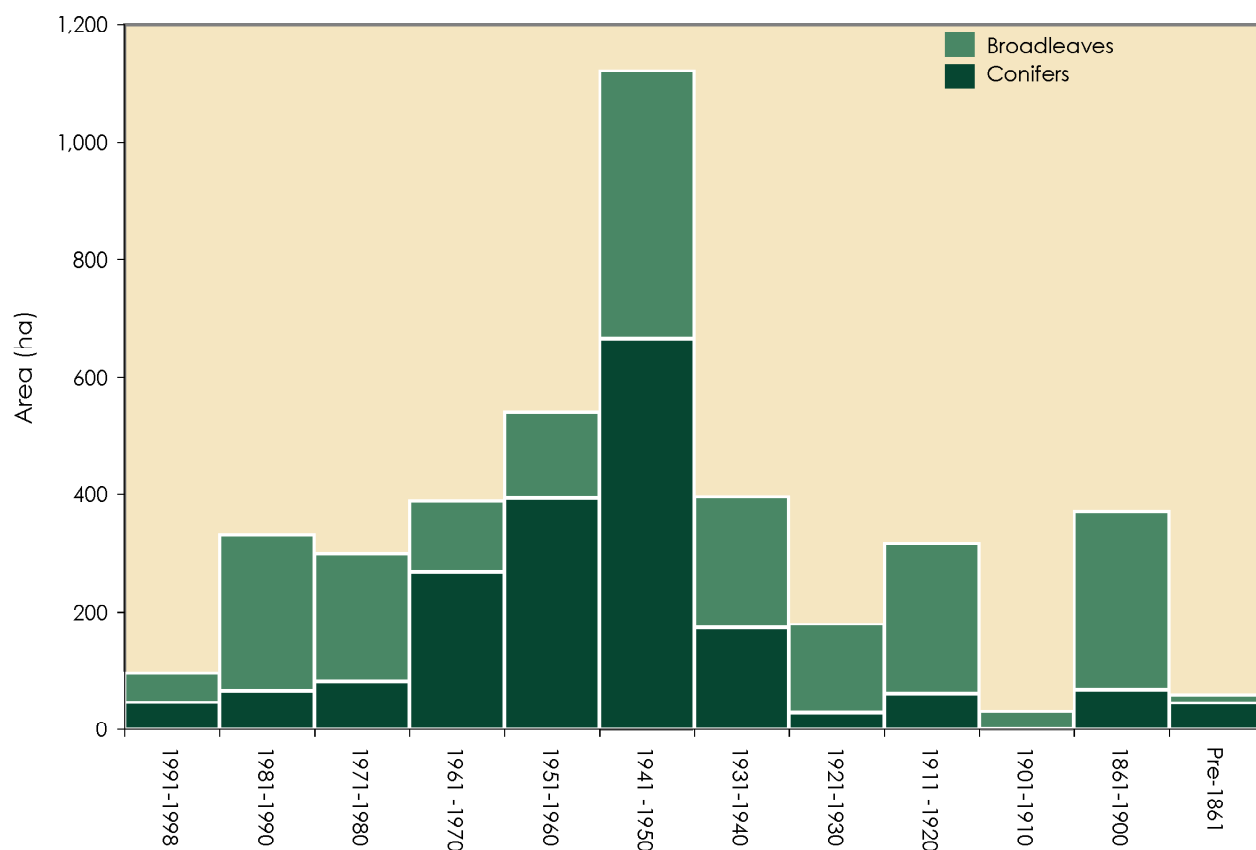
1. Most of the planting year classes cover 10 years, 1991-1998 is 8 years, and the classes prior to 1901 are 40 years or more.

