National Inventory of Woodland and Trees

England

County Report for

Avon

Forestry Commission

CONTENTS

ACKNOWLEDGEMENTS

The Forestry Commission is grateful to many people who helped in the completion of this survey. In particular, the Forestry Commission would like to thank owners and occupiers of the land selected for sampling.

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

The Inventory consists of two separate surveys -

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

BACKGROUND

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 With the statistics becoming increasingly out of date the Forestry Commission decided to undertake a new survey: the *National Inventory of Woodland and Trees*.

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

SURVEY METHODS

Main Woodland Survey

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

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

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

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

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

Survey of Small Woodland and Trees

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

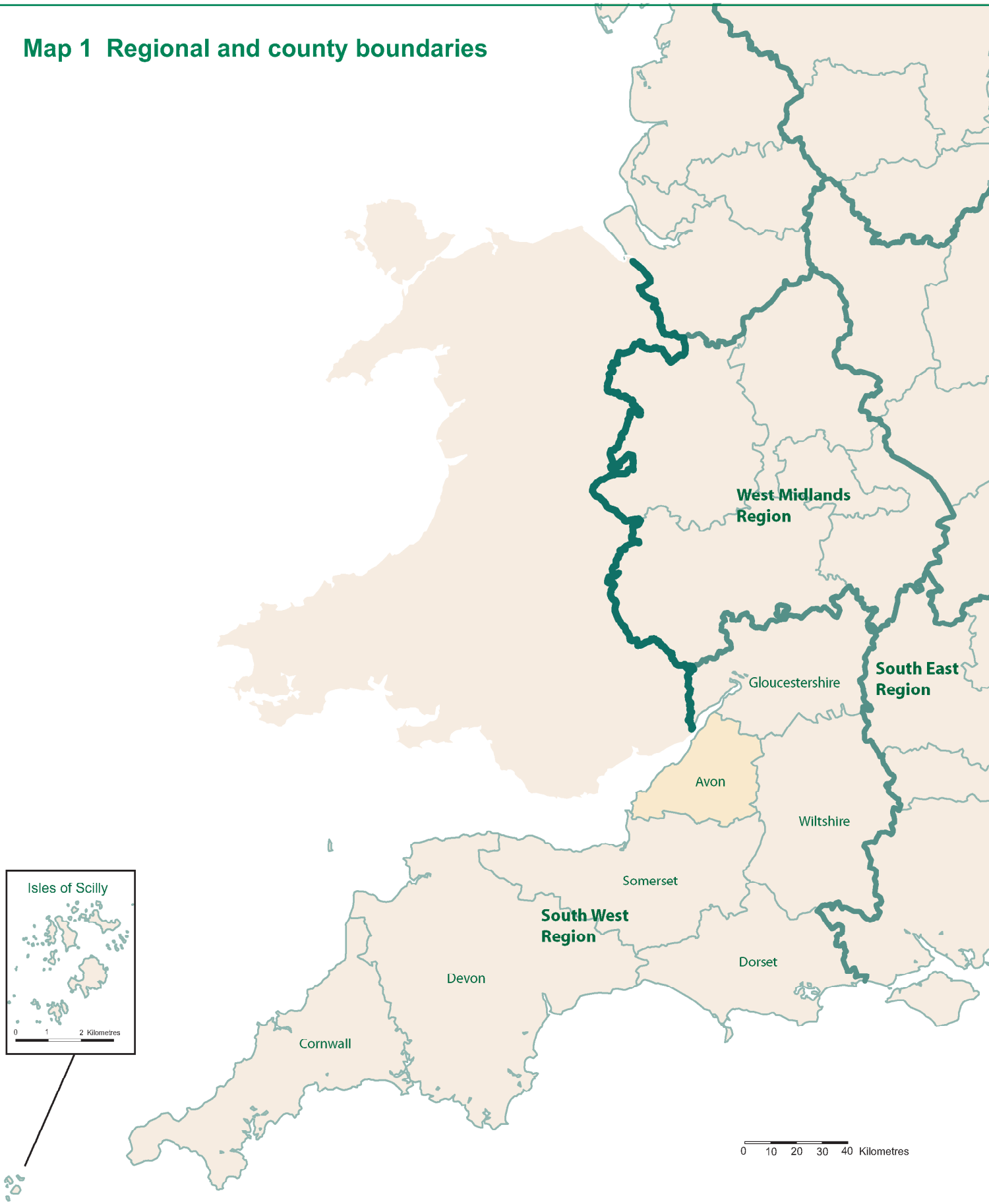
MAIN POINTS FROM THE SURVEY RESULTS

- The total area of woodland of 0.1 hectares and over in Avon is 8,364 hectares. This represents 6.3% of the land area. (Table 1)
- Broadleaved woodland is the dominant forest type representing 66.6 % of all woodland. Conifer woodland represents 10.4 %, Mixed woodland 21.8 % and Open Space within woodlands 1.1 %. (Table 2)
- The main conifer species is pine covering 522 hectares or 35.2 % of all conifer species. The main broadleaved species is ash covering 1,127 hectares or 16.6 % of all broadleaved species. (Table 3)
- 308 hectares or 4 % of woodland over 2 hectares is owned by or leased to the Forestry Commission, and 7,598 hectares or 96 % of woodland is in Other ownership. (Table 6)
- There are a total of 576 woods over 2 ha within Avon with a mean wood area of 13.7 hectares. (Table 7a) There are a total of 1,157 woods from 0.1 - <2.0 hectares with a mean wood area of 0.40 hectares. (Table 14)
- There are 380 thousand live trees outside woodland in Avon. (Table 15)
- Woodland land cover increased by over 1,400 hectares from 5.1 % to 6.2 % of the land area between 1980 and 1997. (Table 19)
- The area of broadleaves increased by 34% between 1980 and 1997, with the relative proportion of broadleaves to conifers increasing from 77 % to 82 %. (Table 20)

INVENTORY REPORTS

As well as this report for Avon, 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



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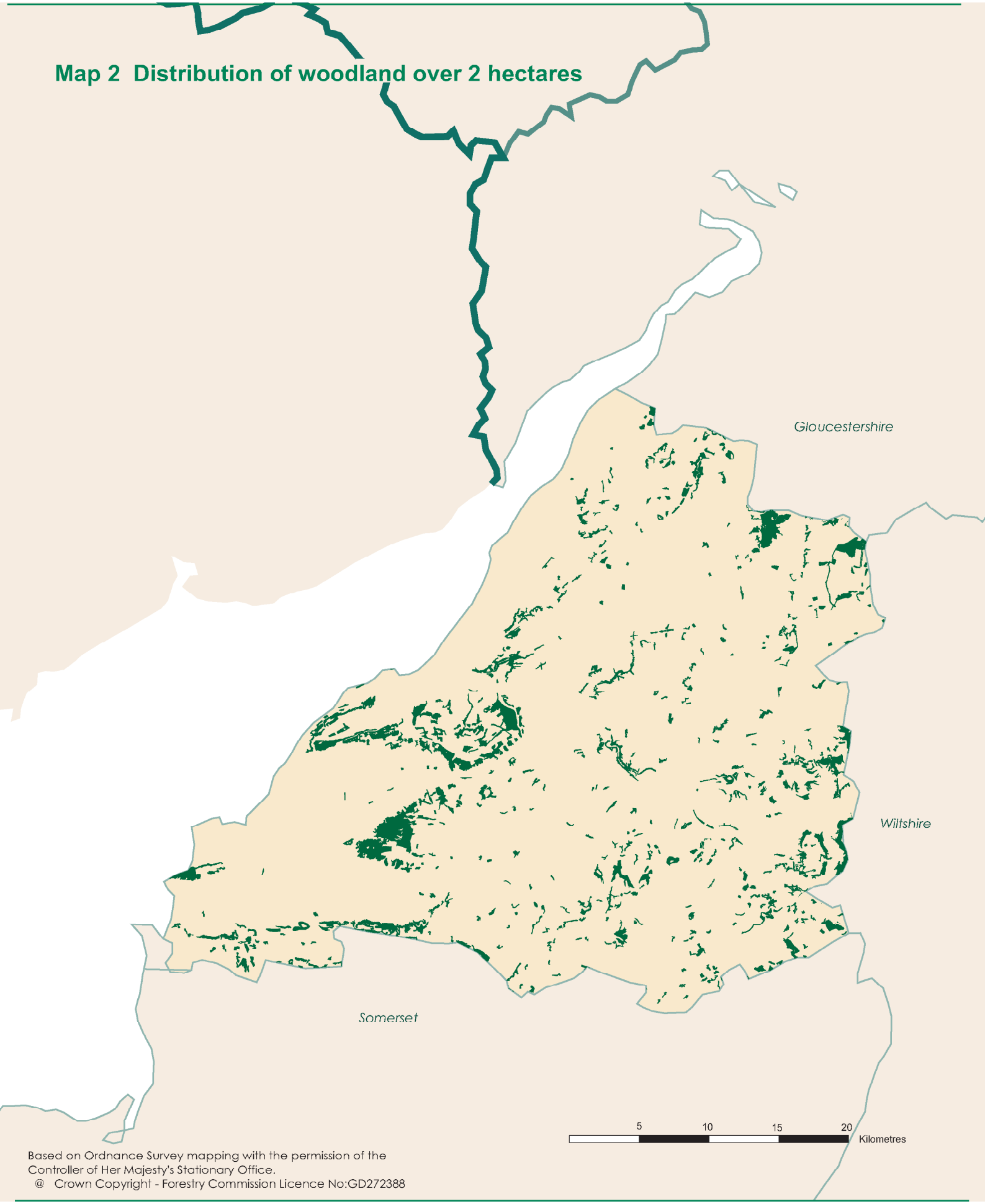
Map 2 Distribution of woodland over 2 hectares



