National Inventory of Woodland and Trees

Wales

Forestry Commission


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Forestry Commission

Inventory Report

National Inventory of Woodland and Trees

Wales

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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 Wales was carried out by Graham Bull, Woodland Survey Officer, and Woodland GIS Officers Chris Brown, Robert Beck and Esther Whitton. Data processing and analysis were carried out by Woodland Data Officers Justin Gilbert and Shona Mackintosh.

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 With the statistics becoming increasingly out of date the Forestry Commission decided to undertake a new survey: the *National Inventory of Woodland and Trees*.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

This digital map gives the extent of all woodland over 2 hectares. 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 in Wales 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:

- 2.0 ha – <100 ha : every fifth wood
- 100 ha – <500 ha : two woods in five
- 500 ha 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 had 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 Wales 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 Woods (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

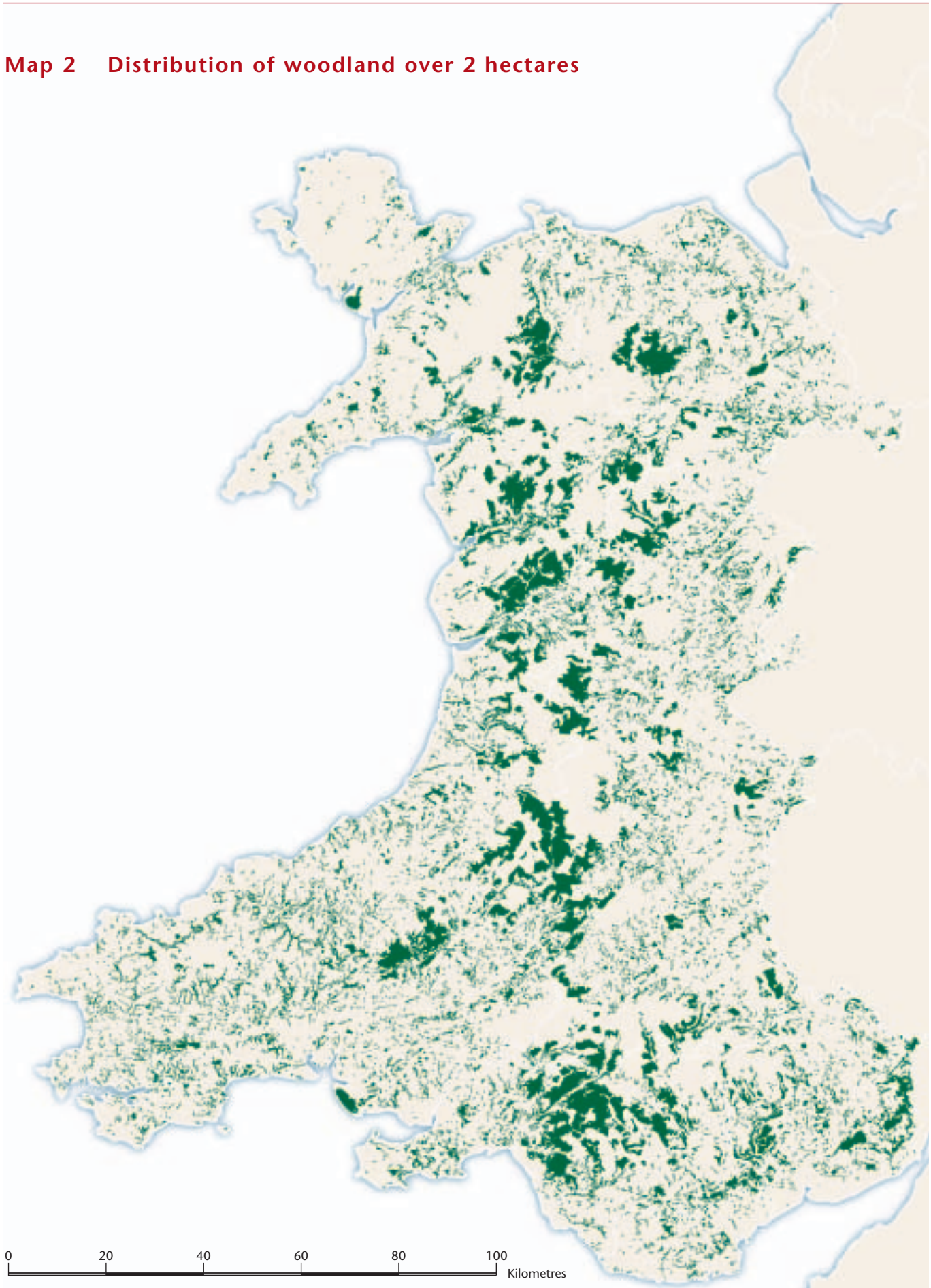
- The total area of woodland of 0.1 hectares and over in Wales is 286 769 hectares. This represents 13.8% of the land area (Table 1).
- Conifer woodland is the dominant forest type representing 47.9% of all woodland. Broadleaved woodland represents 37.3%, Mixed woodland 7.7% and Open Space within woodlands 3.8% (Table 2).
- The main conifer species is Sitka spruce covering 83 891 hectares or 56% of all conifer species. The main broadleaved species is oak covering 42 918 hectares or 37% of all broadleaved species (Table 3).
- 119 979 hectares or 44% of woodland over 2 hectares is owned by or leased to the Forestry Commission, and 150 056 hectares or 56% of woodland is in Other ownerships (Table 6).
- There are a total 9 631 woods over 2 hectares within Wales with a mean wood area of 28.2 hectares (Table 7a). There are a total of 23 405 woods from 0.1 – <2.0 hectares with a mean wood area of 0.71 hectares (Table 14).
- There are 15.33 million live trees and 64 thousand dead trees outside woodland in Wales (Tables 17 and 18).
- Woodland land cover increased by over 45 000 hectares from 11.6% to 13.8% of the land area between 1980 and 1997 (Table 23).
- The area of Broadleaves increased by 80% between 1980 and 1997, with the relative proportion of Broadleaves to Conifers increasing from 29% to 44% (Table 24).

INVENTORY REPORTS

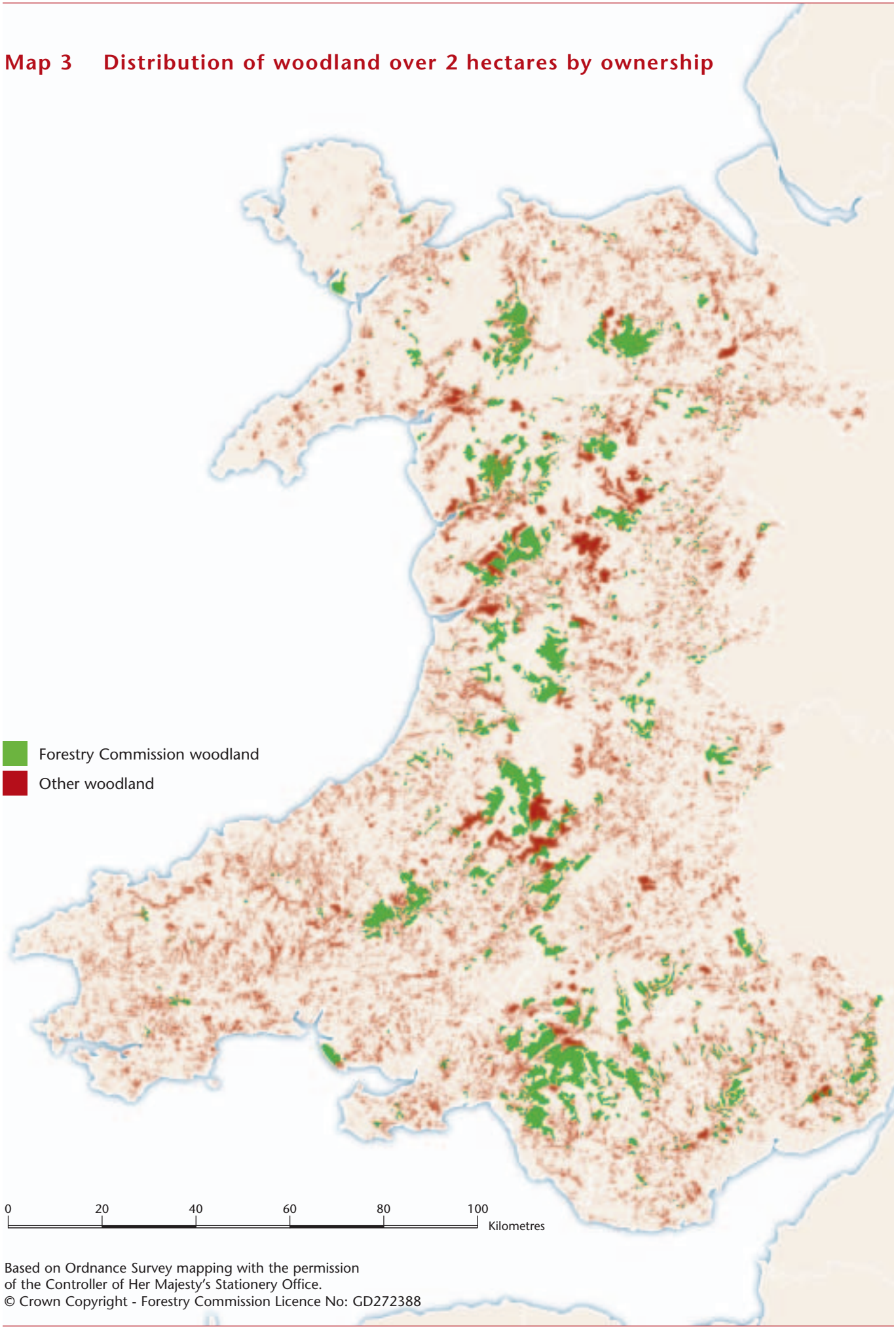
In addition to this Report for Wales, further information is available for the Welsh counties as shown on the map opposite. Country, region and county reports for England, and country and region reports for Scotland, are also available.