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	5	16	52	129	149	263	31	5	61	0	46	45	802
Corsican pine	0	0	0	5	5	16	0	0	0	0	0	0	26
Lodgepole pine	0	0	0	0	66	35	0	0	0	0	0	0	101
Silka spruce	0	0	0	68	31	61	5	0	0	0	0	0	165
Norway spruce	30	41	0	0	5	30	0	0	0	0	0	0	107
European larch	0	0	0	0	0	0	0	0	0	0	0	0	0
Jap/Hybrid larch	10	8	29	34	119	250	125	23	0	0	0	0	599
Douglas fir	0	0	0	0	5	0	10	0	0	0	0	0	16
Other conifers	0	0	0	31	0	10	0	0	0	0	0	0	42
Mixed conifers	0	0	0	0	12	0	0	0	0	0	22	0	34
Total conifers	46	65	82	267	393	665	172	28	61	0	68	45	1,891
Oak	7	153	21	5	7	43	12	0	55	20	148	8	479
Beech	7	28	41	23	0	0	0	0	30	0	57	0	186
Sycamore	0	15	48	9	63	255	19	140	70	10	30	5	666
Ash	0	15	27	16	24	117	0	10	21	0	32	0	263
Birch	0	15	41	0	15	27	130	0	50	0	0	0	277
Poplar	0	29	0	35	18	0	0	0	0	0	0	0	82
Sweet chestnut	0	0	0	0	0	0	0	0	0	0	0	0	0
Elm	0	0	22	0	0	0	0	0	0	0	0	0	22
Other broadleaves	5	0	17	35	20	15	64	0	25	0	36	0	217
Mixed broadleaves	30	12	0	0	0	0	0	0	3	0	0	0	45
Total broadleaves	50	266	217	122	147	457	224	151	256	30	303	14	2,237
Total - all species	96	331	298	389	539	1,122	396	179	317	30	371	59	4,128

*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	Norway spruce	35	Mixed broadleaves	22	Scots pine	15
1981-90	Oak	36	Corsican pine	18	Norway spruce	10
1971-80	Scots pine	21	Other broadleaves	19	Birch	12
1961-70	Scots pine	30	Sitka spruce	16	Other broadleaves	9
1951-60	Other broadleaves	22	Scots pine	20	Jap/Hybrid larch	14
1941-50	Sycamore	17	Scots pine	17	Jap/Hybrid larch	16
1931-40	Birch	55	Jap/Hybrid larch	17	Other broadleaves	12
1921-30	Sycamore	40	Birch	26	Other broadleaves	10
1911-20	Sycamore	26	Birch	24	Beech	14
1901-10	Oak	32	Beech	30	Scots pine	29
1861-1900	Oak	39	Sycamore	15	Ash	14
Pre 1861	Oak	39	Beech	33	Scots pine	15
All years	Oak	16	Sycamore	14	Birch	13

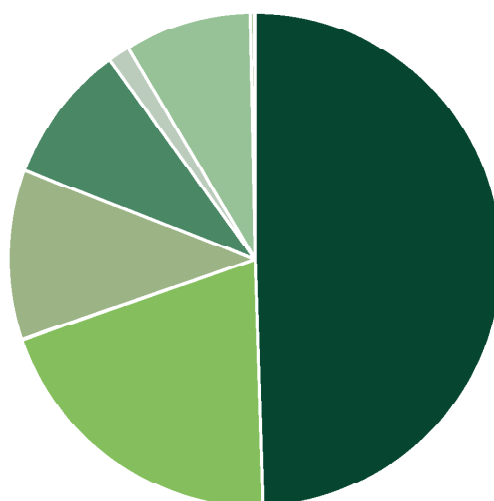
1. Principal species as a percentage of area in the planting year class.

Table 12 Ownership type* by area and percentage

Ownership type	Area (ha)	%
Personal	4,670	49.5
Business	1,903	20.2
Forestry or timber business	19	0.2
Charity	1,047	11.1
Local Authority	846	9.0
Other public (not FC)	149	1.6
Forestry Commission	777	8.2
Community ownership or common land	31	0.3
Unidentified	0	0.0
Total	9,442	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	2,816	762	Area (ha)
Wide Linear Features	1,330	133	Area (ha)
Wide Linear Features	1,330	156	Length (Km)
Narrow Linear Features	19,300	2,349	Length (Km)
Narrow Linear Features	19,300	2,404,100	Number of live trees
Groups	32,500	156,800	Number of live trees
Individual Trees	231,400	231,400	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	191	571	762	2,816	0.27
Wide Linear Features	133	0	133	1,330	0.10
Total	324	571	895	4,146	0.22