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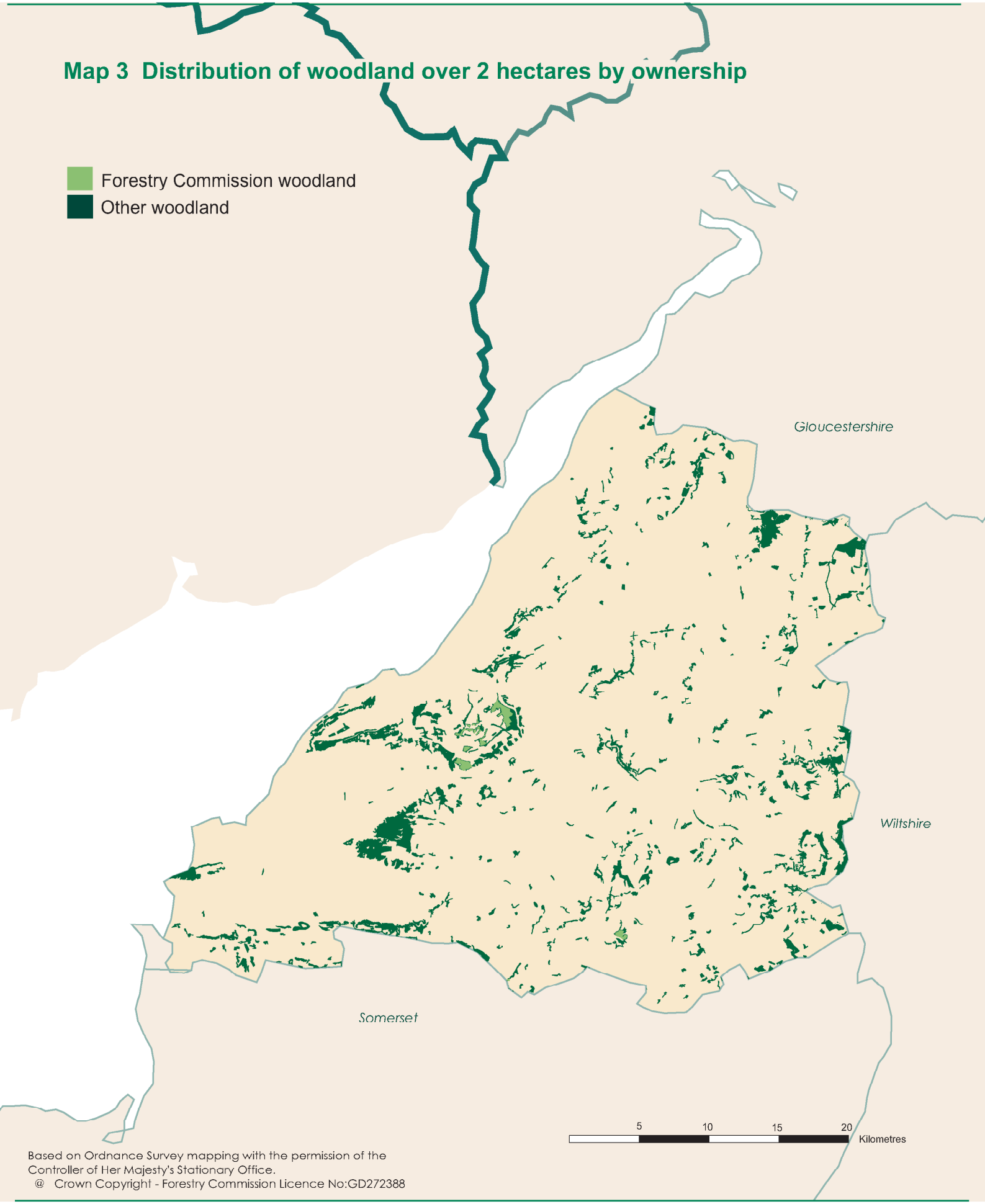
Map 3 Distribution of woodland over 2 hectares by ownership



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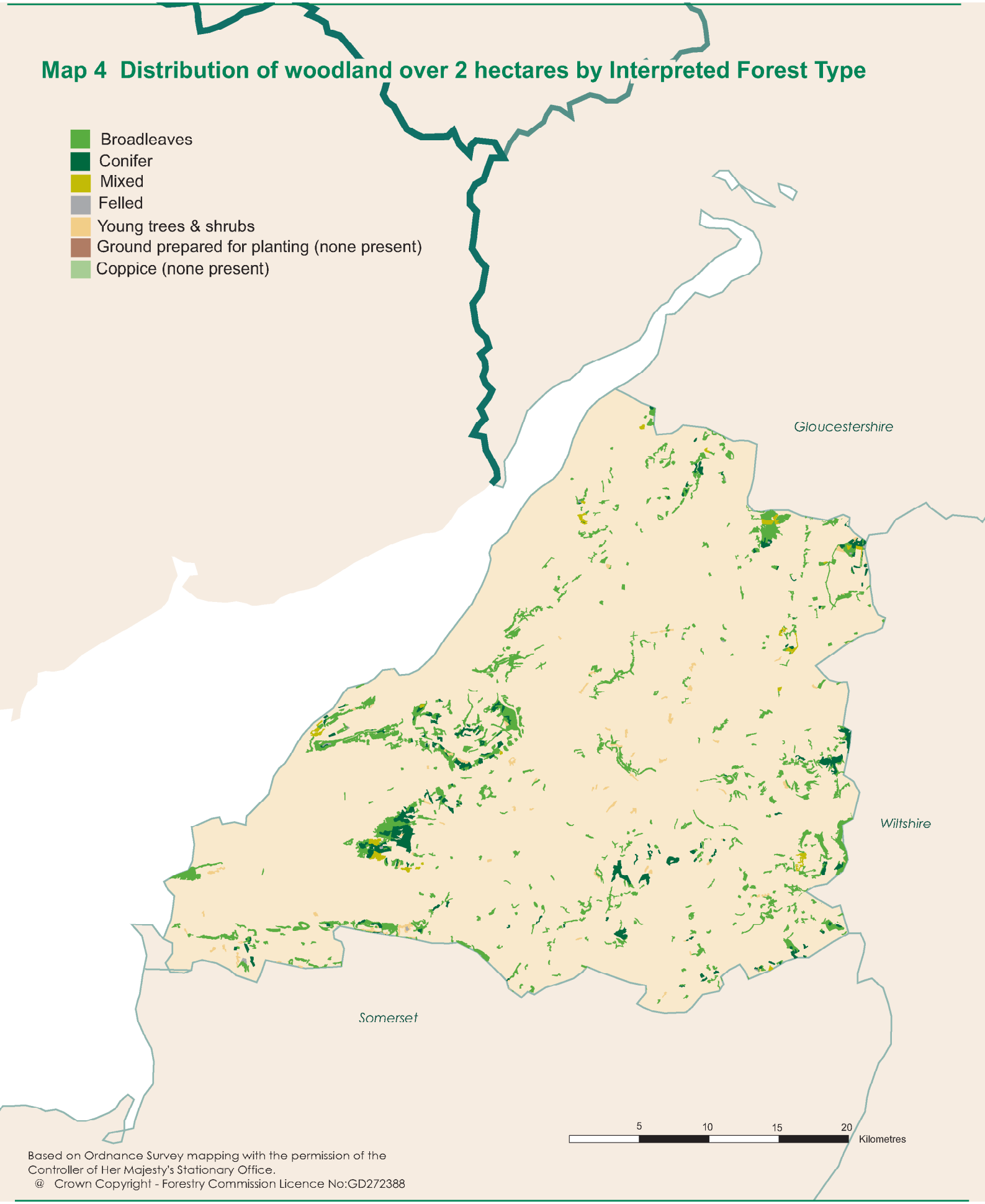
Map 4 Distribution of woodland over 2 hectares by Interpreted Forest Type



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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 Avon.

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	7,906	94.5
0.25 - < 2.00	373	4.5
0.10 - < 0.25	85	1.0
Total area of woodland	**8,364**	**100.0**
% Woodland land cover	**6.3**	

1. Area of Avon, including inland water, 133,244 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	863	3	866	10.4
Broadleaved	5,248	321	5,569	66.6
Mixed	1,689	131	1,820	21.8
Coppiced	0	0	0	0.0
Copp-w-standards	0	0	0	0.0
Windblow	0	0	0	0.0
Felled	20	0	20	0.2
Open Space	86	3	89	1.1
Total	**7,906**	**458**	**8,364**	**100**

1. See Glossary for definitions of forest types.

Table 3 Woodland area by principal species and woodland size

Species/Groups	Woodland size (ha)		Total area	Percentage of total area	
	2.0 and over	0.1 -<2.0	(ha)	Category*	Species**
Pine	519	3	522	35.2	6.3
Sitka spruce	0	0	0	0.0	0.0
Larch	208	33	241	16.3	2.9
Other conifers	329	16	345	23.3	4.2
Mixed conifers	375	0	375	25.3	4.5
Total conifers	**1,430**	**52**	**1,482**	**100.0**	**18.0**
Oak	279	36	315	4.7	3.8
Beech	815	121	936	13.8	11.3
Sycamore	153	61	214	3.2	2.6
Ash	1,078	49	1,127	16.6	13.7
Birch	2	0	2	0.0	0.0
Elm	25	16	41	0.6	0.5
Other broadleaves	680	112	792	11.7	9.6
Mixed broadleaves	3,338	7	3,345	49.4	40.5
Total broadleaves	**6,370**	**402**	**6,772**	**100.0**	**82.0**
Total all species* **	**7,800**	**455**	**8,255**		**100.0**

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

***Excludes the 109 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	16%
Broadleaves	5%
Pine	34%
Beech	25%
Ash	21%

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	7,400	47,600	6	36
Narrow Linear Features	5,000	252,700	51	190
Individual Trees	79,500	79,500	1	60
Total		**379,800**		**285**

1. Land area used to calculate tree density 133,244 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	49%
Narrow Linear Features	50%
Individual Trees	24%

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	502	42	32
Narrow Linear Features	5,000	343	257
Total		**385**	**289**

1. Land area used to calculate tree density 133,244 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	96%
Narrow Linear Features	44%

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

4. See Glossary for definitions of feature type .

RESULTS FROM THE MAIN WOODLAND SURVEY (MWS)

Survey Method

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

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

Table 6 Summary of woodland area by ownership

Ownership	ha	% woodland
Forestry Commission	308	4
Other	7,598	96
Total area of woodland	**7,906**	**100**