Map 1 County boundaries

Map 2 Distribution of woodland over 2 hectares

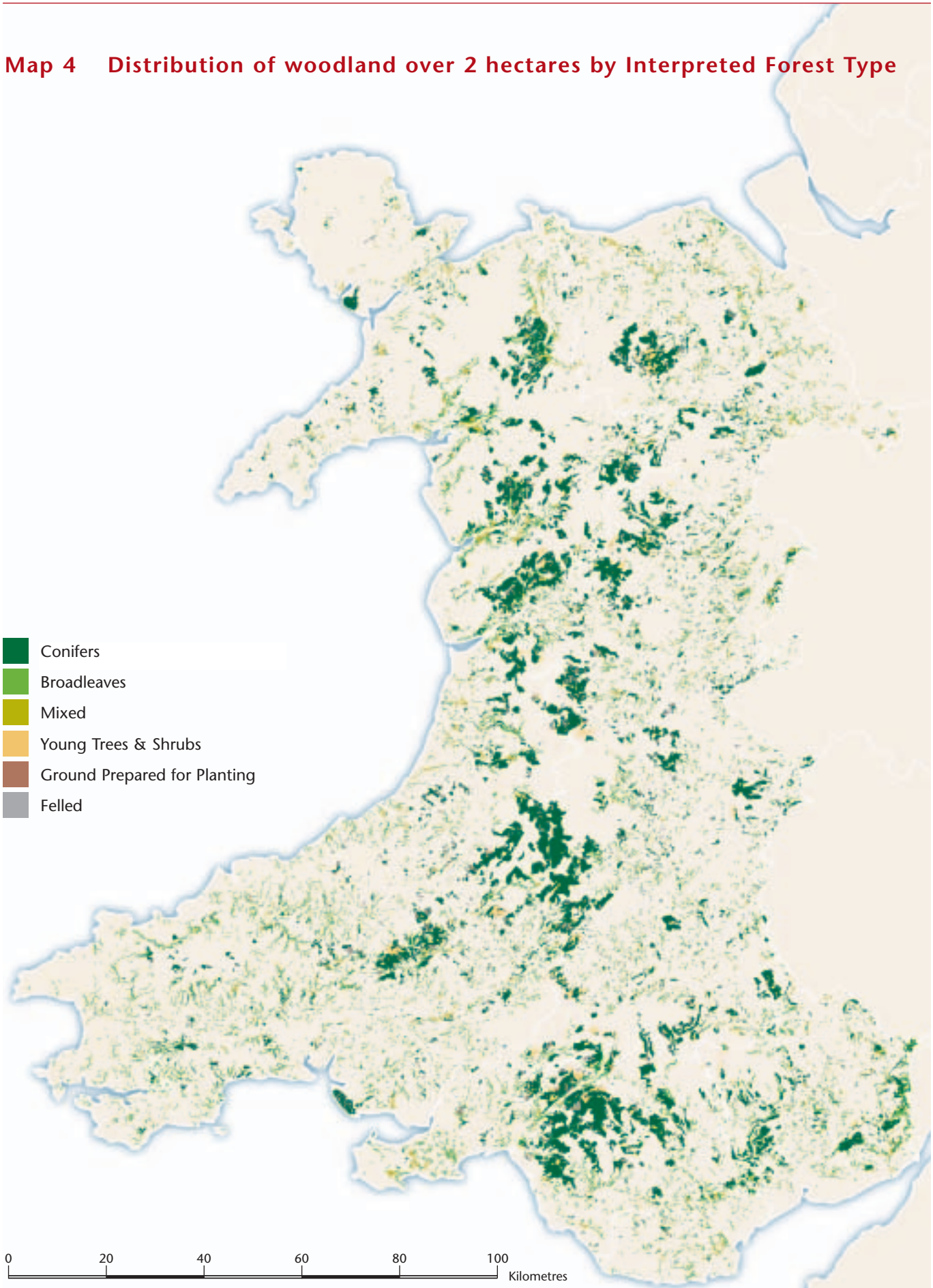


Map 3 Distribution of woodland over 2 hectares by ownership



Reference Date 31 March 1997

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



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

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

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)	% Woodland area
2.00 and over	270 035	94.2
0.25 – < 2.00	16 236	5.7
0.10 – < 0.25	498	0.2
Total area of woodland	**286 769**	**100.0**
% Woodland land cover	**13.8**	

1. Area of Wales, including inland water, 2 076 620 ha based on digital boundaries used in the 1991 Census of Population.

2. The recorded area of new woodland planted in Wales from 1 April 1997 to 31 March 2001 was approximately 2 000 ha. Assuming that woodland losses over the same period were minimal, then the total woodland area at 31 March 2001 was approximately 289 000 ha, giving a total land cover of 13.9%.

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	134 244	3 232	137 476	47.9
Broadleaved	93 967	12 888	106 855	37.3
Mixed	21 505	535	22 040	7.7
Coppiced	489	0	489	0.2
Copp-w-Standards	0	0	0	0.0
Windblow	48	0	48	0.0
Felled	8 961	0	8 961	3.1
Open Space	10 821	80	10 901	3.8
Total	**270 035**	**16 734**	**286 769**	**100.0**

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	13 969	166	14 135	9.5	5.3
Sitka spruce	81 316	2 575	83 891	56.3	31.5
Larch	22 121	290	22 411	15.0	8.4
Other conifers	27 724	260	27 984	18.8	10.5
Mixed conifers	393	99	492	0.3	0.2
Total conifers	**145 523**	**3 390**	**148 913**	**100.0**	**55.9**
Oak	38 092	4 826	42 918	36.5	16.1
Beech	7 369	1 629	8 998	7.7	3.4
Sycamore	6 124	783	6 907	5.9	2.6
Ash	18 181	1 140	19 321	16.4	7.3
Birch	10 813	1 766	12 579	10.7	4.7
Elm	123	0	123	0.1	0.0
Other broadleaves	16 147	2 886	19 033	16.2	7.1
Mixed broadleaves	7 391	233	7 624	6.5	2.9
Total broadleaves	**104 241**	**13 262**	**117 503**	**100.0**	**44.1**
Total all species†	**249 764**	**16 652**	**266 416**		**100.0**

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

† Excludes the 20 351 ha of Coppice, Felled and Open Space areas, which were included in Table 2.

1. The standard errors of the total area estimates for the most common species or species groups are as follows:

Conifers	2%
Broadleaves	3%
Sitka spruce	4%
Other conifers	4%
Oak	5%

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	771 800	5 848 300	8	282
Narrow Linear Features	171 200	8 568 300	50	413
Individual Trees	917 400	917 400	1	44
Total		**15 334 000**		**738**

1. Land area used to calculate tree density 2 076 620 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	10%
Narrow Linear Features	16%
Individual Trees	9%

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	823	66	3
Narrow Linear Features	171 200	14 502	698
Total		**14 568**	**702**

1. Land area used to calculate feature density 2 076 620 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	99%
Narrow Linear Features	85%

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.

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 the sample plots was reduced as the sampled woodlands increased in size, the general aim being to sample 1% of 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	119 979	44
Other	150 056	56
Total area of woodland	**270 035**	**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

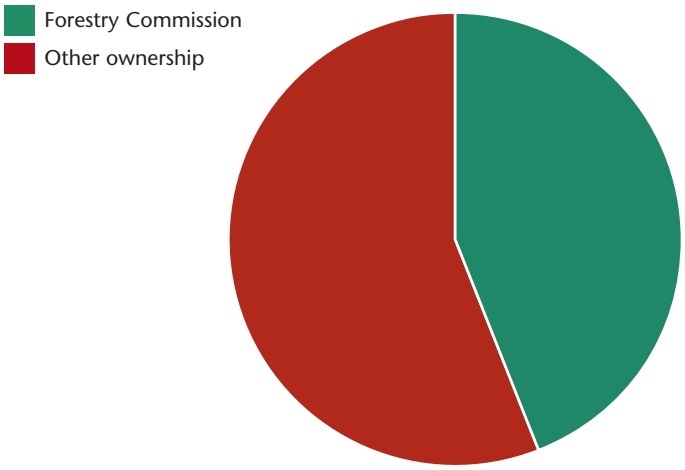


Table 7a Size class distribution of woodland

Size class (ha)	Number of woods	Total area (ha)	Percent of total area	Mean wood area (ha)
<10	6 630	29 344	11	4.4
10 – <20	1 342	18 726	7	14.0
20 – <50	955	29 454	11	30.8
50 – <100	347	24 127	9	69.5
<100	9 274	101 651	37	11.0
100 – <500	288	58 096	21	201.7
500 and >	69	111 709	41	1 619.0
All woods	**9 631**	**271 457**	**100**	**28.2**

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	199	1 055	0	5.3
	O	8 412	33 785	12	4.0
10 – <20	FC	147	2 111	1	14.4
	O	1 402	19 541	7	13.9
20 – <50	FC	190	6 062	2	31.9
	O	940	29 188	11	31.1
50 – <100	FC	107	7 694	3	71.9
	O	299	20 466	8	68.4
<100	FC	643	16 922	6	26.3
	O	11 053	102 980	38	9.3
100 – <500	FC	141	30 007	11	212.8
	O	176	34 269	13	194.7
500 and >	FC	56	73 098	27	1 305.3
	O	14	14 181	5	1 013.0
Total	**FC**	**840**	**120 026**	**44**	**142.9**
	O	**11 243**	**151 430**	**56**	**13.5**

1. Tables 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 1 422 hectares more than that recorded in Tables 1 and 3. 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	88 287	73.6	45 957	30.6	134 244	49.7
Broadleaved	10 365	8.6	83 603	55.7	93 967	34.8
Mixed	8 089	6.7	13 416	8.9	21 505	8.0
Coppice*	0	0.0	489	0.3	489	0.2
Copp-w-stds	0	0.0	0	0.0	0	0.0
Windblow	0	0.0	48	0.0	48	0.0
Felled	6 305	5.3	2 656	1.8	8 961	3.3
Open Space	6 933	5.8	3 888	2.6	10 821	4.0
Total	**119 979**	**100.0**	**150 056**	**100.0**	**270 035**	**100.0**

*Wales has 98 ha Short Rotation Coppice.

Area of woodland by forest type

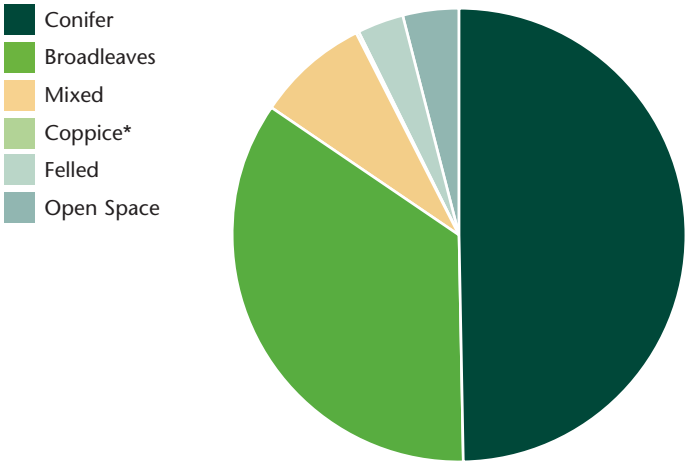


Table 9a Area of High Forest by principal species and ownership

Species	Forestry Commission			Other			All ownerships		
	area (ha)	cat* %	spp† %	area (ha)	cat* %	spp† %	area (ha)	cat* %	spp† %
Scots pine	2 544	3	2	1 944	4	1	4 488	3	2
Corsican pine	2 622	3	2	728	1	1	3 350	2	1
Lodgepole pine	4 024	4	4	2 107	4	1	6 131	4	2
Sitka spruce	55 322	59	52	25 993	50	18	81 316	56	33
Norway spruce	7 165	8	7	3 886	7	3	11 051	8	4
European larch	194	0	0	393	1	0	587	0	0
Japanese/hybrid larch	11 805	13	11	9 729	19	7	21 534	15	9
Douglas fir	5 458	6	5	5 357	10	4	10 816	7	4
Other conifers	3 756	4	4	2 102	4	1	5 857	4	2
Mixed conifers	176	0	0	217	0	0	393	0	0
Total conifers	**93 067**	**100**	**87**	**52 456**	**100**	**37**	**145 523**	**100**	**58**
Oak	4 389	32	4	33 703	37	24	38 092	37	15
Beech	2 269	17	2	5 100	6	4	7 369	7	3
Sycamore	205	1	0	5 919	7	4	6 124	6	2
Ash	1 196	9	1	16 985	19	12	18 181	17	7
Birch	2 399	18	2	8 414	9	6	10 813	10	4
Poplar	52	0	0	516	1	0	568	1	0
Sweet chestnut	130	1	0	402	0	0	532	1	0
Elm	0	0	0	123	0	0	123	0	0
Other broadleaves	1 365	10	1	13 682	15	10	15 047	14	6
Mixed broadleaves	1 667	12	2	5 724	6	4	7 391	7	3
Total broadleaves	**13 674**	**100**	**13**	**90 567**	**100**	**63**	**104 241**	**100**	**42**
Total – all species	**106 741**		**100**	**143 023**		**100**	**249 764**		**100**
Felled	**6 305**			**2 656**			**8 961**		
Total High Forest	**113 046**			**145 679**			**258 725**		

*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 10 821 hectares 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	1%
Broadleaves	2%
Sitka spruce	2%
Japanese/hybrid larch	5%
Oak	3%