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	0.8	1.6	18.0	21.2	33.8	0.8
Spruce	0.8	0.0	0.0	0.0	0.8	1.3	0.0
Larch	3.2	0.0	0.0	18.6	21.8	34.8	0.8
Cypress	0.0	0.8	0.8	17.3	18.9	30.1	0.7
Other conifers	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total conifers	4.8	1.6	2.4	53.9	62.7	100.0	2.2
Oak	97.5	20.3	13.8	125.1	256.7	9.4	9.2
Beech	12.2	0.8	4.9	15.3	33.2	1.2	1.2
Sycamore	0.8	0.0	6.5	62.5	69.8	2.6	2.5
Ash	21.9	0.8	8.9	63.2	94.8	3.5	3.4
Birch	15.4	2.4	0.0	41.2	59.0	2.2	2.1
Poplar	0.8	0.0	7.3	307.3	315.4	11.6	11.3
Sweet chestnut	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Horse chestnut	1.2	1.2	0.0	0.7	3.1	0.1	0.1
Alder	4.1	0.8	22.7	175.6	203.2	7.4	7.3
Lime	0.0	0.0	0.8	1.3	2.1	0.1	0.1
Elm	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Willow	2.4	0.8	15.4	167.0	185.6	6.8	6.6
Other broadleaves	34.1	7.3	73.9	1,390.9	1,506.2	55.2	53.9
Total broadleaves	190.4	34.4	154.3	2,350.2	2,729.1	100.0	97.7
Total - all species	195.2	36.0	156.7	2,404.1	2,792.3		100.0

- Percentages

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

Individual Trees	19%
Groups	31%
Narrow Linear Features	25%
- 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	0.8	0.0	0.0	0.0	0.8	100.0	8.7
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	0.8	0.0	0.0	0.0	0.8	100.0	8.7
Oak	1.6	0.8	0.0	0.0	2.4	28.6	26.1
Beech	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sycamore	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ash	0.0	0.0	0.0	2.7	2.7	32.1	29.3
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	3.3	3.3	39.3	35.9
Lime	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Elm	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Willow	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other broadleaves	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total broadleaves	1.6	0.8	0.0	6.0	8.4	100.0	91.3
Total - all species	2.4	0.8	0.0	6.0	9.2		100.0

1. See Glossary for definitions of feature types.

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

Species	Height band (m)				Total live trees
	2-5	5-15	15-20	>20	
Pine	0.0	11.2	10.0	0.0	21.2
Spruce	0.0	0.8	0.0	0.0	0.8
Larch	0.0	2.4	19.4	0.0	21.8
Cypress	0.8	0.8	17.3	0.0	18.9
Other conifers	0.0	0.0	0.0	0.0	0.0
Total conifers	0.8	15.2	46.7	0.0	62.7
Oak	44.3	139.0	73.3	0.0	256.6
Beech	3.8	6.6	22.8	0.0	33.2
Sycamore	3.3	50.5	16.0	0.0	69.8
Ash	16.0	46.5	32.4	0.0	94.9
Birch	8.8	37.8	12.5	0.0	59.1
Poplar	0.0	167.9	147.5	0.0	315.4
Sweet chestnut	0.0	0.0	0.0	0.0	0.0
Horse chestnut	0.8	0.8	1.5	0.0	3.1
Alder	49.2	127.4	26.6	0.0	203.2
Lime	0.0	1.3	0.8	0.0	2.1
Elm	0.0	0.0	0.0	0.0	0.0
Willow	70.3	105.4	10.0	0.0	185.7
Other broadleaves	1,077.2	426.7	2.4	0.0	1,506.3
Total broadleaves	1,273.7	1,109.9	345.8	0.0	2,729.4
Total - all species	1,274.4	1,125.3	392.5	0.0	2,792.3

Table 18 Number of Groups by group size

Number of trees per Group*	Number of Groups (000's)
2	3
3-5	17
6-10	8
11-20	2
21-50	2
51-100	0
>100	0
Total	32

*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	7,202	81.5	9,442	94.3	31
0.25 - <2.0	1,640	18.5	571	5.7	-65
Total	8,842		10,013		13
% Woodland land cover	3.8		4.3		

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), 233,107 ha, was based on the 1991 Census of Population digital boundaries.
4. Land area used to calculate woodland cover percent (1980), 232,846 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	791	1,112	41
Corsican pine	380	207	-45
Lodgepole pine	68	102	50
Sitka spruce	151	204	35
Norway spruce	47	127	170
European larch	73	4	-95
Jap/Hybrid larch	217	674	210
Douglas fir	9	16	74
Other conifers	52	86	67
Mixed conifers	324	60	-81
Total conifers	2,112	2,592	23
Oak	1,436	1,446	1
Beech	448	631	41
Sycamore	972	1,167	20
Ash	246	601	144
Birch	1,400	1,185	-15
Poplar	160	82	-49
Sweet chestnut	18	14	-24
Elm	93	40	-57
Other broadleaves	238	1,093	360
Mixed broadleaves	939	224	-76
Total broadleaves	5,951	6,483	9
Total all species	8,063	9,075	13
Felled	72	101	41
Total High Forest	8,135	9,176	13