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

2. See Glossary for definitions of ownership types

Woodland area by ownership

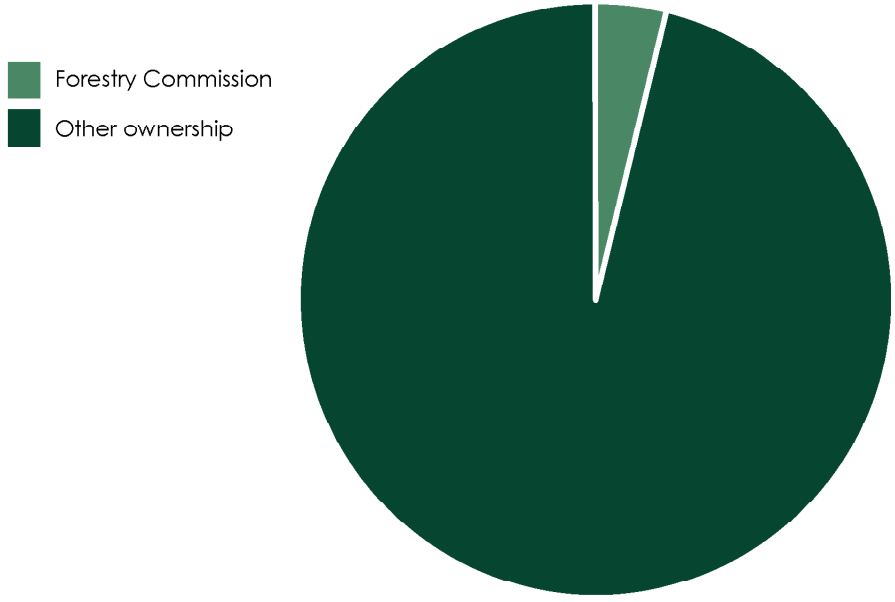


Table 7a Size class distribution of woodland

Size class (ha)	Number of woods	Total area (ha)	Percent of total area	Mean wood area (ha)
<10	431	1,936	24	4.5
10 - <20	78	1,054	13	13.5
20 - <50	39	1,146	14	29.4
50 - <100	16	1,044	13	65.3
<100	**564**	**5,181**	**66**	**9.2**
100 - <500	**11**	**1,993**	**25**	**181.2**
500 and >	**1**	**731**	**9**	**731.2**
All woods	**576**	**7,906**	**100**	**13.7**

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	7	25	0	3.6
	O	443	1,968	25	4.4
10 - <20	FC	2	23	0	11.6
	O	77	1,029	13	13.4
20 - <50	FC	3	77	1	25.7
	O	38	1,115	14	29.3
50 - <100	FC	1	60	1	60.1
	O	16	1,084	14	67.8
<100	FC	13	185	2	14.2
	O	574	5,197	66	9.0
100 - <500	FC	1	123	2	123.0
	O	10	1,669	21	166.9
500 and >	FC	0	0	0	0.0
	O	1	731	9	731.2
Total	**FC**	**14**	**308**	**4**	**22.0**
	O	**585**	**7,598**	**96**	**13.0**

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 occasionaly generate part woods of less than 2 hectares

Table 8 Area of woodland by forest type and ownership

Forest type	Forestry Commission		Other		All ownerships	
	ha	%	ha	%	ha	%
Conifer	47	15.3	816	10.7	863	10.9
Broadleaved	253	82.1	4,995	65.7	5,248	66.4
Mixed	8	2.6	1,681	22.1	1,689	21.4
Coppice	0	0.0	0	0.0	0	0.0
Copp-w-Stds	0	0.0	0	0.0	0	0.0
Windblow	0	0.0	0	0.0	0	0.0
Felled	0	0.0	20	0.3	20	0.3
Open Space	0	0.0	86	1.1	86	1.1
Total	**308**	**100.0**	**7,598**	**100.0**	**7,906**	**100.0**

Area of woodland by forest type

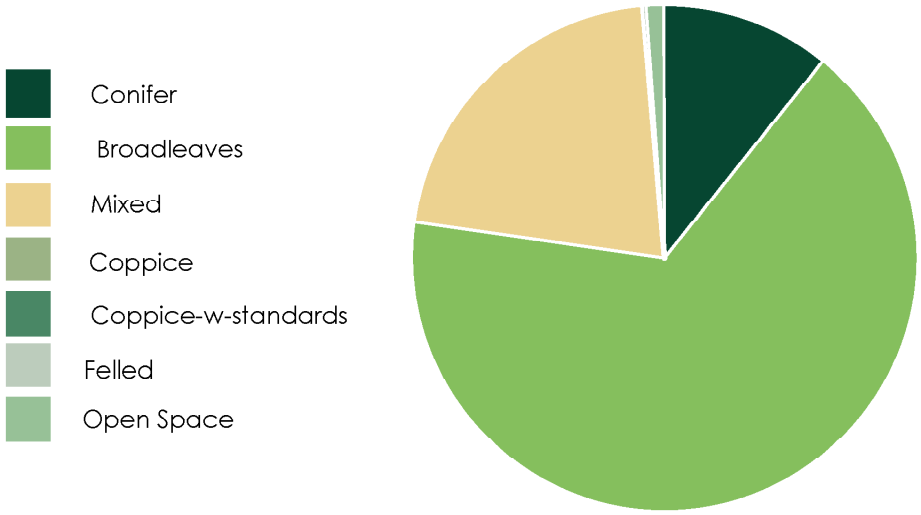


Table 9a Area of High Forest by principal species and ownership

Species	Forestry Commission			Other			All ownerships		
	area (ha)	cat* %	spp** %	area (ha)	cat* %	spp** %	area (ha)	cat* %	spp** %
Scots pine	8	14	3	378	28	5	387	27	5
Corsican pine	9	15	3	123	9	2	132	9	2
Lodgepole pine	0	0	0	0	0	0	0	0	0
Sitka spruce	0	0	0	0	0	0	0	0	0
Norway spruce	3	5	1	131	10	2	135	9	2
European larch	8	14	3	174	13	2	183	13	2
Jap/Hybrid larch	13	22	4	12	1	0	25	2	0
Douglas fir	3	5	1	75	5	1	79	6	1
Other conifers	13	22	4	102	7	1	115	8	1
Mixed conifers	0	0	0	375	27	5	375	26	5
Total conifers	**59**	**100**	**19**	**1,371**	**100**	**18**	**1,430**	**100**	**18**
Oak	53	21	17	225	4	3	279	4	4
Beech	66	27	21	749	12	10	815	13	10
Sycamore	7	3	2	146	2	2	153	2	2
Ash	73	29	24	1,005	16	13	1,078	17	14
Birch	2	1	1	0	0	0	2	0	0
Poplar	0	0	0	140	2	2	140	2	2
Sweet chestnut	0	0	0	35	1	0	35	1	0
Elm	0	0	0	25	0	0	25	0	0
Other broadleaves	3	1	1	502	8	7	505	8	6
Mixed broadleaves	44	18	14	3,294	54	44	3,338	52	43
Total broadleaves	**249**	**100**	**81**	**6,121**	**100**	**82**	**6,370**	**100**	**82**
Total - all species	**308**		**100**	**7,492**		**100**	**7,800**		**100**
Felled	**0**			**20**			**20**		
Total High Forest	**308**			**7,512**			**7,820**		

*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 86 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	16%
Broadleaves	5%
Scots pine	42%
Beech	25%
Ash	21%

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

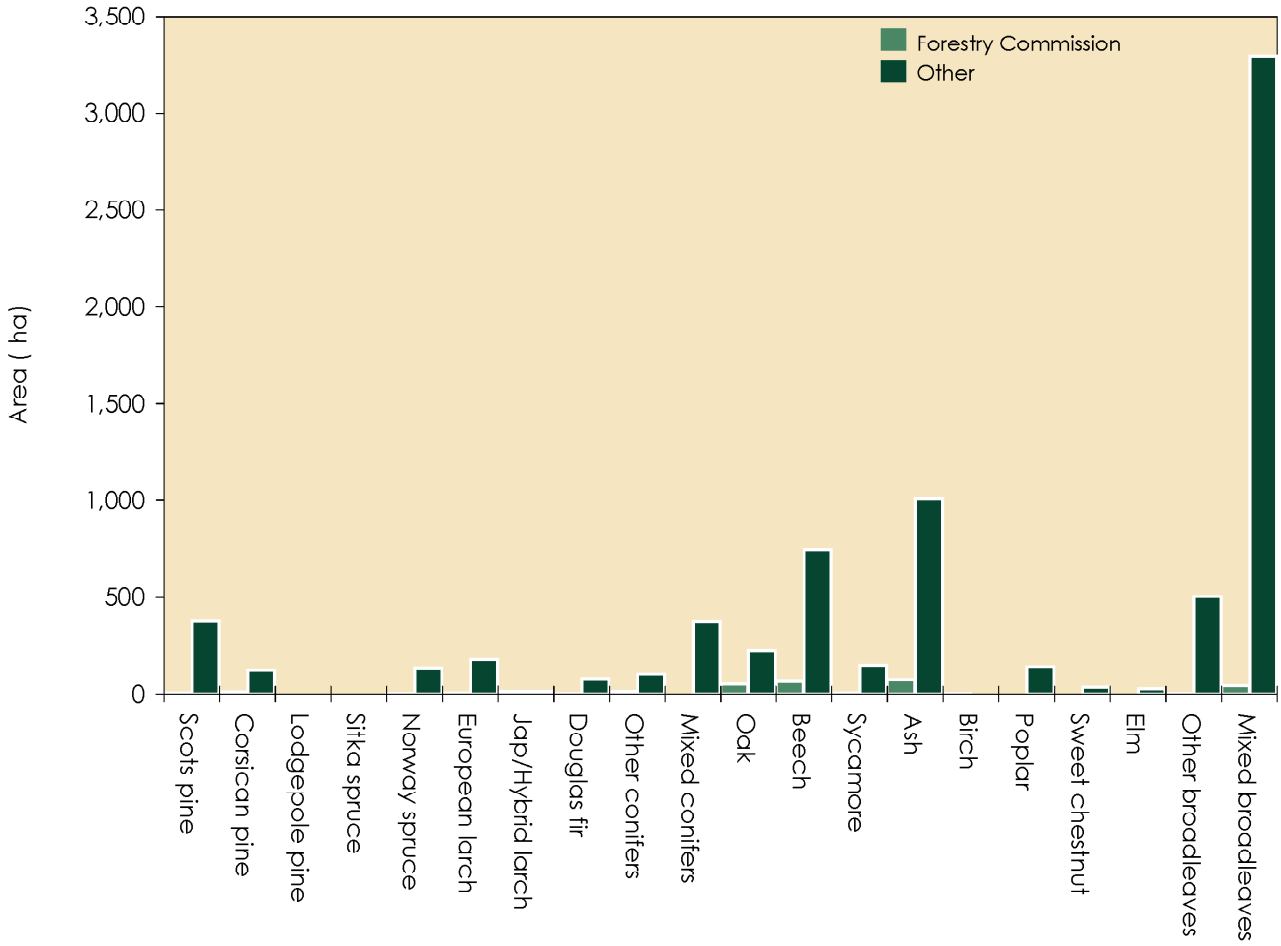


Table 9b Area of High Forest by principal species,ownership and category

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	8	0	8	378	0	378	387	0	387
Corsican pine	9	0	9	123	0	123	132	0	132
Lodgepole pine	0	0	0	0	0	0	0	0	0
Sitka spruce	0	0	0	0	0	0	0	0	0
Norway spruce	3	0	3	131	0	131	135	0	135
European larch	8	0	8	174	0	174	183	0	183
Jap/Hybrid larch	13	0	13	12	0	12	25	0	25
Douglas fir	3	0	3	75	0	75	79	0	79
Other conifers	13	0	13	102	0	102	115	0	115
Mixed conifers	0	0	0	375	0	375	375	0	375
Total conifers	**59**	**0**	**59**	**1,371**	**0**	**1,371**	**1,430**	**0**	**1,430**
Oak	53	0	53	225	0	225	279	0	279
Beech	66	0	66	749	0	749	815	0	815
Sycamore	0	7	7	146	0	146	146	7	153
Ash	53	20	73	907	98	1,005	960	118	1,078
Birch	0	2	2	0	0	0	0	2	2
Poplar	0	0	0	140	0	140	140	0	140
Sweet chestnut	0	0	0	35	0	35	35	0	35
Elm	0	0	0	0	25	25	0	25	25
Other broadleaves	0	3	3	149	353	502	149	356	505
Mixed broadleaves	11	33	44	2,430	864	3,294	2,441	898	3,338
Total broadleaves	**184**	**65**	**249**	**4,781**	**1,340**	**6,121**	**4,965**	**1,405**	**6,370**
Total - all species	**243**	**65**	**308**	**6,152**	**1,340**	**7,492**	**6,395**	**1,405**	**7,800**