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

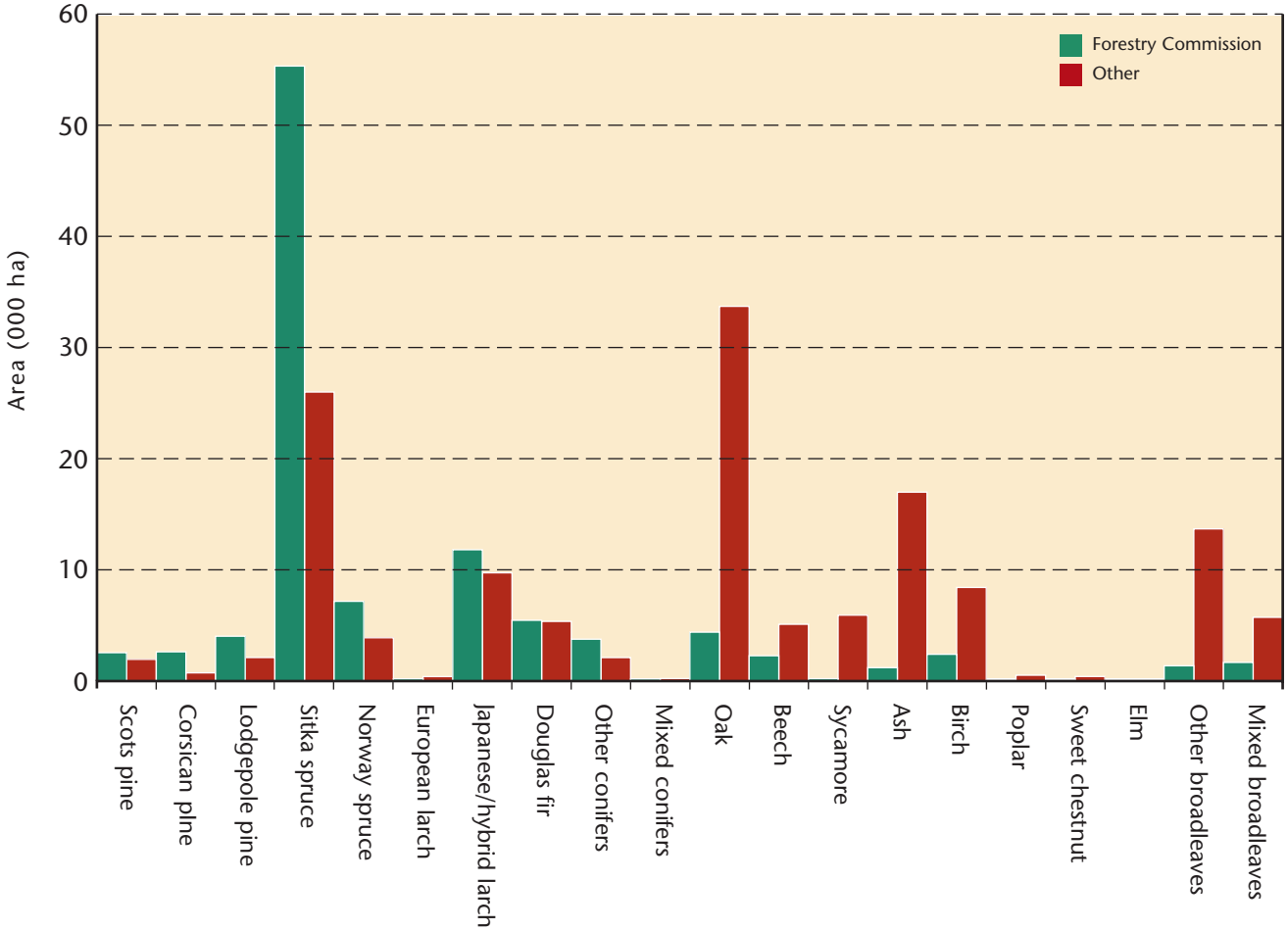


Table 9b Area of High Forest by principal species, ownership and category

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	2 397	148	2 544	1 742	202	1 944	4 139	350	4 488
Corsican pine	2 360	262	2 622	723	5	728	3 084	267	3 350
Lodgepole pine	3 222	802	4 024	1 816	291	2 107	5 038	1 093	6 131
Sitka spruce	50 137	5 186	55 322	23 601	2 392	25 993	73 738	7 578	81 316
Norway spruce	6 854	310	7 165	3 839	47	3 886	10 693	358	11 051
European larch	194	0	194	393	0	393	587	0	587
Japanese/hybrid larch	11 509	296	11 805	9 072	657	9 729	20 581	953	21 534
Douglas fir	5 385	73	5 458	5 222	135	5 357	10 608	208	10 816
Other conifers	3 611	144	3 756	1 876	226	2 102	5 488	370	5 857
Mixed conifers	153	23	176	163	54	217	316	77	393
Total conifers	**85 823**	**7 244**	**93 067**	**48 447**	**4 009**	**52 456**	**134 270**	**11 253**	**145 523**
Oak	2 000	2 389	4 389	9 399	24 304	33 703	11 399	26 693	38 092
Beech	1 800	469	2 269	2 736	2 364	5 100	4 536	2 833	7 369
Sycamore	58	147	205	1 705	4 214	5 919	1 763	4 361	6 124
Ash	494	702	1 196	6 908	10 077	16 985	7 402	10 779	18 181
Birch	357	2 042	2 399	1 635	6 779	8 414	1 992	8 821	10 813
Poplar	10	42	52	494	21	516	505	63	568
Sweet chestnut	42	88	130	181	221	402	223	309	532
Elm	0	0	0	0	123	123	0	123	123
Other broadleaves	271	1 094	1 365	1 944	11 738	13 682	2 215	12 832	15 047
Mixed broadleaves	789	878	1 667	2 275	3 449	5 724	3 064	4 327	7 391
Total broadleaves	**5 821**	**7 853**	**13 674**	**27 279**	**63 288**	**90 567**	**33 100**	**71 141**	**104 241**
Total – all species	**91 644**	**15 097**	**106 741**	**75 727**	**67 297**	**143 023**	**167 370**	**82 394**	**249 764**

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:

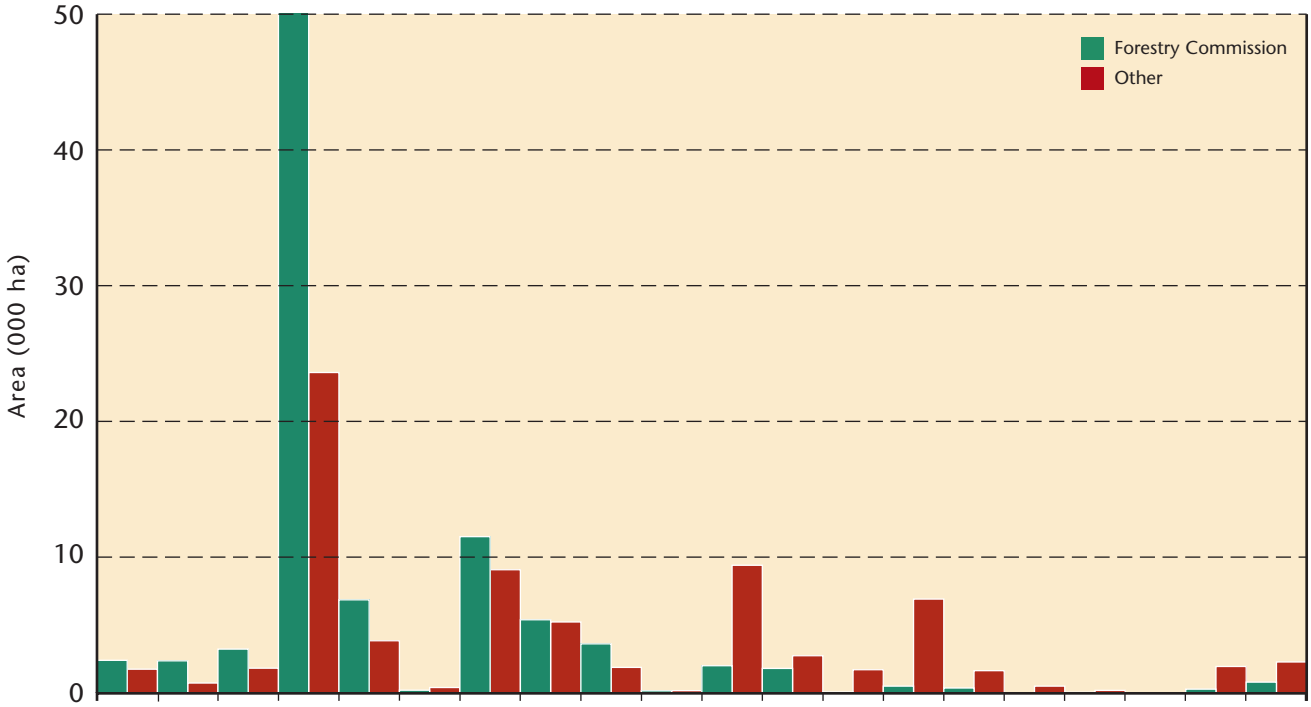
	Category 1*	Category 2*	Total High Forest
Conifers	1%	6%	1%
Broadleaves	3%	2%	2%
Sitka spruce	2%	9%	2%
Janpanese/hybrid larch	5%	22%	5%
Oak	6%	4%	3%