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 7.9% (Table 2). To obtain meaningful comparisons between the two datasets the 1980 Census data have therefore been reduced by 7.9%.
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

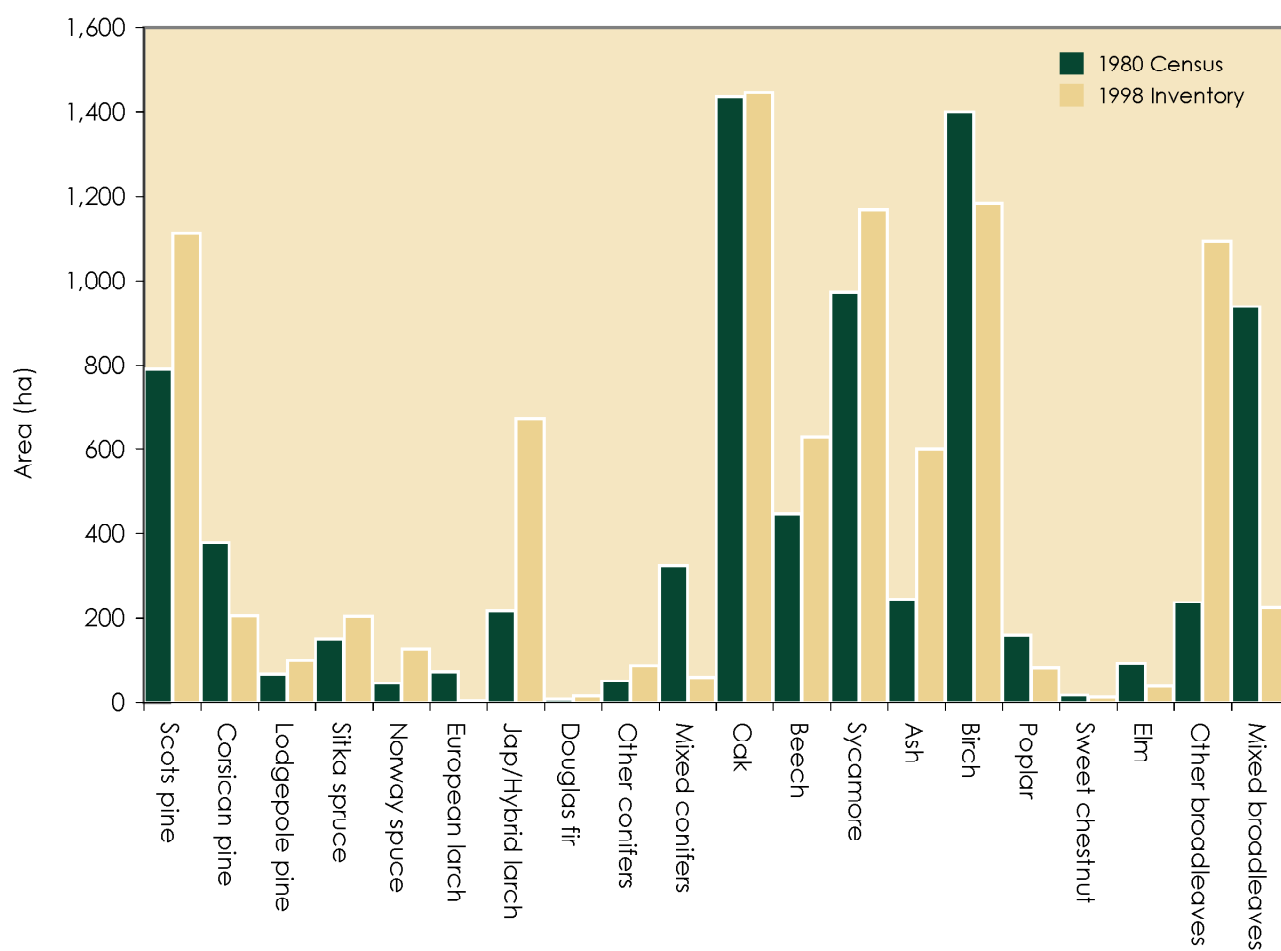


Table 21 Comparison of High Forest Category 1 area by planting year class
between 1980 Census and 1998 Inventory

Planting year class	1980 Census woodland area (ha)	1998 Inventory woodland area (ha)	Change (%)
1991-1998	0	245	see note
1981-1990	0	423	see note
1971-1980	313	359	15
1961-1970	391	468	20
1951-1960	1,074	670	-38
1941-1950	1,071	1,280	20
1931-1940	589	397	-33
1921-1930	387	211	-45
1911-1920	333	319	-4
1901-1910	157	57	-64
1861-1900	2,588	381	-85
Pre 1861	1,058	98	-91
Total all years	7,960	4,908	-38

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.