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

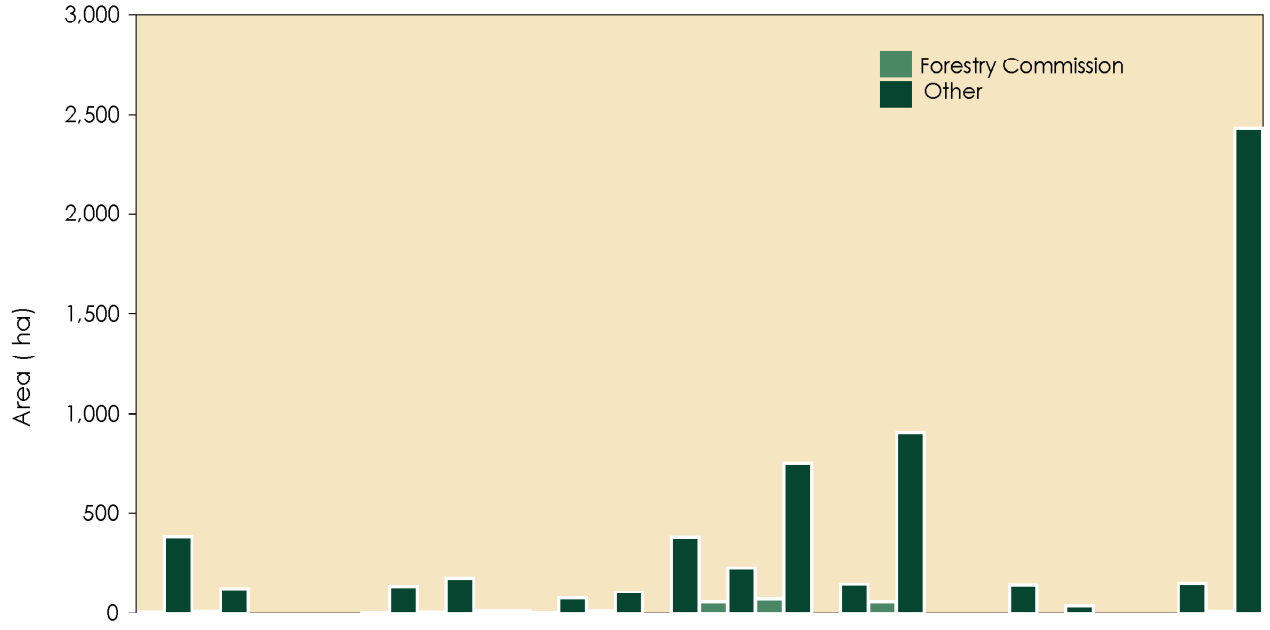
	Category 1*	Category 2*	Total High Forest
Conifers	15%	-	16%
Broadleaves	6%	10%	5%
Scots pine	42%	-	42%
Beech	25%	-	25%
Ash	21%	85%	21%

*See Glossary for Category 1 and Category 2 descriptions

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

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

High Forest Category 1 - Area by principal species and ownership



High Forest Category 2 - Area by principal species and ownership

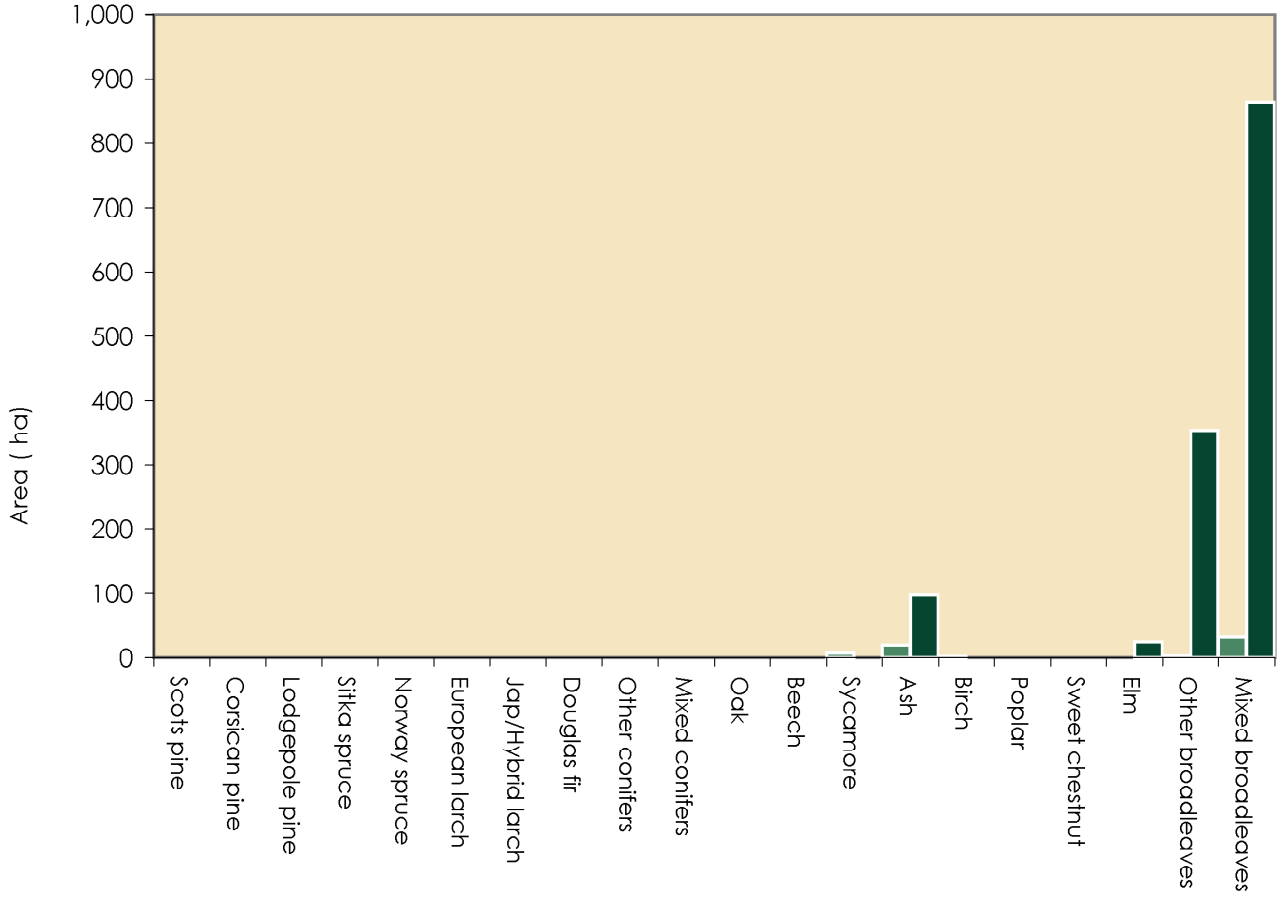
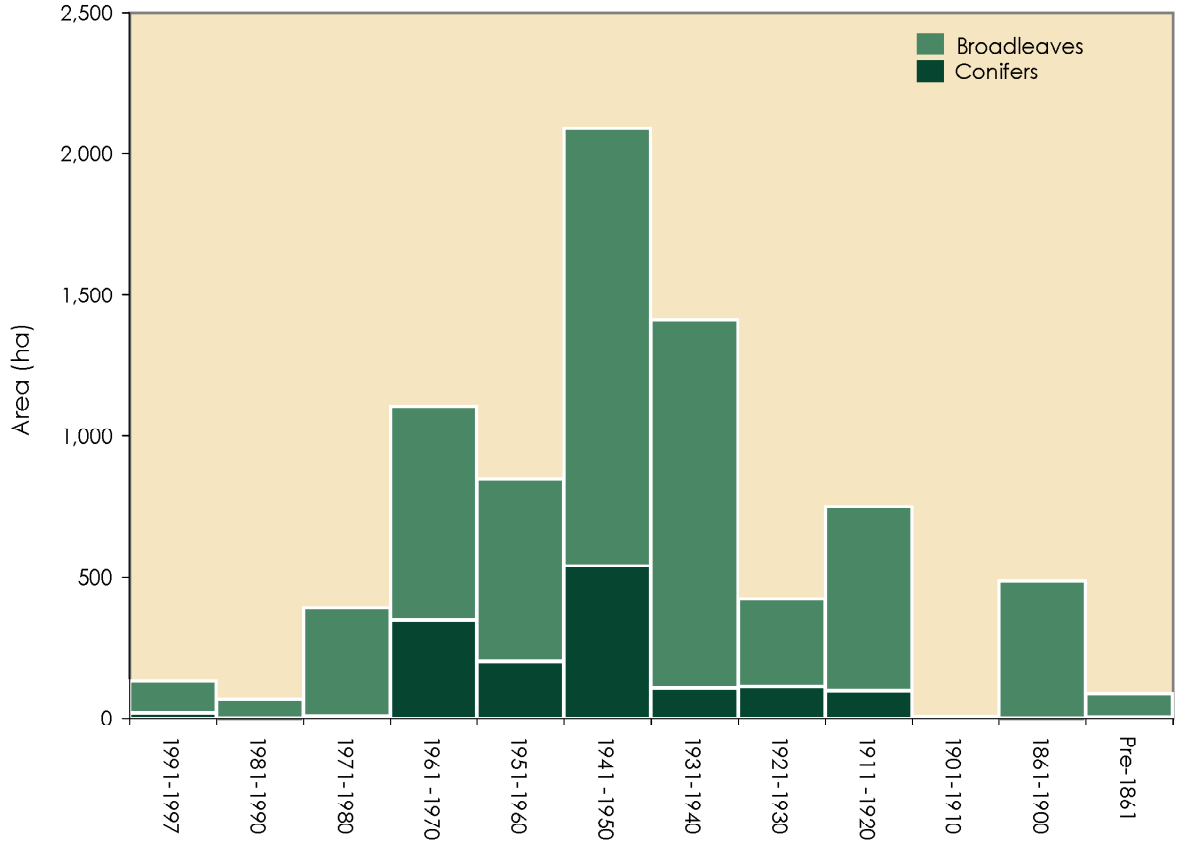