*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

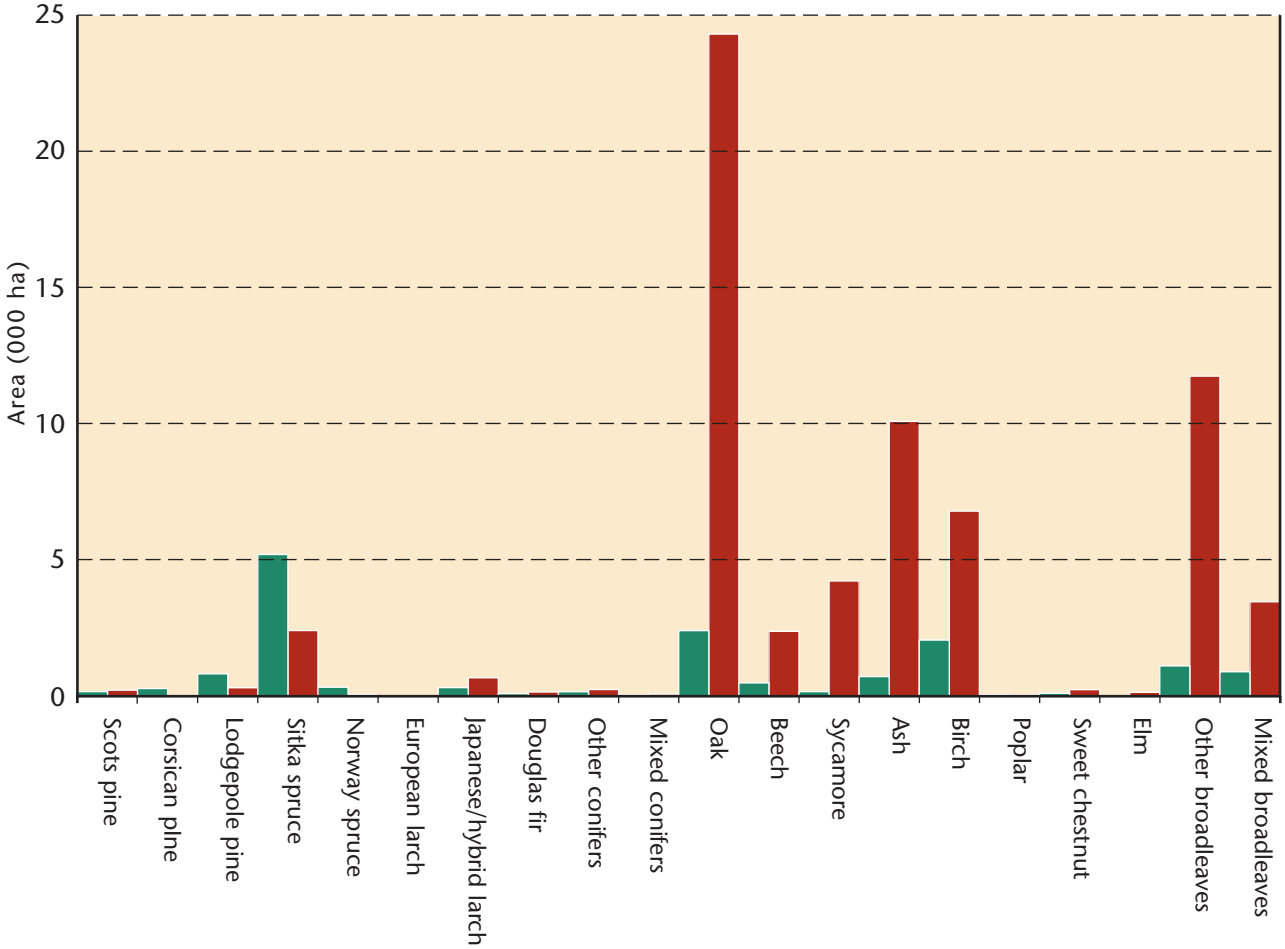
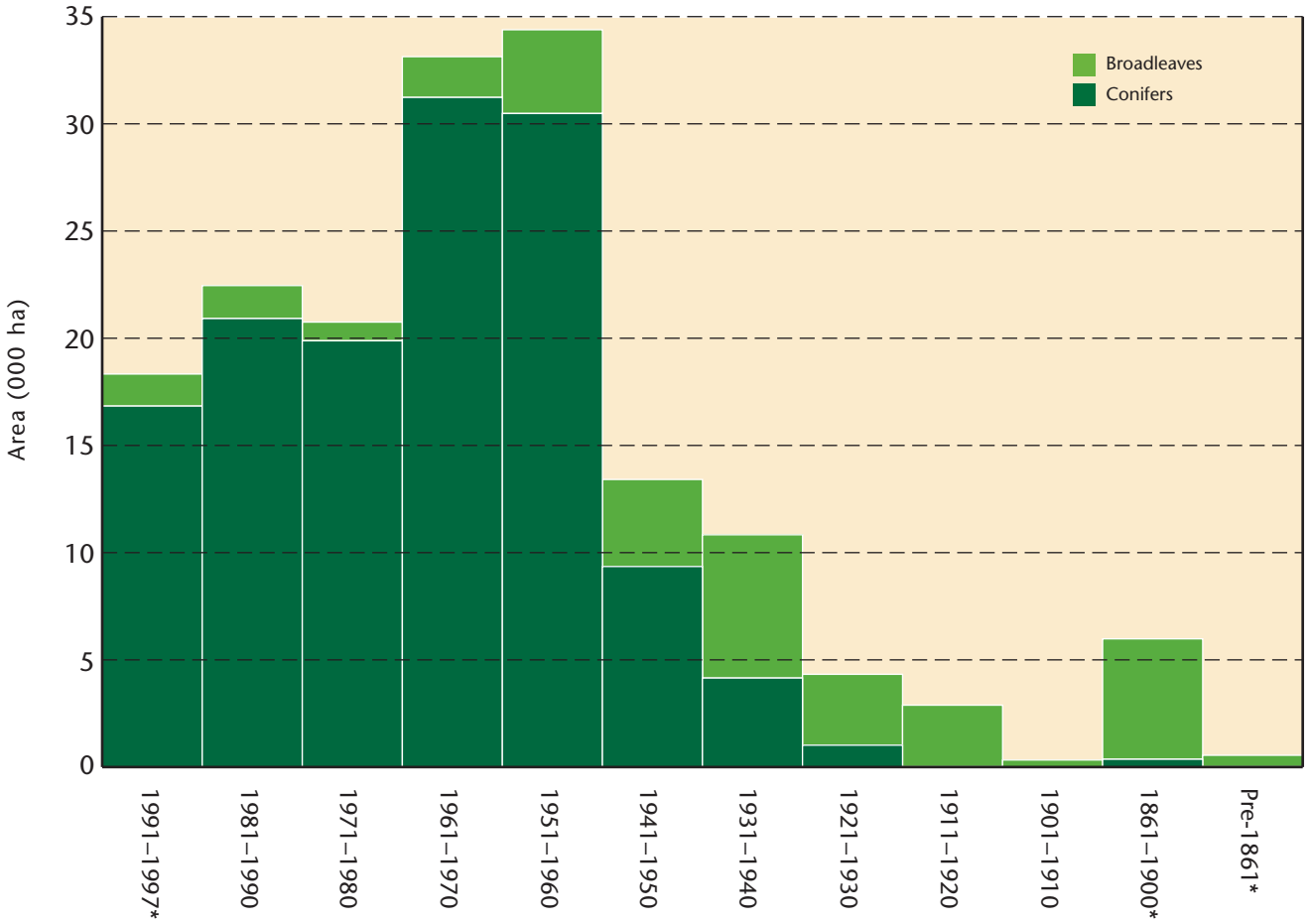


Table 10a High Forest Category 1 - Area by principal species and planting year class

Species	Planting year class*												Total (ha)
	1991 –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	493	0	59	782	1 382	835	236	91	7	0	253	0	4 139
Corsican pine	482	119	258	638	1 014	85	386	55	0	0	46	0	3 084
Lodgepole pine	61	440	992	1 507	1 731	208	25	74	0	0	0	0	5 038
Sitka spruce	10 546	16 119	13 848	17 637	11 018	3 329	1 158	75	0	0	7	0	73 738
Norway spruce	1 108	517	608	2 718	3 629	1 374	667	67	0	4	0	0	10 693
European larch	0	0	0	16	149	169	96	112	0	0	30	15	587
Japanese/hybrid larch	1 692	2 131	2 139	3 589	7 320	2 628	838	225	0	0	18	0	20 581
Douglas fir	1 947	1 389	1 215	2 464	2 423	379	482	306	0	0	4	0	10 608
Other conifers	449	203	713	1 823	1 747	284	253	14	0	0	0	0	5 488
Mixed conifers	57	0	48	57	68	62	11	0	7	0	6	0	316
Total conifers	**16 836**	**20 918**	**19 881**	**31 231**	**30 481**	**9 353**	**4 152**	**1 020**	**15**	**4**	**364**	**15**	**134 270**
Oak	394	336	27	266	430	1 411	2 631	1 298	1 564	170	2 675	197	11 399
Beech	100	20	13	250	872	421	688	319	408	81	1 090	274	4 536
Sycamore	82	11	99	215	328	214	300	198	90	0	218	11	1 763
Ash	293	175	108	686	984	996	1 574	786	521	74	1 155	52	7 402
Birch	125	307	211	175	453	281	202	113	7	0	120	0	1 992
Poplar	70	121	0	6	286	0	0	16	0	0	5	0	505
Sweet chestnut	6	0	94	0	9	0	0	70	0	0	44	0	223
Elm	0	0	0	0	0	0	0	0	0	0	0	0	0
Other broadleaves	259	183	139	189	242	382	620	117	19	0	64	0	2 215
Mixed broadleaves	166	383	181	113	302	355	667	389	263	0	246	0	3 064
Total broadleaves	**1 494**	**1 537**	**871**	**1 900**	**3 906**	**4 058**	**6 681**	**3 306**	**2 871**	**325**	**5 616**	**534**	**33 100**
Total – all species	**18 330**	**22 454**	**20 752**	**33 131**	**34 387**	**13 411**	**10 833**	**4 326**	**2 886**	**329**	**5 981**	**549**	**167 370**

*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



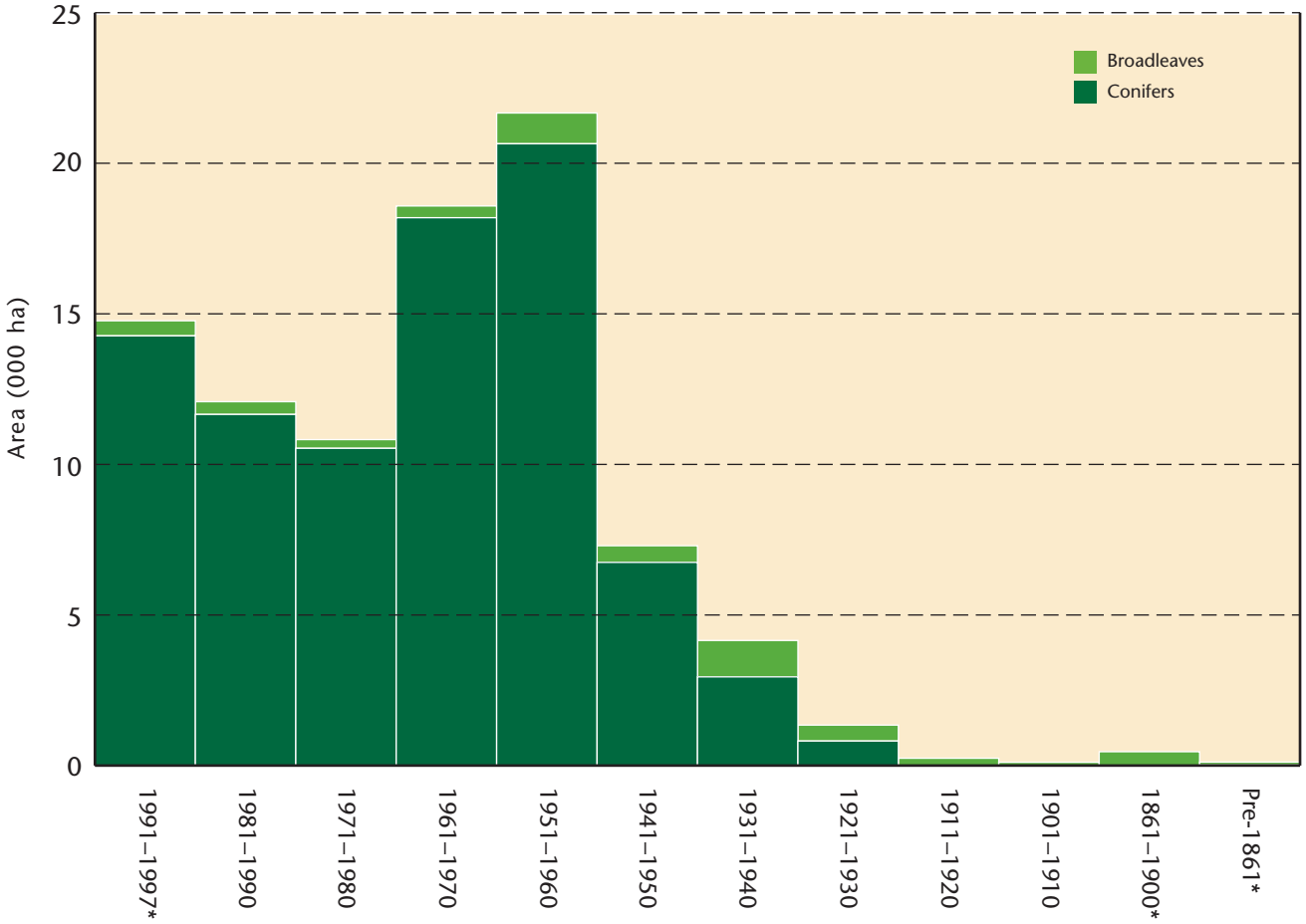
*Most of the planting year classes cover 10 years, 1991–1997 is 7 years, and the classes prior to 1901 are 40 years or more.