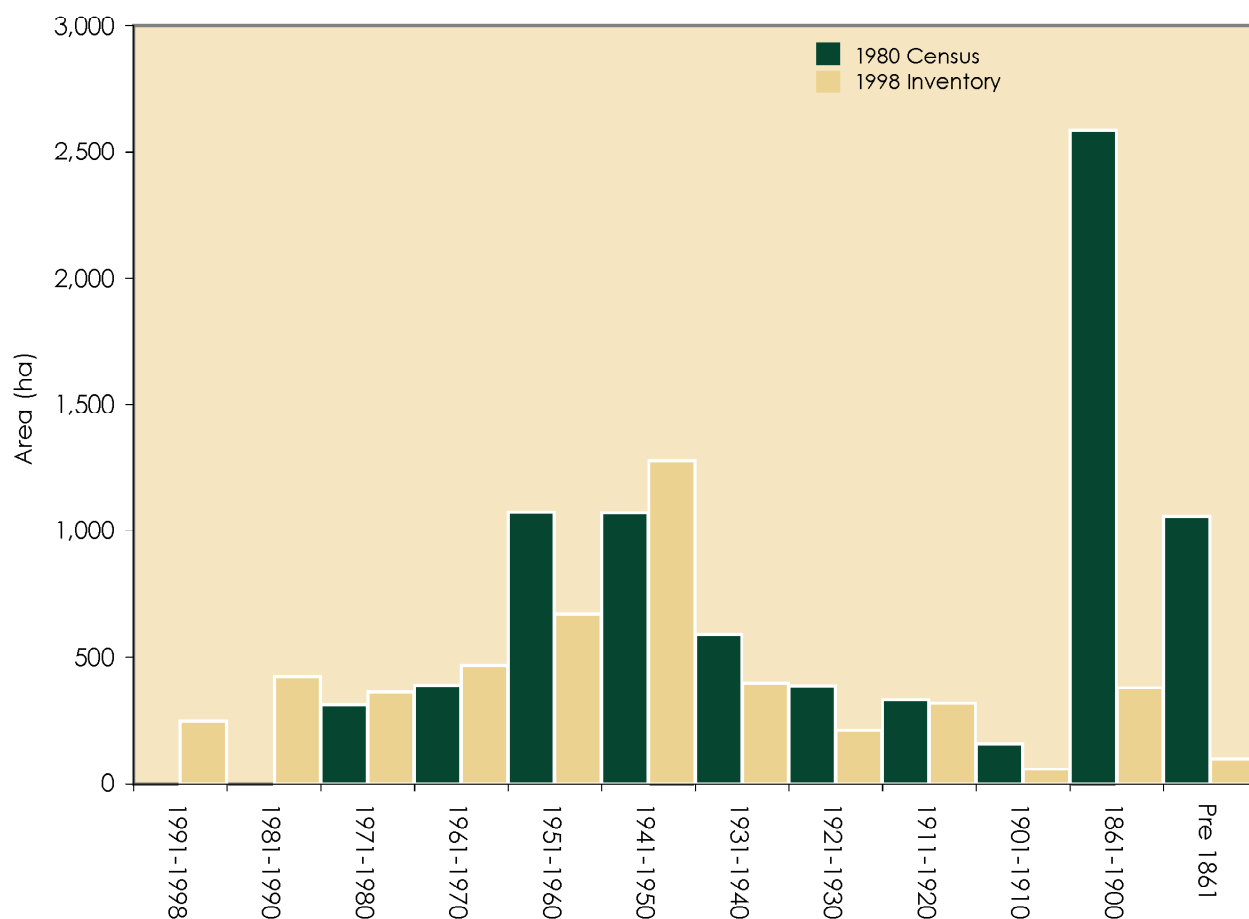
Comparison of High Forest Category 1 area by planting year class between 1980 Census and 1998 Inventory