Table 10a High Forest Category 1 - Area by principal species and planting year class

Species	Planting year class*												Total (ha)
	1991-1997	1981-1990	1971-1980	1961 - 1970	1951-1960	1941 - 1950	1931-1940	1921-1930	1911 - 1920	1901-1910	1861-1900	Pre-1861	
Scots pine	5	0	0	268	25	7	0	82	0	0	0	0	387
Corsican pine	0	0	0	0	75	21	30	0	0	6	0	0	132
Lodgepole pine	0	0	0	0	0	0	0	0	0	0	0	0	0
Sitka spruce	0	0	0	0	0	0	0	0	0	0	0	0	0
Norway spruce	0	0	0	35	79	21	0	0	0	0	0	0	135
European larch	0	0	0	0	3	151	29	0	0	0	0	0	183
Jap/Hybrid larch	4	0	3	0	14	4	0	0	0	0	0	0	25
Douglas fir	10	0	0	0	3	47	19	0	0	0	0	0	79
Other conifers	0	0	4	6	2	27	7	29	39	0	0	2	115
Mixed conifers	0	0	0	39	0	262	19	0	56	0	0	0	375
Total conifers	**19**	**0**	**7**	**348**	**201**	**538**	**104**	**112**	**95**	**6**	**0**	**2**	**1,430**
Oak	10	0	0	21	7	0	10	0	21	0	211	0	279
Beech	0	0	0	300	253	138	48	0	0	0	41	35	815
Sycamore	0	0	29	3	0	19	4	0	98	0	0	0	146
Ash	10	29	108	153	215	191	153	77	93	1	0	49	960
Birch	0	0	0	2	0	0	0	0	0	0	0	0	0
Poplar	0	0	82	48	10	0	0	0	0	0	0	0	140
Sweet chestnut	0	0	0	0	0	0	0	35	0	0	0	0	35
Elm	0	0	25	0	0	0	0	0	0	0	0	0	0
Other broadleaves	10	39	137	59	19	90	102	49	0	0	0	0	149
Mixed broadleaves	84	0	3	173	143	1,116	988	149	445	0	237	0	2,441
Total broadleaves	**113**	**69**	**384**	**757**	**647**	**1,554**	**1,306**	**311**	**657**	**1**	**488**	**84**	**4,965**
Total - all species	**132**	**69**	**390**	**1,105**	**847**	**2,092**	**1,409**	**423**	**752**	**7**	**488**	**86**	**6,395**

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

High Forest Category 1 - Area by planting year class



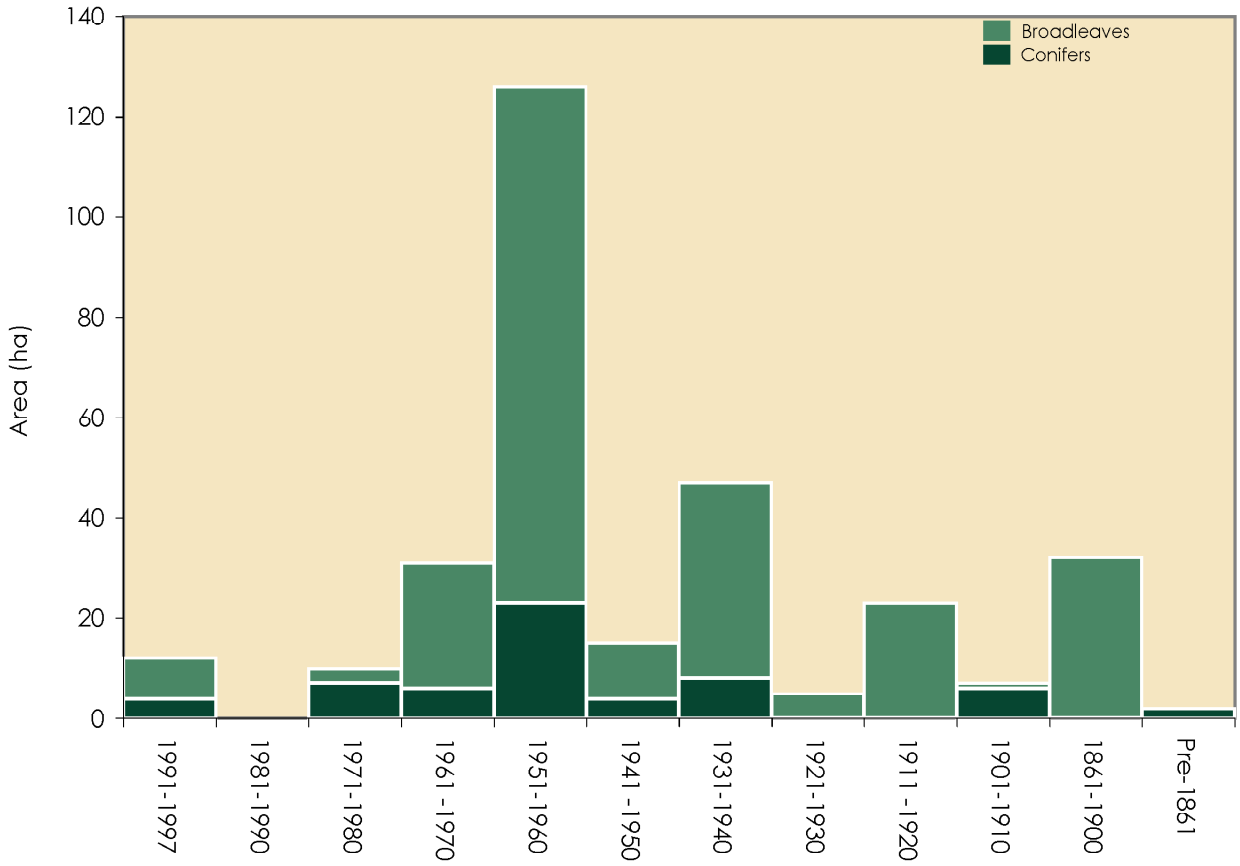
1. Most of the planting year classes cover 10 years, 1991-1997 is 7 years, and the classes prior to 1901 are 40 years or more.

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

Species	Planting year class*												Total (ha)
	1991-1997	1981-1990	1971-1980	1961 - 1970	1951-1960	1941 - 1950	1931-1940	1921-1930	1911 - 1920	1901-1910	1861-1900	Pre-1861	
Scots pine	0	0	0	0	8	0	0	0	0	0	0	0	8
Corsican pine	0	0	0	0	2	0	2	0	0	6	0	0	9
Lodgepole pine	0	0	0	0	0	0	0	0	0	0	0	0	0
Sitka spruce	0	0	0	0	0	0	0	0	0	0	0	0	0
Norway spruce	0	0	0	0	3	0	0	0	0	0	0	0	3
European larch	0	0	0	0	3	0	6	0	0	0	0	0	8
Jap/Hybrid larch	4	0	3	0	3	4	0	0	0	0	0	0	13
Douglas fir	0	0	0	0	3	0	0	0	0	0	0	0	3
Other conifers	0	0	4	6	2	0	0	0	0	0	0	2	13
Mixed conifers	0	0	0	0	0	0	0	0	0	0	0	0	0
Total conifers	**4**	**0**	**7**	**6**	**23**	**4**	**8**	**0**	**0**	**6**	**0**	**2**	**0**
Oak	0	0	0	0	3	0	0	0	21	0	29	0	53
Beech	0	0	0	2	58	3	0	0	0	0	3	0	66
Sycamore	0	0	0	3	0	0	4	0	0	0	0	0	0
Ash	0	0	0	13	34	3	23	0	0	1	0	0	53
Birch	0	0	0	2	0	0	0	0	0	0	0	0	0
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	0	0	0	3	0	0	0	0	0	0
Mixed broadleaves	8	0	3	7	7	5	8	5	2	0	0	0	11
Total broadleaves	**8**	**0**	**3**	**25**	**103**	**11**	**39**	**5**	**23**	**1**	**32**	**0**	**184**
Total - all species	**13**	**0**	**9**	**31**	**126**	**15**	**47**	**5**	**23**	**7**	**32**	**2**	**243**