Table 10b High Forest Category 1 - Forestry Commission: area by principal species and planting year 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	464	0	10	405	706	577	184	51	0	0	0	0	2 397
Corsican pine	482	45	0	523	900	58	296	55	0	0	0	0	2 360
Lodgepole pine	57	55	515	1 171	1 289	42	19	74	0	0	0	0	3 222
Sitka spruce	9 603	9 238	7 315	11 363	8 739	2 797	1 013	70	0	0	0	0	50 137
Norway spruce	947	218	329	1 136	2 342	1 233	594	55	0	0	0	0	6 854
European larch	0	0	0	10	0	0	67	102	0	0	0	15	194
Japanese/hybrid larch	1 282	1 080	978	1 701	4 239	1 731	334	163	0	0	0	0	11 509
Douglas fir	945	856	877	819	1 266	137	247	238	0	0	0	0	5 385
Other conifers	443	166	476	1 034	1 128	167	192	5	0	0	0	0	3 611
Mixed conifers	47	0	34	28	39	5	0	0	0	0	0	0	153
Total conifers	**14 269**	**11 659**	**10 534**	**18 192**	**20 647**	**6 747**	**2 945**	**814**	**0**	**0**	**0**	**15**	**85 823**
Oak	167	43	10	0	187	226	637	262	79	102	209	79	2 000
Beech	65	10	0	181	691	135	288	99	104	5	203	20	1 800
Sycamore	0	0	6	4	39	0	4	0	0	0	6	0	58
Ash	9	9	23	90	64	46	106	133	2	0	11	0	494
Birch	70	114	125	10	0	0	39	0	0	0	0	0	357
Poplar	0	0	0	0	0	0	0	10	0	0	0	0	10
Sweet chestnut	0	0	31	0	0	0	0	5	0	0	6	0	42
Elm	0	0	0	0	0	0	0	0	0	0	0	0	0
Other broadleaves	95	37	14	11	23	0	85	5	0	0	0	0	271
Mixed broadleaves	93	210	81	94	18	146	50	15	57	0	25	0	789
Total broadleaves	**500**	**423**	**289**	**390**	**1 021**	**552**	**1 208**	**529**	**242**	**108**	**459**	**99**	**5 821**
Total – all species	**14 769**	**12 082**	**10 824**	**18 583**	**21 668**	**7 299**	**4 153**	**1 343**	**242**	**108**	**459**	**115**	**91 644**

*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



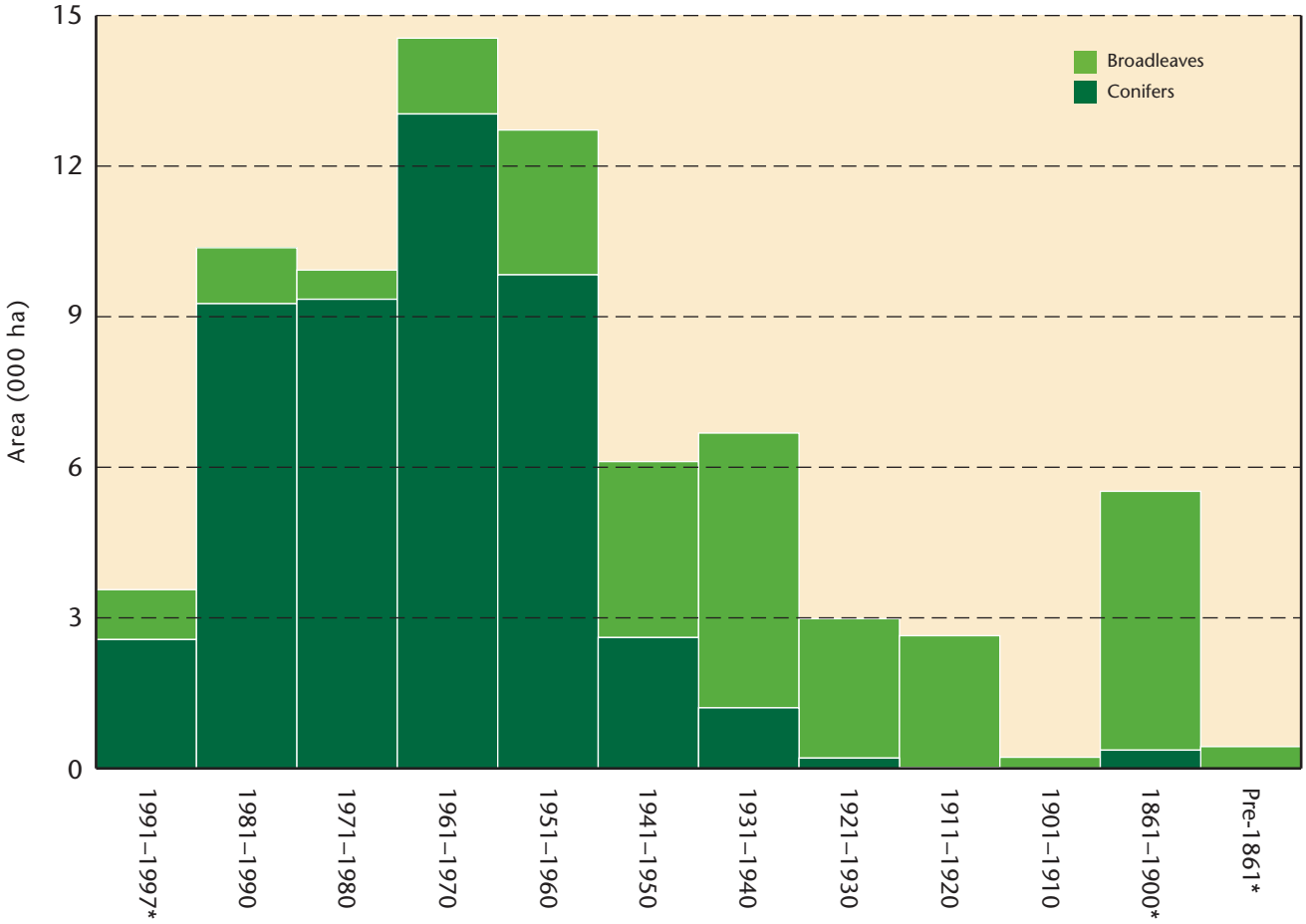
*Most of the planting year classes cover 10 years, 1991–1997 is 7 years, and the classes prior to 1901 are 40 years or more.

Table 10c High Forest Category 1 - Other ownership: area by principal species and planting year 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	30	0	49	377	676	259	52	40	7	0	253	0	1 742
Corsican pine	0	74	258	115	114	26	90	0	0	0	46	0	723
Lodgepole pine	4	385	477	335	442	166	6	0	0	0	0	0	1 816
Sitka spruce	943	6 882	6 533	6 274	2 279	533	146	5	0	0	7	0	23 601
Norway spruce	160	299	279	1 582	1 288	141	73	13	0	4	0	0	3 839
European larch	0	0	0	5	149	169	29	9	0	0	30	0	393
Japanese/hybrid larch	410	1 050	1 162	1 888	3 082	897	503	62	0	0	18	0	9 072
Douglas fir	1 002	532	337	1 645	1 157	242	235	68	0	0	4	0	5 222
Other conifers	6	37	237	788	620	116	61	9	0	0	0	0	1 876
Mixed conifers	11	0	14	28	28	58	11	0	7	0	6	0	163
Total conifers	**2 567**	**9 259**	**9 347**	**13 039**	**9 834**	**2 607**	**1 207**	**206**	**15**	**4**	**364**	**0**	**48 447**
Oak	227	294	17	266	243	1 185	1 994	1 037	1 484	68	2 465	118	9 399
Beech	35	10	13	69	181	286	400	219	304	76	887	254	2 736
Sycamore	82	11	93	211	289	214	296	198	90	0	212	11	1 705
Ash	284	166	85	596	920	949	1468	653	519	74	1 144	52	6 908
Birch	54	193	86	165	453	281	163	113	7	0	120	0	1 635
Poplar	70	121	0	6	286	0	0	6	0	0	5	0	494
Sweet chestnut	6	0	63	0	9	0	0	65	0	0	38	0	181
Elm	0	0	0	0	0	0	0	0	0	0	0	0	0
Other broadleaves	164	146	125	178	219	382	535	112	19	0	64	0	1 944
Mixed broadleaves	73	173	100	19	284	210	616	373	206	0	221	0	2 275
Total broadleaves	**994**	**1 114**	**582**	**1 510**	**2 885**	**3 506**	**5 474**	**2 777**	**2 629**	**218**	**5 157**	**434**	**27 279**
Total – all species	**3 561**	**10 373**	**9 929**	**14 549**	**12 719**	**6 112**	**6 680**	**2 983**	**2 644**	**222**	**5 522**	**434**	**75 727**

*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



*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	%
1991–1997	Sitka spruce	54	Douglas fir	10	Japanese/hybrid larch	9
1981–1990	Sitka spruce	64	Japanese/hybrid larch	8	Birch	6
1971–1980	Sitka spruce	63	Japanese/hybrid larch	8	Lodgepole pine	5
1961–1970	Sitka spruce	49	Japanese/hybrid larch	9	Douglas fir	6
1951–1960	Sitka spruce	26	Japanese/hybrid larch	17	Other broadleaves	8
1941–1950	Oak	16	Other broadleaves	15	Sitka spruce	14
1931–1940	Oak	33	Ash	16	Other broadleaves	8
1921–1930	Oak	36	Ash	23	Other broadleaves	9
1911–1920	Oak	52	Ash	20	Beech	9
1901–1910	Oak	69	Ash	15	Beech	8
1861–1900	Oak	63	Ash	16	Beech	8
Pre-1861	Oak	46	Beech	28	Ash	15
All years	**Sitka spruce**	**32**	**Oak**	**15**	**Japanese/hybrid larch**	**9**

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

Ownership type by area

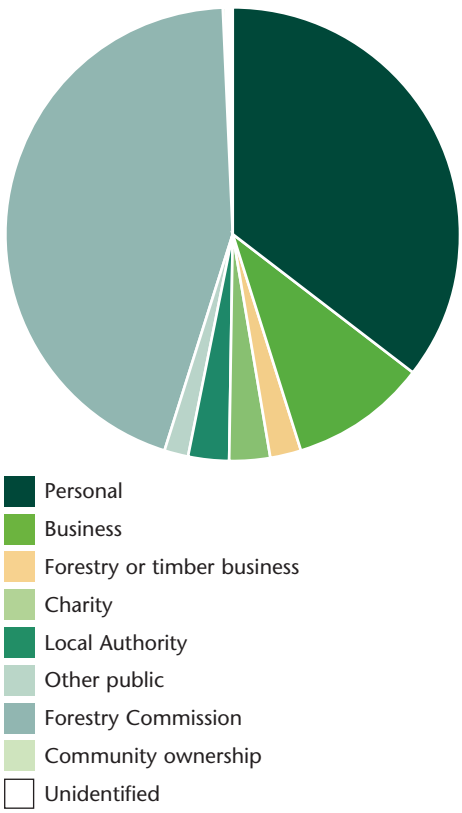


Table 12 Ownership type* by area and percentage

Ownership type	Area (ha)	%
Personal	95 500	35.4
Business	26 089	9.7
Forestry or timber business	6 006	2.2
Charity	7 784	2.9
Local Authority	7 925	2.9
Other public (not FC)	4 704	1.7
Forestry Commission	119 979	44.4
Community ownership or common land	652	0.2
Unidentified	1 396	0.5
Total	**270 035**	**100.0**

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

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

Survey method

The land area of Wales was stratified into coastal and inland 1 km x 1 km squares, 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 square was then divided into 16 parts and two of these were selected at random for field data collection. Data was collected on: Small Woods (0.10 – <2.00 ha), Linear Features, Groups and Individual Trees.