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	335	172	-49
Middle Tree	146	29	-80
Total Individual Trees	481	201	-58
Groups	425	87	-80
Linear Features	1,055	1,106	5
Total	1,962	1,394	-29

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)	206.6	86.4	-58
Groups (per sq km)	45.6	8.4	-82
Linear Features (m per sq km)	1,497.0	1,007.6	-33

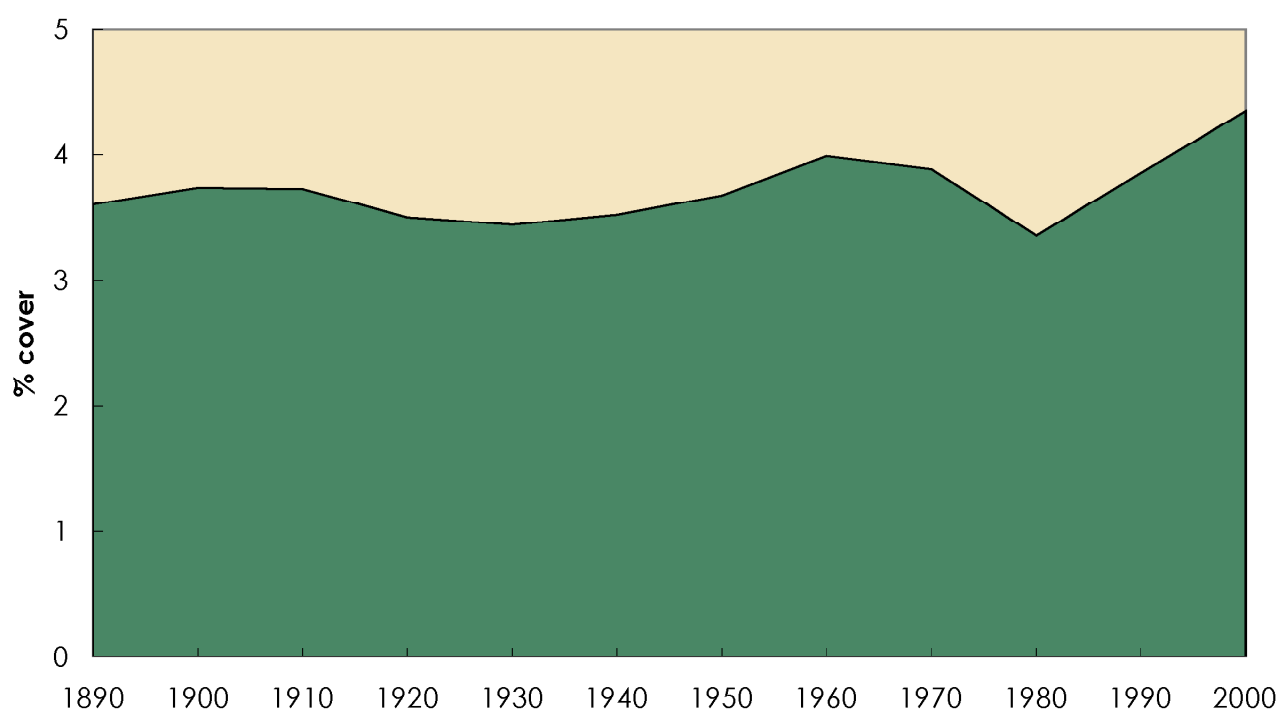
1. The Survey of Small Woodland and Trees did not record information referring to tree features (I.e. Individual trees, Groups and Narrow Linear Features) within developed land.
2. In the 1980 Census hazel, hawthorn, blackthorn and goat willow were excluded, the 1998 Inventory figures have been adjusted 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.