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

High Forest Category 1 - Forestry Commission: area by planting year class



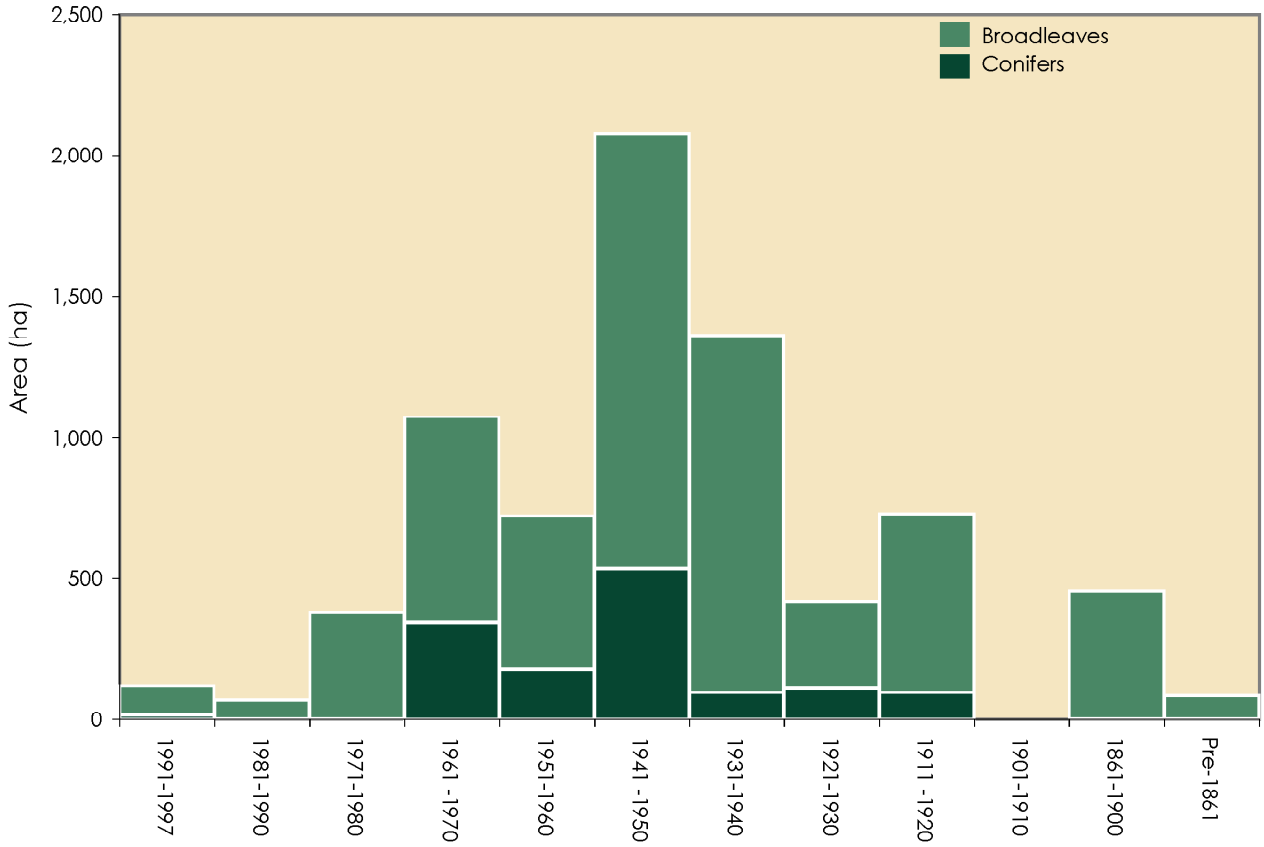
1. Most of the planting year classes cover 10 years, 1991-1997 is 7 years, and the classes prior to 1901 are 40 years or more.

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

Species	Planting year class*												Total (ha)
	1991-1997	1981-1990	1971-1980	1961 - 1970	1951-1960	1941 - 1950	1931-1940	1921-1930	1911 - 1920	1901-1910	1861-1900	Pre-1861	
Scots pine	5	0	0	268	17	7	0	82	0	0	0	0	378
Corsican pine	0	0	0	0	74	21	28	0	0	0	0	0	123
Lodgepole pine	0	0	0	0	0	0	0	0	0	0	0	0	0
Sitka spruce	0	0	0	0	0	0	0	0	0	0	0	0	0
Norway spruce	0	0	0	35	75	21	0	0	0	0	0	0	131
European larch	0	0	0	0	0	151	24	0	0	0	0	0	174
Jap/Hybrid larch	0	0	0	0	12	0	0	0	0	0	0	0	12
Douglas fir	10	0	0	0	0	47	19	0	0	0	0	0	75
Other conifers	0	0	0	0	0	27	7	29	39	0	0	0	102
Mixed conifers	0	0	0	39	0	262	19	0	56	0	0	0	375
Total conifers	**15**	**0**	**0**	**342**	**177**	**534**	**96**	**112**	**95**	**0**	**0**	**0**	**1,371**
Oak	10	0	0	21	4	0	10	0	0	0	181	0	225
Beech	0	0	0	298	195	134	48	0	0	0	38	35	749
Sycamore	0	0	29	0	0	19	0	0	98	0	0	0	146
Ash	10	29	108	140	180	188	129	77	93	0	0	49	907
Birch	0	0	0	0	0	0	0	0	0	0	0	0	0
Poplar	0	0	82	48	10	0	0	0	0	0	0	0	140
Sweet chestnut	0	0	0	0	0	0	0	35	0	0	0	0	35
Elm	0	0	25	0	0	0	0	0	0	0	0	0	0
Other broadleaves	10	39	137	59	19	90	99	49	0	0	0	0	149
Mixed broadleaves	75	0	0	167	136	1,111	980	144	443	0	237	0	2,430
Total broadleaves	**105**	**69**	**381**	**732**	**544**	**1,543**	**1,266**	**306**	**634**	**0**	**457**	**84**	**4,781**
Total - all species	**120**	**69**	**381**	**1,074**	**721**	**2,077**	**1,362**	**418**	**729**	**0**	**457**	**84**	**6,152**

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

High Forest Category 1 - Other Ownership: area by planting year class



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

Table 11 High Forest : principal species by planting year class

Planting year class	First	%	Second	%	Third	%
1991-97	Mixed broadleaves	64	XB/AH/OK/DF	8	Scots pine	4
1981-90	Other broadleaves	56	Ash	42	-	
1971-80	Other broadleaves	35	Ash	28	Poplar	21
1961-70	Beech	27	Scots pine	24	Mixed broadleaves	16
1951-60	Beech	30	Ash	25	Mixed broadleaves	17
1941-50	Mixed broadleaves	53	Mixed conifers	12	Ash	9
1931-40	Mixed broadleaves	70	Ash	11	Other broadleaves	7
1921-30	Mixed broadleaves	35	Scots pine	19	Ash	18
1911-20	Mixed broadleaves	59	Sycamore	13	Ash	12
1901-10	Corsican pine	86	Ash	14	-	
1861-1900	Mixed broadleaves	48	Oak	43	Beech	8
Pre 1861	Ash	57	Beech	41	Other conifers	2
All years	**Mixed broadleaves**	**43**	**Ash**	**14**	**Beech**	**10**

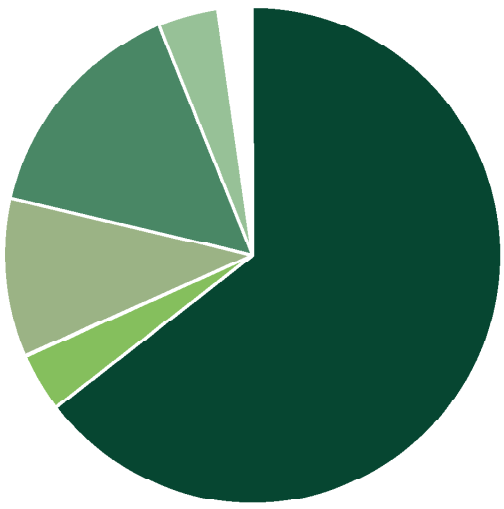
1. Principal species as a percentage of area in the planting year class.
2. XB - Other broadleaves, AH - Ash, OK - Oak, DF - Douglas fir

Table 12 Ownership type* by area and percentage

Ownership type	Area (ha)	%
Personal	5,104	64.6
Business	309	3.9
Forestry or timber business	0	0.0
Charity	801	10.1
Local Authority	1,206	15.3
Other public (not FC)	0	0.0
Forestry Commission	308	3.9
Community ownership or common land	0	0.0
Unidentified	179	2.3
Total	**7,906**	**100.0**

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

Ownership type by area



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

Survey Method

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

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

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

Feature type	Number of features	Total	Unit
Small Woods	655	393	Area (ha)
Wide Linear Features	502	65	Area (ha)
Wide Linear Features	502	42	Length (Km)
Narrow Linear Features	5,000	343	Length (Km)
Narrow Linear Features	5,000	252,700	Number of live trees
Groups	7,400	47,600	Number of live trees
Individual Trees	79,500	79,500	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	20	373	393	655	0.60
Wide Linear Features	65	0	65	502	0.13
Total	**85**	**373**	**458**	**1,157**	**0.40**

1. See Glossary for definitions of feature types.

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

Species	Feature type				Total live trees	Percent of total trees	
	Boundary Trees	Middle Trees	Groups	Narrow Linear Features		Category	Species
Pine	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spruce	0.8	0.0	0.0	0.0	0.8	100.0	0.2
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	**0.8**	**0.0**	**0.0**	**0.0**	**0.8**	**100.0**	**0.2**
Oak	21.3	1.6	2.5	2.5	27.9	7.4	7.3
Beech	0.0	0.0	0.0	5.5	5.5	1.5	1.4
Sycamore	1.6	0.8	7.4	5.5	15.3	4.0	4.0
Ash	25.4	0.8	0.8	16.1	43.1	11.4	11.3
Birch	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Poplar	1.6	0.0	0.0	2.5	4.1	1.1	1.1
Sweet chestnut	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Horse chestnut	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alder	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lime	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Elm	4.9	0.0	3.3	2.5	10.7	2.8	2.8
Willow	4.1	0.8	6.6	54.2	65.7	17.3	17.3
Other broadleaves	9.8	5.7	27.1	163.7	206.3	54.4	54.3
Total broadleaves	**68.9**	**9.8**	**47.6**	**252.7**	**379.0**	**100.0**	**99.8**
Total - all species	**69.7**	**9.8**	**47.6**	**252.7**	**379.8**		**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	24%
Groups	49%
Narrow Linear Features	50%

3. See Glossary for definitions of feature types.

Table 16 Numbers of dead trees outside woodland by species and feature type (000's trees)

Species	Feature type				Total dead trees	Percent of total trees	
	Boundary Trees	Middle Trees	Groups	Narrow Linear Features		Category	Species
Pine	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spruce	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Larch	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cypress	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other conifers	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total conifers	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Oak	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beech	0.0	0.0	0.0	0.5	0.5	13.2	13.2
Sycamore	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ash	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Birch	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Poplar	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sweet chestnut	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Horse chestnut	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alder	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lime	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Elm	3.3	0.0	0.0	0.0	3.3	86.8	86.8
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	**3.3**	**0.0**	**0.0**	**0.5**	**3.8**	**100.0**	**100.0**
Total - all species	**3.3**	**0.0**	**0.0**	**0.5**	**3.8**		**100.0**

1. See Glossary for definitions of feature types.

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

Species	Height band (m)				Total live trees
	2-5	5-15	15-20	>20	
Pine	0.0	0.0	0.0	0.0	0.0
Spruce	0.0	0.8	0.0	0.0	0.8
Larch	0.0	0.0	0.0	0.0	0.0
Cypress	0.0	0.0	0.0	0.0	0.0
Other conifers	0.0	0.0	0.0	0.0	0.0
Total conifers	**0.0**	**0.8**	**0.0**	**0.0**	**0.8**
Oak	2.5	20.5	4.2	0.8	28.0
Beech	2.5	0.0	3.0	0.0	5.5
Sycamore	1.6	8.2	5.5	0.0	15.3
Ash	7.4	32.7	3.0	0.0	43.1
Birch	0.0	0.0	0.0	0.0	0.0
Poplar	0.8	0.8	2.5	0.0	4.1
Sweet chestnut	0.0	0.0	0.0	0.0	0.0
Horse chestnut	0.0	0.0	0.0	0.0	0.0
Alder	0.0	0.0	0.0	0.0	0.0
Lime	0.0	0.0	0.0	0.0	0.0
Elm	1.6	8.3	0.8	0.0	10.7
Willow	4.1	25.0	36.7	0.0	65.8
Other broadleaves	101.9	102.9	1.6	0.0	206.4
Total broadleaves	**122.4**	**198.4**	**57.3**	**0.8**	**378.9**
Total - all species	**122.4**	**199.2**	**57.3**	**0.8**	**379.8**

Table 18 Number of Groups by group size

Number of trees per Group*	Number of Groups (000's)
2	0
3-5	3
6-10	2
11-20	2
21-50	1
51-100	0
>100	0
Total	**7**

*The size of the group is determined by the total number of trees, live plus dead.