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

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

Feature type	Number of features	Total	Unit
Small Woods	22 582	16 602	Area (ha)
Wide Linear Features	823	132	Area (ha)
Wide Linear Features	823	66	Length (km)
Narrow Linear Features	171 200	14 502	Length (km)
Narrow Linear Features	171 200	8 568 300	Number of live trees
Groups	771 800	5 848 300	Number of live trees
Individual Trees	917 400	917 400	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	366	16 236	16 602	22 582	0.74
Wide Linear Features	132	0	132	823	0.16
Total	**498**	**16 236**	**16 734**	**23 405**	**0.71**

1. The standard errors of the total area estimates for these feature types are:

   Small Woods 32%
   Wide Linear Features 99%

2. See Glossary for definitions of feature types.

Table 15 Woodland area by forest type, woodland size and feature type

Forest type	Woodland size class (ha)						Total area (ha)
	0.1 – <0.25		0.25 – <2.0		0.1 – <2.0		
	SW*	WLF†	SW	WLF	SW	WLF	SW + WLF
Conifer	0	0	3 232	0	3 232	0	3 232
Broadleaved	138	132	12 618	0	12 756	132	12 888
Mixed	179	0	356	0	535	0	535
Coppiced	0	0	0	0	0	0	0
Copp-w-stds	0	0	0	0	0	0	0
Windblow	0	0	0	0	0	0	0
Felled	0	0	0	0	0	0	0
Open Space	50	0	30	0	80	0	80
Total	**366**	**132**	**16 236**	**0**	**16 602**	**132**	**16 734**

*SW - Small Woods, †WLF - Wide Linear Features.

1. See Glossary for definitions of forest type and feature type.

Table 16 Woodland area by species and feature type

Species	Feature type		Total area (ha)	Percent of total area	
	Small Wood	Wide Linear Feature		Category	Species
Pine	166	0	166	4.9	1.0
Spruce	2 806	0	2 806	82.7	16.8
Larch	290	0	290	8.5	1.7
Cypress	0	0	0	0.0	0.0
Other conifers	30	0	30	0.9	0.2
Mixed conifers	99	0	99	2.9	0.6
Total conifers	**3 391**	**0**	**3 392**	**100.0**	**20.4**
Oak	4 776	49	4 825	36.4	29.0
Beech	1 629	0	1 629	12.3	9.8
Sycamore	783	0	783	5.9	4.7
Ash	1 098	41	1 139	8.6	6.8
Birch	1 766	0	1 766	13.3	10.6
Poplar	0	0	0	0.0	0.0
Sweet chestnut	0	0	0	0.0	0.0
Horse chestnut	25	0	25	0.2	0.2
Alder	1 062	0	1 062	8.0	6.4
Lime	0	0	0	0.0	0.0
Elm	0	0	0	0.0	0.0
Willow	507	0	507	3.8	3.0
Other broadleaves	1 252	41	1 293	9.7	7.8
Mixed broadleaves	233	0	233	1.8	1.4
Total broadleaves	**13 131**	**132**	**13 262**	**100.0**	**79.6**
Total – all species	**16 522**	**132**	**16 654**		**100.0**

*Areas above exclude the 80 ha of Felled and Open Space areas which were included in Table 15.

1. Percentages:

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

2. The standard errors of the total area estimates for the most common species/groups are:

Spruce	86%
Oak	34%
Birch	40%
Other broadleaves	45%

3. See Glossary for definitions of feature types.

Table 17 Numbers of live trees outside woodland by species and feature type (000s trees)

Species	Feature type					Percent of total trees	
	Boundary Trees	Middle Trees	Groups	Narrow Linear Features	Total live trees	Category	Species
Pine	8.5	1.6	61.4	77.9	149.4	14.4	1.0
Spruce	6.6	1.2	230.6	534.9	773.3	74.5	5.0
Larch	4.7	3.1	7.8	13.0	28.6	2.8	0.2
Cypress	0.8	0.0	59.7	1.9	62.4	6.0	0.4
Other conifers	0.8	0.0	19.5	3.6	23.9	2.3	0.2
Total conifers	**21.4**	**5.9**	**379.0**	**631.4**	**1 037.6**	**100.0**	**6.8**
Oak	167.0	60.6	624.6	716.9	1 569.1	11.0	10.2
Beech	13.4	2.3	125.8	149.2	290.7	2.0	1.9
Sycamore	32.4	13.2	309.6	560.2	915.4	6.4	6.0
Ash	121.7	19.8	620.6	824.7	1 586.8	11.1	10.3
Birch	28.8	26.5	389.1	276.0	720.4	5.0	4.7
Poplar	4.1	0.0	6.1	32.2	42.4	0.3	0.3
Sweet chestnut	1.6	1.6	2.4	0.0	5.6	0.0	0.0
Horse chestnut	4.0	0.8	3.8	2.5	11.1	0.1	0.1
Alder	12.6	0.0	336.9	222.6	572.1	4.0	3.7
Lime	0.0	0.0	0.8	4.4	5.2	0.0	0.0
Elm	0.8	0.0	16.5	57.1	74.4	0.5	0.5
Willow	26.6	16.0	659.2	715.5	1 417.3	9.9	9.2
Other broadleaves	194.1	142.5	2 374.0	4 375.8	7 086.4	49.6	46.2
Total broadleaves	**607.1**	**283.3**	**5 469.3**	**7 936.9**	**14 296.9**	**100.0**	**93.2**
Total – all species	**628.6**	**289.1**	**5 848.3**	**8 568.3**	**15 333.9**		**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	9%
Groups	10%
Narrow Linear Features	16%

3. See Glossary for definitions of feature types.

Table 18 Numbers of dead trees outside woodland by species and feature type (000s of trees)

Species	Feature type					Percent of total trees	
	Boundary Trees	Middle Trees	Groups	Narrow Linear Features	Total dead trees	Category	Species
Pine	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spruce	0.0	0.0	0.0	19.3	19.3	100.0	30.3
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**	**19.3**	**19.3**	**100.0**	**30.3**
Oak	4.7	0.8	0.0	3.8	9.3	23.5	14.6
Beech	0.0	0.0	0.8	0.0	0.8	2.0	1.3
Sycamore	0.0	0.0	0.8	0.6	1.4	3.5	2.2
Ash	0.8	0.0	1.5	2.8	5.1	12.9	8.0
Birch	0.0	0.0	0.8	2.2	3.0	7.6	4.7
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	3.1	1.0	4.1	10.4	6.4
Lime	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Elm	0.0	0.0	0.0	0.8	0.8	2.0	1.3
Willow	0.0	0.0	0.0	2.1	2.1	5.3	3.3
Other broadleaves	0.8	0.0	3.9	8.2	12.9	32.7	20.3
Total broadleaves	**6.3**	**0.8**	**10.8**	**21.6**	**39.5**	**100.0**	**62.0**
Total – all species	**11.2**	**0.8**	**10.8**	**40.9**	**63.7**		**100.0**

1. See Glossary for definitions of feature types.

Table 19 Numbers of live Individual Trees by species and height band (000s trees)

Species	Height band (m)				Total live trees
	2–5	5–15	15–20	>20	
Pine	2.4	3.8	6.2	0.0	12.4
Spruce	0.0	1.6	3.9	0.0	5.5
Larch	0.8	5.5	1.5	0.0	7.8
Cypress	0.0	0.8	0.0	0.0	0.8
Other conifers	0.0	0.8	0.0	0.0	0.8
Total conifers	**3.2**	**12.5**	**11.6**	**0.0**	**27.3**
Oak	26.4	118.0	73.6	9.6	227.6
Beech	2.3	7.1	6.3	0.0	15.7
Sycamore	19.0	18.1	8.5	0.0	45.6
Ash	24.1	73.5	40.8	3.1	141.5
Birch	11.7	38.8	4.6	0.0	55.1
Poplar	2.4	1.6	0.0	0.0	4.0
Sweet chestnut	1.6	0.8	1.6	0.0	4.0
Horse chestnut	2.4	0.8	1.6	0.0	4.8
Alder	0.0	11.8	0.8	0.0	12.6
Lime	0.0	0.0	0.0	0.0	0.0
Elm	0.8	0.0	0.0	0.0	0.8
Willow	37.1	5.4	0.0	0.0	42.5
Other broadleaves	292.9	43.7	0.0	0.0	336.6
Total broadleaves	**420.7**	**319.6**	**137.8**	**12.7**	**890.8**
Total – all species	**424.0**	**331.3**	**149.4**	**12.7**	**917.4**

Table 20 Numbers of live trees in Groups by species and height band (000s trees)

Species	Height band (m)				Total live trees
	2–5	5–15	15–20	>20	
Pine	0.0	25.5	14.8	21.1	61.4
Spruce	48.6	94.5	87.5	0.0	230.6
Larch	4.7	0.8	2.3	0.0	7.8
Cypress	42.6	17.0	0.0	0.0	59.7
Other conifers	14.8	1.6	3.1	0.0	19.5
Total conifers	**110.7**	**139.4**	**107.7**	**21.1**	**379.0**
Oak	46.8	429.2	146.2	2.4	624.6
Beech	24.6	58.1	33.7	9.4	125.8
Sycamore	50.7	190.8	58.0	10.2	309.6
Ash	93.0	427.6	98.5	1.6	620.6
Birch	95.3	282.2	11.5	0.0	389.1
Poplar	2.3	3.8	0.0	0.0	6.1
Sweet chestnut	0.0	2.4	0.0	0.0	2.4
Horse chestnut	0.0	3.8	0.0	0.0	3.8
Alder	28.1	289.0	19.8	0.0	336.9
Lime	0.0	0.8	0.0	0.0	0.8
Elm	15.7	0.8	0.0	0.0	16.5
Willow	473.9	161.2	22.6	1.6	659.2
Other broadleaves	2 175.7	195.8	2.4	0.0	2 374.0
Total broadleaves	**3 006.1**	**2 045.5**	**392.7**	**25.2**	**5 469.3**
Total – all species	**3 116.8**	**2 184.9**	**500.4**	**46.3**	**5 848.3**

Table 21 Numbers of live trees in Narrow Linear Features by species and height band (000s trees)

Species	Height band (m)				Total live trees
	2–5	5–15	15–20	>20	
Pine	0.0	32.2	45.7	0.0	77.9
Spruce	127.9	404.8	2.3	0.0	534.9
Larch	2.5	8.2	2.3	0.0	13.0
Cypress	1.9	0.0	0.0	0.0	1.9
Other conifers	3.6	0.0	0.0	0.0	3.6
Total conifers	**135.9**	**445.2**	**50.3**	**0.0**	**631.4**
Oak	55.0	540.2	121.6	0.0	716.9
Beech	49.6	81.6	18.0	0.0	149.2
Sycamore	109.0	413.3	33.5	4.3	560.2
Ash	112.9	584.2	127.0	0.6	824.7
Birch	69.6	202.6	3.7	0.0	276.0
Poplar	19.0	13.2	0.0	0.0	32.2
Sweet chestnut	0.0	0.0	0.0	0.0	0.0
Horse chestnut	0.0	2.5	0.0	0.0	2.5
Alder	31.8	176.5	11.1	3.2	222.6
Lime	4.4	0.0	0.0	0.0	4.4
Elm	51.1	6.0	0.0	0.0	57.1
Willow	477.6	233.7	4.2	0.0	715.5
Other broadleaves	3 767.3	588.8	19.7	0.0	4 375.8
Total broadleaves	**4 747.3**	**2 842.6**	**338.8**	**8.1**	**7 936.9**
Total – all species	**4 883.2**	**3 287.8**	**389.1**	**8.1**	**8 568.3**

Table 22 Number of Groups by group size

Number of trees per Group*	Number of Groups (000s)
2	103
3–5	251
6–10	156
11–20	151
21–50	87
51–100	22
>100	2
Total	**772**

*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 lead to changes in sampling methodology, scope and woodland definitions were required. For example, the Main Woodland Survey used the digital woodland map, created from aerial photographs 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 23:	Comparison of woodland area between 1980 Census and 1997 Inventory
Table 24:	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 25:	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 26:	Comparison of numbers of live trees outside woodland between 1980 Census and 1997 Inventory
Table 27:	Comparison of density of non-woodland features between 1980 Census and 1997 Inventory

Woodland Cover

Chart:	Change in woodland cover through time (1870–2000)
Map Series:	Woodland cover by county through time (1895–1997)

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

Table 23 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	226 669	94.1	270 035	94.3	19
0.25 – <2.0	14 115	5.9	16 236	5.7	15
Total	**240 784**		**286 271**		**19**
% Woodland land cover	**11.6**		**13.8**		

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 hectares, thereby matching the scope of the 1980 Census. The 1997 figures will therefore not match those in the previous sections of the report.