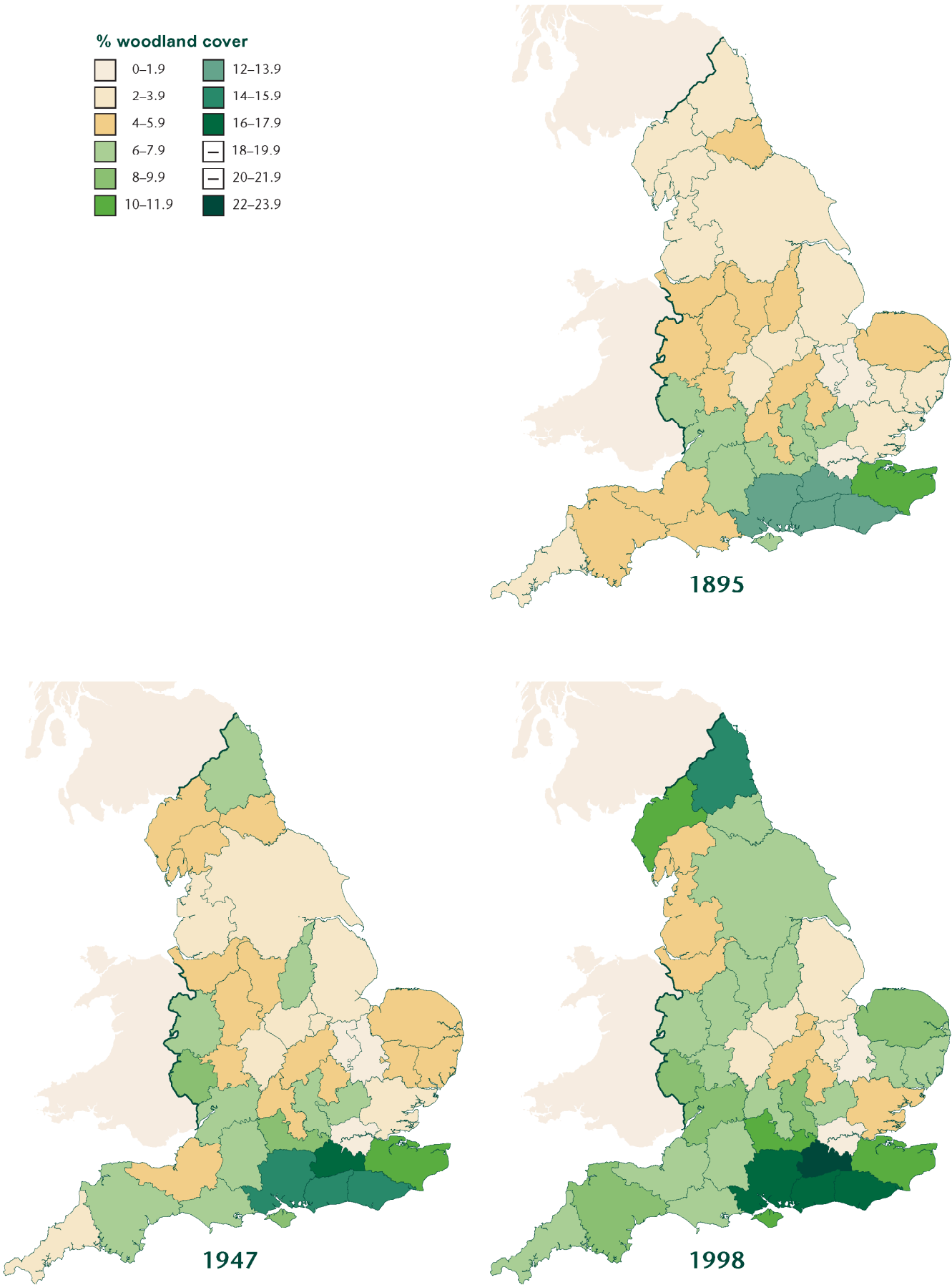
The maps use the old County structure data of England, as reported on in 1895 and 1947. The data from these counties could not be re-worked for different geographic areas. In contrast, the digital woodland map, which forms the basis of the current inventory, can be analysed for any geographic area.

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



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

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



GLOSSARY

Woodland

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

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

Interpreted Forest Types

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

High Forest

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

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

Mixtures

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

Forest Types

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

- **Coppice**

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

- **Coppice with Standards**

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

- **Felled**

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

- **Windblow**

Areas of blown woodland which remain uncleared and not regenerated.

- **Open Space**

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

Ownership types

- **Other Ownership**

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

- **Personal**

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

- **Private forestry or timber business**

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

- **Other private business**

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

- **Local Authority**

Region, County, District or other Council

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

Government department/agency, nationalised industry, etc.

- **Charitable organisations**

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

- Community ownership or common land

the common property of all members of the community.

- **Forestry Commission**

Land owned by or land leased to the Forestry Commission

Feature types

- **Small Wood**

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

- **Group**

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

- **Individual Tree**

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

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

- **Linear Feature**

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

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

NOTES



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