COMPARISON OF RESULTS WITH THE 1980 CENSUS AND PREVIOUS SURVEYS

Survey Method

The 1980 Census and 1997 Inventory were undertaken using very different sampling methods.

Inventory practice and technology have moved on since the 1980 Census; this has led to changes in sampling methodology, scope and woodland definitions. For example, the Main Woodland Survey used the digital woodland map, created from aerial photos as a basis for sampling whereas the 1980 Census relied only on the woodland shown on the 1:50,000 Ordnance Survey map. Also in contrast to the 1980 Census, the Survey of Small Woodland and Trees did not record information within developed land e.g. residential or industrial areas of 2 or more hectares.

Where possible adjustments have been made to both the 1980 Census and the Inventory to achieve the nearest available comparison. The apparent changes indicated in the following tables and charts should therefore be treated with caution, particularly where areas are small.

Table 19:	Comparison of woodland area between 1980 Census and 1997 Inventory
Table 20:	Comparison of High Forest area by species between 1980 Census and 1997 Inventory
Chart:	Comparison of High Forest area by species between 1980 Census and 1997 Inventory
Table 21:	Comparison of High Forest Category 1 area by planting year class between 1980 Census and 1997 Inventory
Chart:	Comparison of High Forest Category 1 area by planting year class between 1980 Census and 1997 Inventory
Table 22:	Comparison of numbers of live trees outside woodland between 1980 Census and 1997 Inventory
Table 23:	Comparison of density of non-woodland features between 1980 Census and 1997 Inventory

Woodland cover

Chart	Change in woodland cover through time (1890 – 2000)
Maps:	Woodland by county through time (1895 – 1998)

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

Table 19 Comparison of woodland area between 1980 Census and 1997 Inventory

Woodland size (ha)	1980 Census woodland area		1997 Inventory woodland area		Change (%)
	(ha)	(%)	(ha)	(%)	(%)
2.0 or more	6,058	88.3	7,906	95.5	31
0.25 - <2.0	804	11.7	373	4.5	-54
Total	**6,862**		**8,279**		**21**
% Woodland land cover	**5.1**		**6.2**		

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

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

3. Land area used to calculate woodland cover percent (1997), 133,244 ha, was based on the 1991 Census of Population digital boundaries.

4. Land area used to calculate woodland cover percent (1980), 134,605 ha, (Ordnance Survey data)

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

Species	1980 Census woodland area (ha)	1997 Inventory woodland area (ha)	Change (%)
Scots pine	269	390	45
Corsican pine	78	132	69
Lodgepole pine	0	0	#DIV/0!
Sitka spruce	59	0	-100
Norway spuce	141	135	-5
European larch	51	183	256
Jap/Hybrid larch	565	58	-90
Douglas fir	130	79	-39
Other conifers	104	131	26
Mixed conifers	87	375	331
Total conifers	**1,485**	**1,483**	**0**
Oak	1,196	315	-74
Beech	504	936	86
Sycamore	678	205	-70
Ash	1,447	1,104	-24
Birch	133	2	-98
Poplar	70	140	99
Sweet chestnut	113	35	-69
Elm	9	41	360
Other broadleaves	362	564	56
Mixed broadleaves	494	3,345	578
Total broadleaves	**5,005**	**6,687**	**34**
Total all species	**6,490**	**8,170**	**26**
Felled	**158**	**20**	**-87**
Total High Forest	**6,648**	**8,190**	**23**

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 1.1% (Table 2). To obtain meaningful comparisons between the two datasets the 1980 Census data have therefore been reduced by 1.1%.

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

4. The 1980 figures include scrub to enable comparison

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

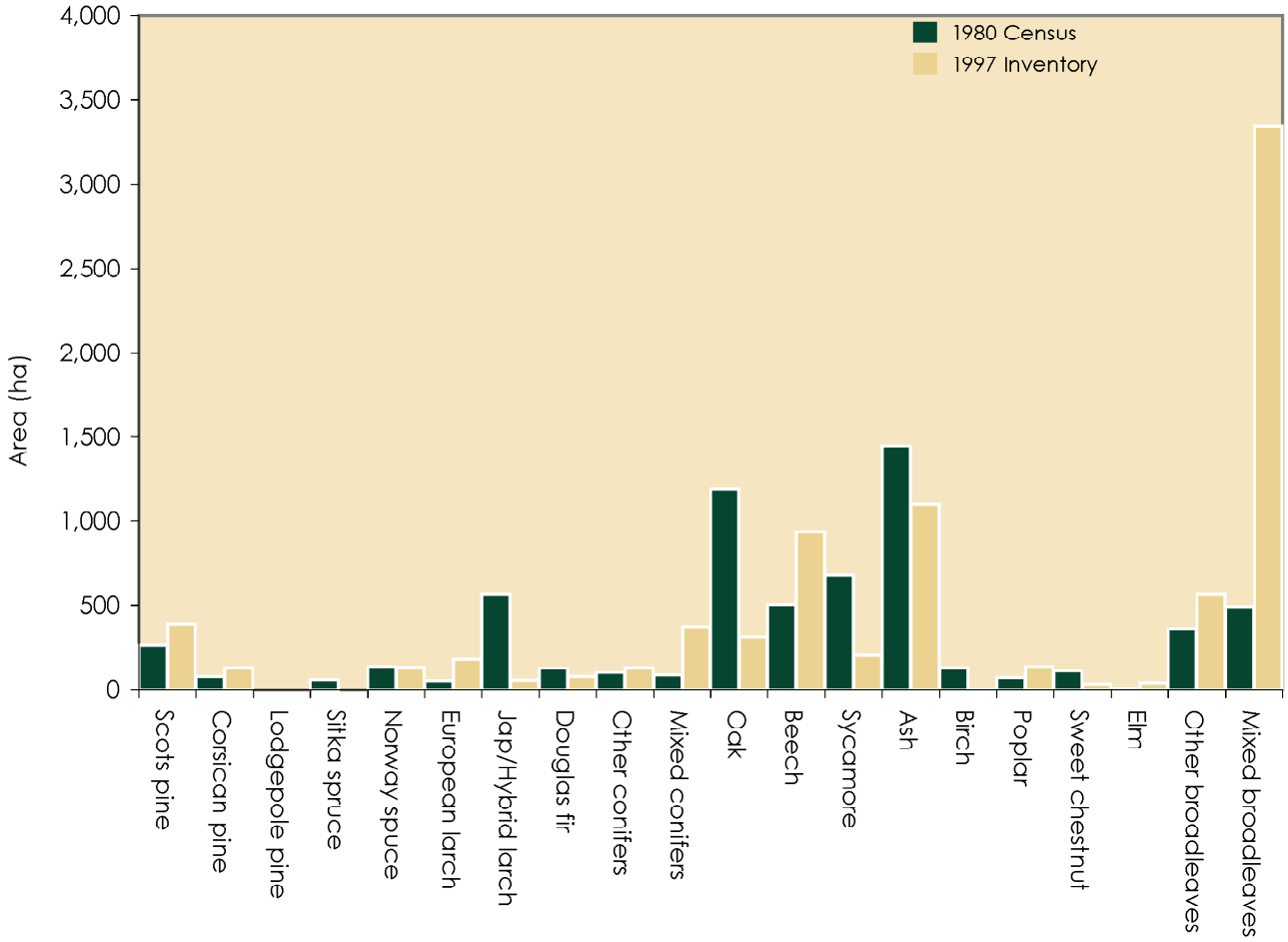


Table 21 Comparison of High Forest Category 1 area by planting year class between 1980 Census and 1997 Inventory

Planting year class	1980 Census woodland area (ha)	1997 Inventory woodland area (ha)	Change (%)
1991-1997	0	283	see note
1981-1990	0	69	see note
1971-1980	217	407	88
1961-1970	958	1,105	15
1951-1960	815	868	6
1941-1950	966	2,092	117
1931-1940	278	1,410	407
1921-1930	487	423	-13
1911-1920	477	765	60
1901-1910	331	7	-98
1861-1900	1,369	534	-61
Pre 1861	155	86	-45
Total all years	**6,053**	**8,049**	**33**

1. The first two classes, 1991-1997 and 1981-1990, cover the period since the 1980 Census and no comparison is therefore available.

2. The definition of High Forest Category 1 in the Inventory does not fully coincide with High Forest as defined in the 1980 Census.