3. Land area used to calculate woodland cover percent (1997), 2 076 620 hectares was based on the 1991 Census of Population digital boundaries.

4. Land area used to calculate woodland cover percent (1980), 2 076 402 hectares, (Ordnance Survey data).

Table 24 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	5 380	4 654	-13
Corsican pine	3 553	3 350	-6
Lodgepole pine	7 595	6 131	-19
Sitka spruce	82 444	83 891	2
Norway spuce	17 933	11 281	-37
European larch	2 496	587	-76
Japanese/hybrid larch	22 569	21 824	-3
Douglas fir	10 301	10 816	5
Other conifers	7 610	5 887	-23
Mixed conifers	1 678	393	-77
Total conifers	**161 559**	**148 814**	**-8**
Oak	26 425	42 822	62
Beech	5 435	8 998	66
Sycamore	3 766	6 907	83
Ash	9 246	19 233	108
Birch	6 456	12 579	95
Poplar	485	568	17
Sweet chestnut	396	532	34
Elm	344	123	-64
Other broadleaves	8 736	17 892	105
Mixed broadleaves	3 705	7 499	102
Total broadleaves	**64 995**	**117 153**	**80**
Total – all species	**226 554**	**265 967**	**17**
Felled	**3 225**	**8 961**	**178**
Total High Forest	**229 779**	**274 928**	**20**

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 3.8% (Table 2). To obtain meaningful comparisons between the two datasets the 1980 Census data have therefore been reduced by 3.8%.

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

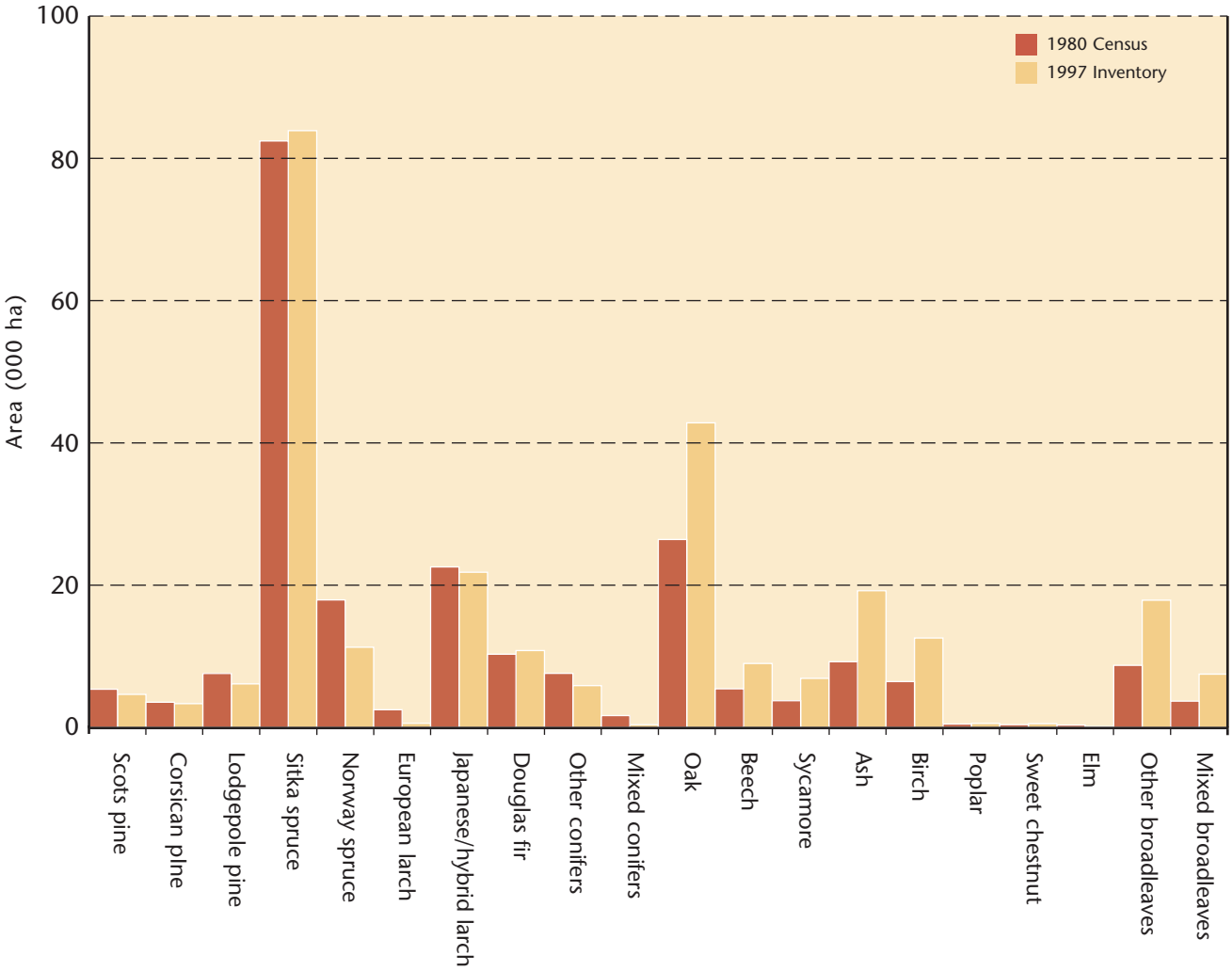


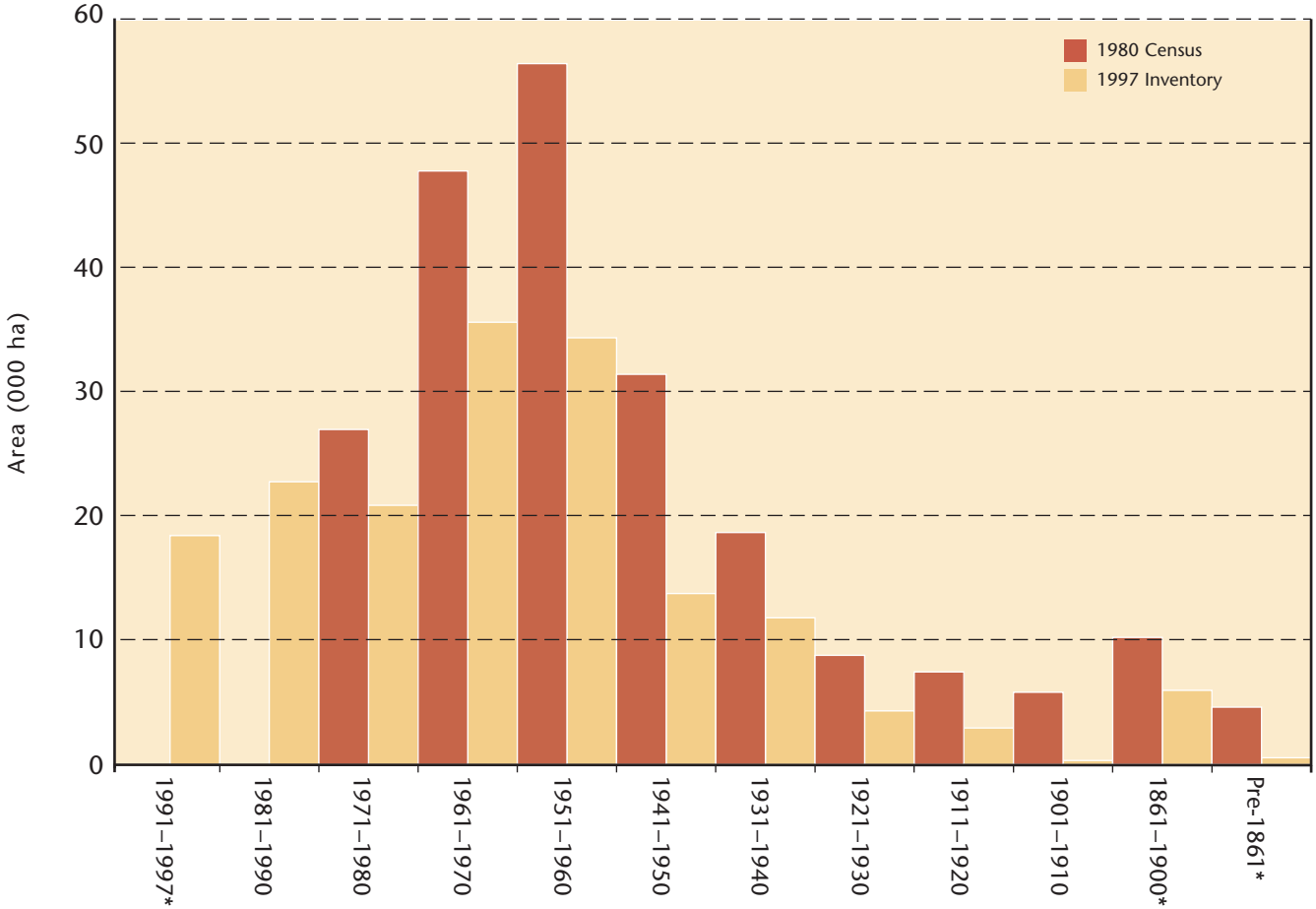
Table 25 Comparison of High Forest Category 1 area by planting year class between 1980 Census and 1997 Inventory

Planting year class	1980 Census woodland area (ha)	1997 Inventory woodland area (ha)	Change (%)
1991–1997	-	18 452	-*
1981–1990	-	22 785	-*
1971–1980	26 997	20 890	-23
1961–1970	47 828	35 640	-25
1951–1960	56 479	34 387	-39
1941–1950	31 444	13 784	-56
1931–1940	18 699	11 825	-37
1921–1930	8 803	4 326	-51
1911–1920	7 464	2 947	-61
1901–1910	5 827	329	-94
1861–1900	10 249	5 980	-42
Pre-1861	4 627	549	-88
Total: all years	**218 417**	**171 894**	**-21**

* These classes cover the period since the 1980 Census therefore no comparison can be made.

1. 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



*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 26 Comparison of numbers of live trees outside woodland between 1980 Census and 1997 Inventory (000s trees)

Feature type	1980 Census	1997 Inventory	Change (%)
Boundary	1 423	485	-66
Middle	657	202	-69
Total Individual Trees	**2 080**	**687**	**-67**
Groups	3 855	3 334	-14
Linear Features	6 647	4 596	-31
Total	**12 582**	**8 616**	**-32**

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 2 m height as minimum criteria for inclusion.
4. See Glossary for definitions of feature types.