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

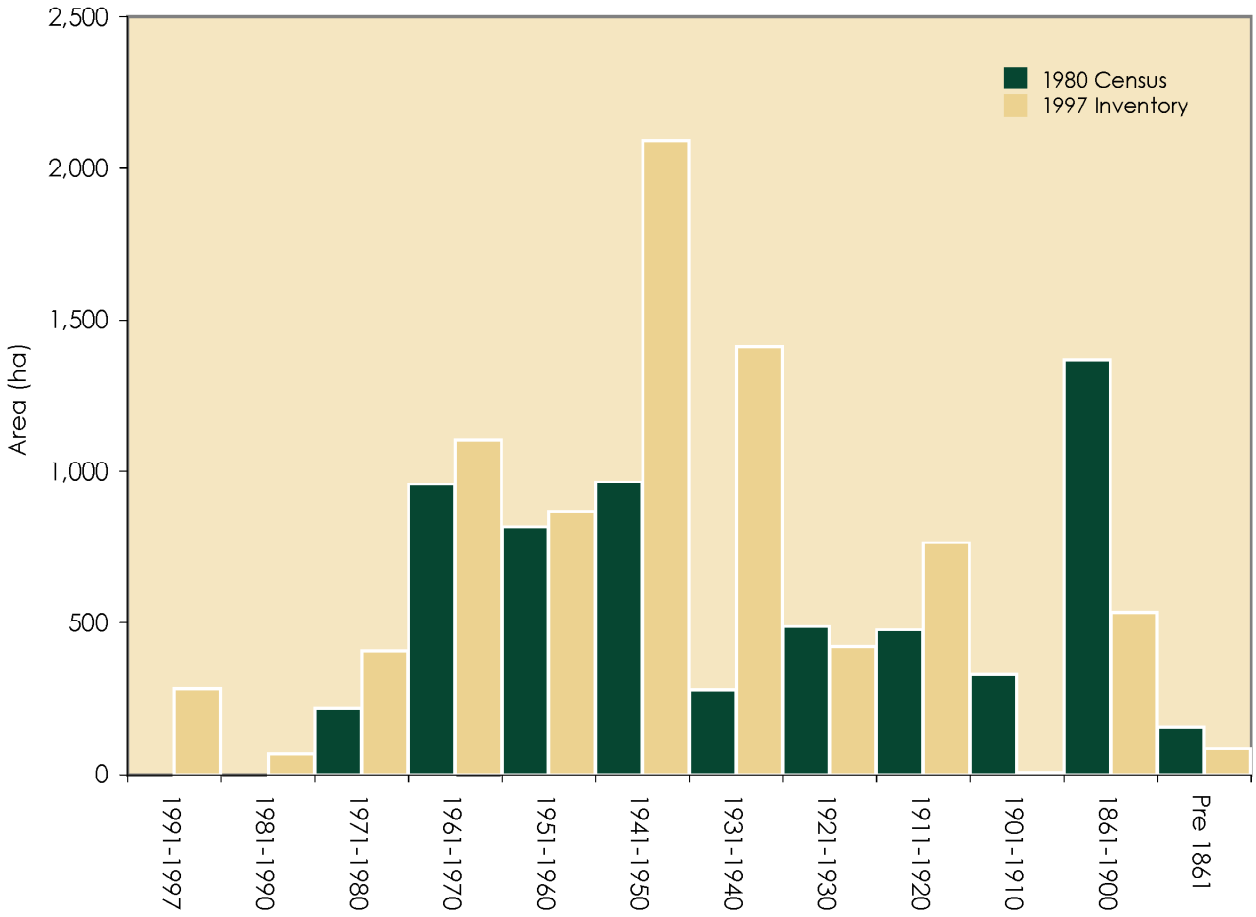


Table 22 Comparison of numbers of live trees outside woodland between 1980 Census and 1997 Inventory (000's)

Feature type	1980 Census	1997 Inventory	Change (%)
Boundary Tree	82	65	-21
Middle Tree	90	10	-89
Total Individual Trees	172	75	-57
Groups	225	33	-85
Linear Features	127	144	13
Total	**524**	**251**	**-52**

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 1997 Inventory figures have been adjusted accordingly. The 1997 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 1997 Inventory, the two surveys are not directly comparable - 1980 used 7cm diameter at breast height, and 1997 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 1997 Inventory

Feature type	1980 Census	1997 Inventory	Change (%)
Individual Trees (per sq km)	128.0	56.0	-56
Groups (per sq km)	58.5	5.0	-92
Linear Features (m per sq km)	564.6	257.1	-54

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 1997 Inventory figures have been adjusted accordingly. The 1997 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 1997 Inventory, the two surveys are not directly comparable - 1980 used 7cm diameter at breast height, and 1997 used 2m height, as minimum criteria for inclusion.

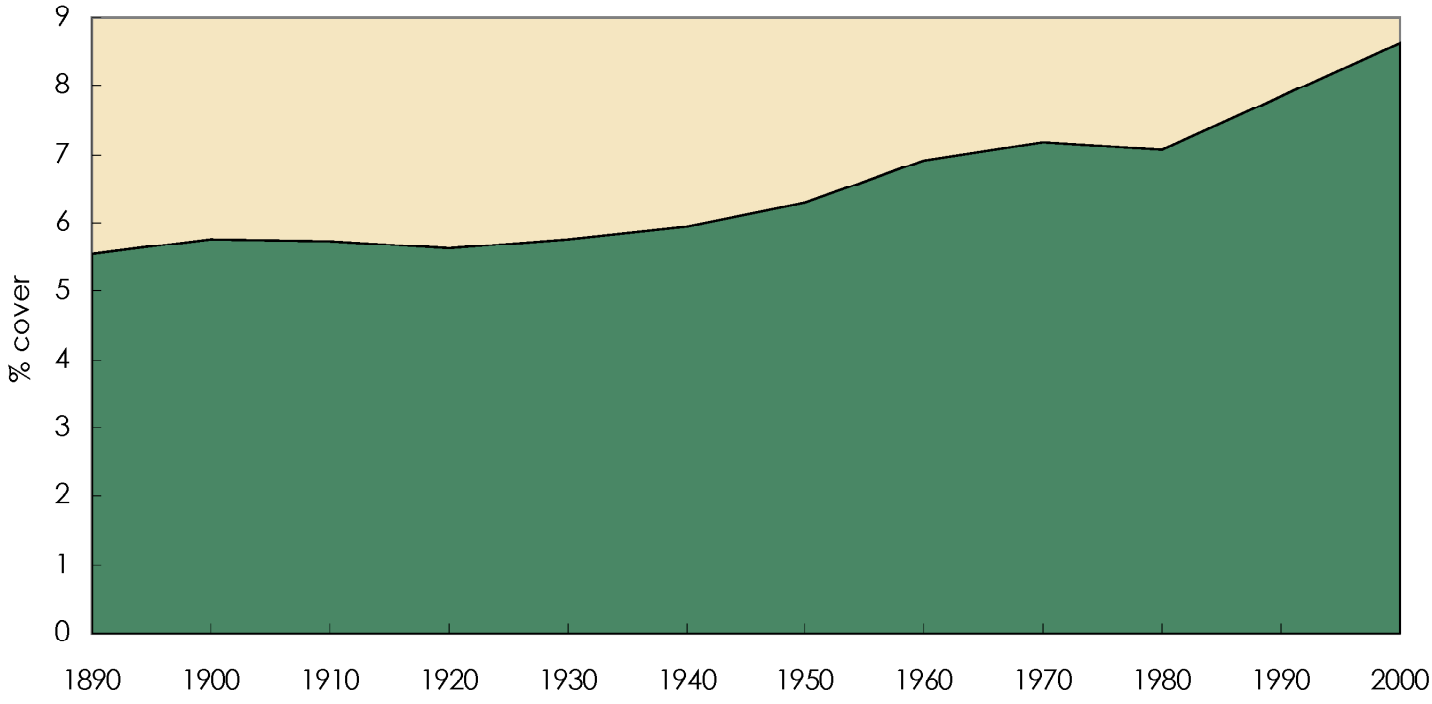
4. See Glossary for definitions of feature type.

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.

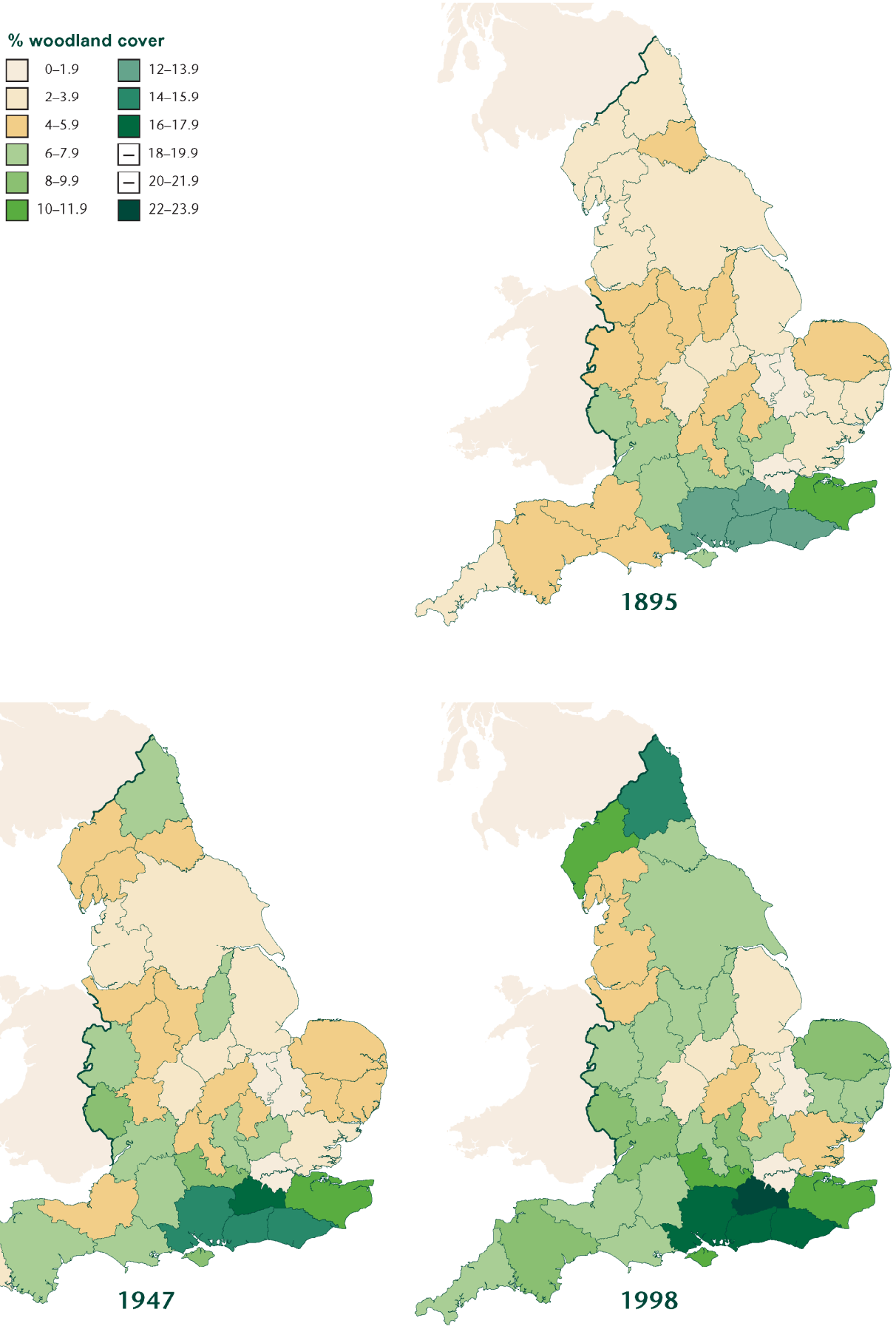
The maps use the old County structure data of England, as reported on in 1895 and 1947. The data from these counties could not be re-worked for different geographic areas. In contrast, the digital woodland map, which forms the basis of the current inventory, can be analysed for any geographic area.

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

NOTES

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