Table 27 Comparison of density of non-woodland features between 1980 Census and 1997 Inventory

Feature type	1980 Census	1997 Inventory	Change (%)
Individual Trees (per km^2)	100.2	33.1	-67
Groups (per km^2)	32.1	26.5	-17
Linear Features (m per km^2)	819.2	689.4	-16

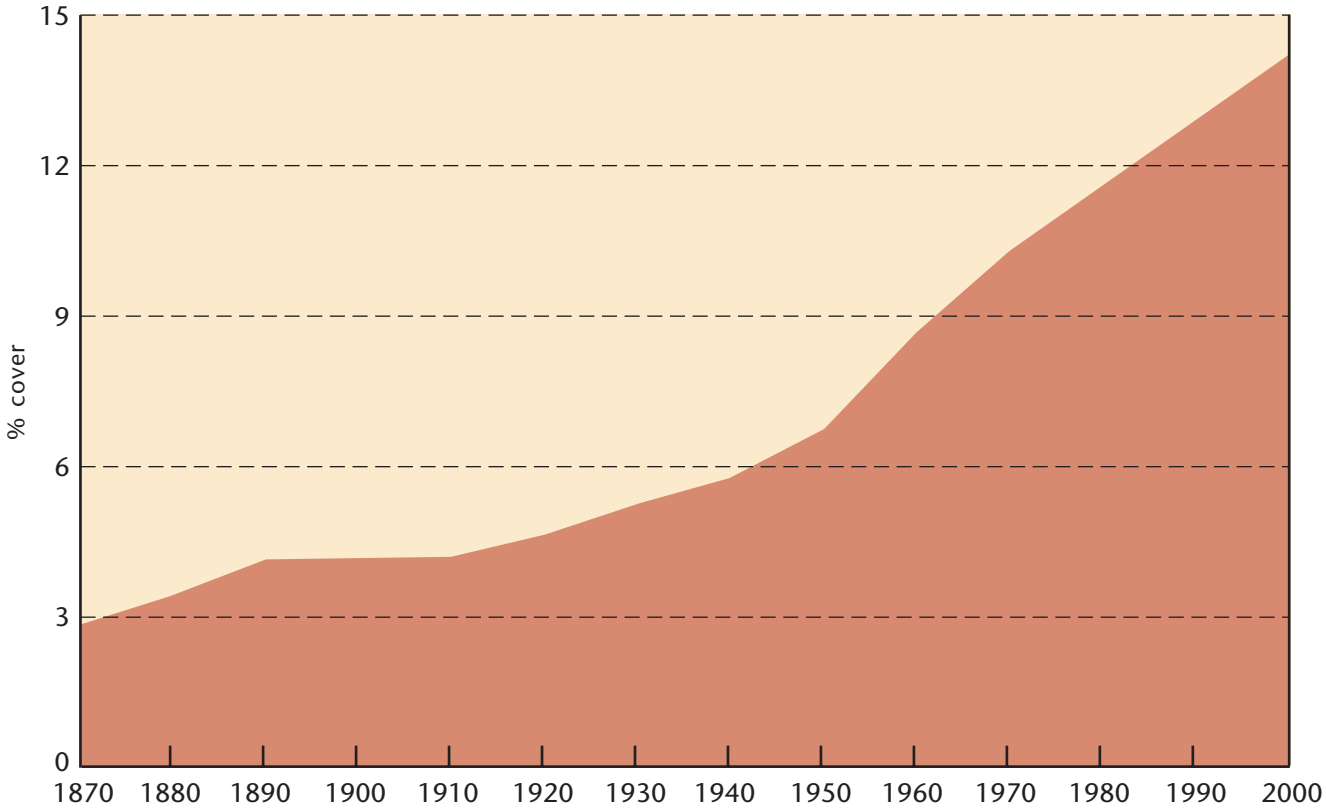
1. The Survey of Small Woodland and Trees did not record information referring to tree features (i.e. Individual trees, Groups and Narrow Linear features) within developed land.
2. In the 1980 Census hazel, hawthorn, blackthorn and goat willow were excluded; the 1997 Inventory figures have been adjusted 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 7 cm diameter at breast height and 1997 used 2 m height as minimum criteria for inclusion.
4. See Glossary for definitions of feature types.

WOODLAND COVER

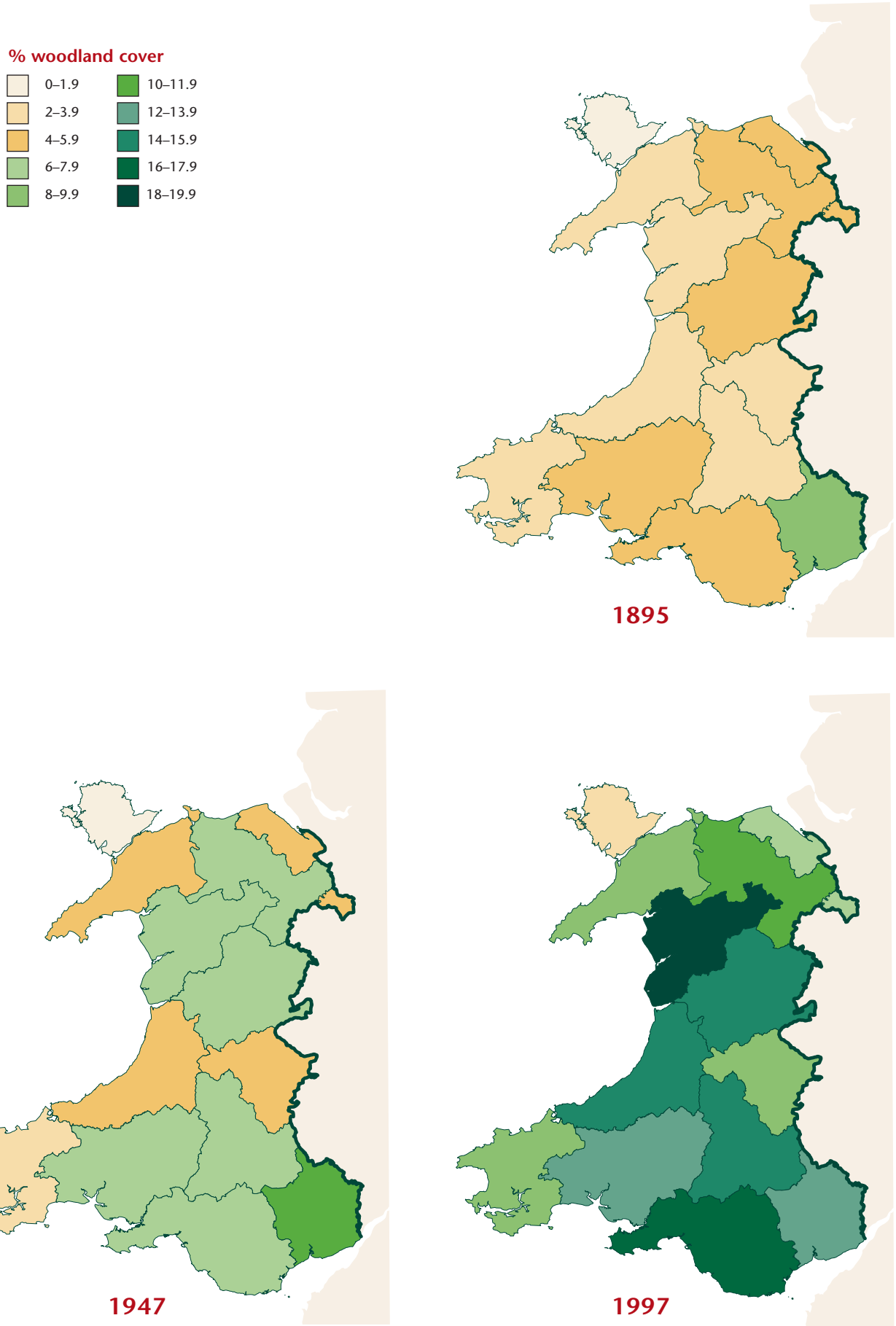
Woodland area data is available from Ministry of Agriculture surveys since 1871, and from Forestry Commission national woodland inventories since 1924. The following chart and maps show the changes in woodland area through time.

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

Change in woodland cover through time (1870–2000)



Map 5 Woodland cover by county through time (1895–1997)



APPENDICES

The following tables summarise the results of the Main Woodland Survey and the Survey of Small Woodland and Trees by county in Wales. Full reports of the results are available separately by county.

Appendix 1: Summary of woodland area by county and woodland size
Appendix 2: Summary of woodland area by county and forest type
Appendix 3: Summary of live trees outside woodland by county and feature type
Appendix 4: Summary of number and length of Linear Features by county

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

APPENDIX 1

Summary of woodland area by county and woodland size

County*	Woodland size (ha)**		Total area (ha)	Woodland cover (%)
	2.0 or more	0.1 – <2.0		
Gwynedd	46 840	1 775	48 615	12.6
Clwyd	23 845	425	24 270	10.0
Dyfed	73 487	4 329	77 816	13.5
Powys	68 194	6 888	75 082	14.8
Glamorgan	39 614	2 349	41 963	18.6
Gwent	18 054	968	19 022	13.8
Wales	**270 035**	**16 734**	**286 769**	**13.8**

*Areas of counties used to derive woodland cover % based on digital boundaries used in 1991 Census of Population.

**Area of woodland blocks of 2.0 ha and over derived from the Main Woodland Survey. Area of woodland blocks 0.1– < 2.0 ha derived from the Survey of Small Woodland and Trees.

APPENDIX 2

Summary of woodland area by county and forest type

County	Forest type								Total
	Conifer	Broad-leaved	Mixed	Coppice	Coppice -w-stds	Wind-blow	Felled	Open Space	
Gwynedd	25 314	15 632	3 338	0	0	0	1 716	2 615	48 615
Clwydd	12 551	8 543	2 102	0	0	0	401	673	24 270
Dyfed	32 170	35 172	5 221	0	0	48	2 192	3 014	77 815
Powys	42 947	22 299	5 063	6	0	0	2 735	2 032	75 082
Glamorgan	19 067	15 657	3 388	253	0	0	1 733	1 864	41 963
Gwent	5 425	9 552	2 928	229	0	0	184	704	19 022
Total	**137 474**	**106 855**	**22 040**	**488**	**0**	**48**	**8 961**	**10 902**	**286 767**

1. See Glossary for definitions of forest types.

APPENDIX 3

Summary of live trees outside woodland by county and feature type (000s trees and features)

County*	Total number	Feature type			Total live trees	Tree density (per km²)
		Groups	Narrow Linear Feature	Individual Trees		
Gwynedd	Features	9.3	4.3	136.6		
	Live Trees	69.4	142.8	136.6	348.8	90
Clwyd	Features	33.2	13.1	139.3		
	Live Trees	193.6	1 523.3	139.3	1 856.2	764
Dyfed	Features	242.6	86.5	279.4		
	Live Trees	1 526.9	3 581.0	279.4	5 387.3	934
Powys	Features	262.5	41.8	212.5		
	Live Trees	2 063.7	2 498.6	212.5	4 774.8	940
Glamorgan	Features	110.9	21.9	88.7		
	Live Trees	839.6	625.8	88.7	1 554.1	690
Gwent	Features	113.5	3.7	60.9		
	Live Trees	1 155.1	196.8	60.9	1 412.8	1026
Total	**Features**	**772.0**	**171.3**	**917.4**		
	Live Trees	**5 848.3**	**8 568.3**	**917.4**	**15 334.0**	**738**

*Areas of counties used to derive tree density per km² based on digital boundaries used in 1991 Census of Population.

1. See Glossary for definitions of feature types

APPENDIX 4

Summary of number and length of Linear Features by county

Region*	Total number of features (000s)	Total length of features (km)	Density (m per km²)
Gwynedd	4.3	449	116
Clwyd	13.1	2 319	954
Dyfed	87.3	6 912	1 199
Powys	41.8	3 259	642
Glamorgan	21.9	1 317	585
Gwent	3.7	312	226
Total	**172.1**	**14 568**	**702**

* Areas of counties used to derive length per km² based on digital boundaries used in 1991 Census of Population.

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 with 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 50 m 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 50 m, 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 1 m 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 leased to the Forestry Commission.

Feature types

- **Small Wood**

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

- **Group**

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

- **Individual Tree**

  A tree with a crown that 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 a 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 50 m wide or as narrow as a single line of trees. Two types of Linear Feature 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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