

FORESTRY COMMISSION

**Census of Woodlands
and
Trees
1979—1982**

PREFACE

This Census of Woodlands and Non-Woodland Trees was authorised by the Forestry Commissioners, as empowered by the Forestry Act, 1967. After preparatory work on the methods to be employed, field work for the Census started in September 1979. The reference date for the Census is 31 March 1980.

The survey work and the compiling of the Report was undertaken by the Field Surveys Branch, Forestry Commission Research and Development Division. The Branch is grateful for the assistance of owners and occupiers of the land selected for sampling and officers and staffs of the following organisations: the County and Regional Councils; the Ordnance Survey; the Soil Survey of England and Wales and the Macaulay Institute for Soil Research; the Ministry of Agriculture, Fisheries and Food, the Welsh Office Agriculture Department and the Department of Agriculture and Fisheries for Scotland; the Countryside Commission and the Countryside Commission for Scotland; and the Nature Conservancy Council.

In addition the Branch also wishes to thank the Forestry Commission Conservancy staff and staffs of the Statistics and Computing Branch and other Branches of the Research and Development Division.

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CONTENTS

	Page
LIST OF TABLES, DIAGRAMS AND APPENDICES	iv
CENSUS OBJECTIVES AND METHODS	1
Objectives	
Methods: The Woodland Survey	
The Non-Woodland Tree Survey	
Analysis of Results	
General Comments on Table Entries	
COMMENTARY ON THE RESULTS FOR WOODLANDS	4
General	
Previous Surveys	
Woodland Area	
Woodland Ownership	
Distribution of Forest Types	
Mainly Coniferous High Forest	
Mainly Broadleaved High Forest	
Coppice and Coppice with Standards	
Scrub	
Overall Broadleaved Position	
Standing Volume	
WOODLAND DIAGRAMS AND TABLES	12
COMMENTARY ON THE RESULTS FOR NON-WOODLAND TREES	34
Previous Forestry Commission Surveys	
Sample Strata used in the 1980 Census	
Results: General	
Isolated Trees	
Clumps	
Linear Features	
Size Class Distribution	
Health	
Standing Volume	
Comparison with Previous Surveys	
Comparison of Tree Numbers	
Volume Comparison	
NON-WOODLAND TREE DIAGRAMS AND TABLES	41
APPENDICES	52

LIST OF TABLES, DIAGRAMS AND APPENDICES

Woodland Tables	Page
1. Summary of Areas by Ownership	13
2. Area of Woodland by Forest Type and Ownership	15
3. Area of High Forest Types by Planting Year Classes - All Woodland Ownerships	17
3 a. Area of High Forest Types by Planting Year Classes - Forestry Commission	19
3 b. Area of High Forest Types by Planting Year Classes - Dedicated and Approved	19
3 c. Area of High Forest Types by Planting Year Classes - "Other"	19
4. Area of High Forest by Principal Species and Ownership	21
5. Area of High Forest by Principal Species and Planting Year Classes - All Woodland Ownerships	22
6. Principal Species in High Forest by Planting Year Classes - All Woodland Ownerships	23
7. Area of Coppice by Principal Species - All Woodland Ownerships	24
8. Area of Coppice with Standards by Principal Species of both Coppice and Standards - All Woodland Ownerships	24
9. Area of Scrub by Principal Species - All Woodland Ownerships	25
10. Principal Species of the Shrub Layer by Forest Types - "Other" Woodlands Only	25
11. Standing Volume of Timber by Category and Ownership	27
12. Standing Volume of Timber in High Forest and Standards over Coppice by Principal Species and Planting Year Classes - All Woodland Ownerships	29
13. Standing Volume of Timber in High Forest and Standards over Coppice by Principal Species and Size Classes - All Woodland Ownerships	31

Non-Woodland Tree Tables

14. Summary of Numbers of Live Isolated Trees and Clumps and Length of Linear Features	41
15. Area of Clumps by Species Groups	41
16. Number of Live Trees of 7 cm dbh or greater by Category and Principal Species	43
17. Number of All Live Trees by Principal Species and Size Classes	45
18 a. Health of All Trees of 7 cm dbh or greater by Principal Species and Size Classes - All Species	47
18 b. Health of All Trees of 7 cm dbh or greater by Principal Species and Size Classes - Conifers	47
18 c. Health of All Trees of 7 cm dbh or greater by Principal Species and Size Classes - Broadleaves	49
19. Standing Volume of Timber for Live Trees of 7 cm dbh or greater by Principal Species and Size Classes	51

Woodland Diagrams	Relating to table No	
1. Woodland Area by Ownership	1	12
2. Area of Woodland by Forest Type and Ownership	2	14
3. Area of High Forest Types by Planting Year Classes - All Woodland Ownerships	3	16
3 a. Area of High Forest by Planting Year Classes - Forestry Commission	3a	18
3 b. Area of High Forest by Planting Year Classes - Dedicated and Approved	3b	18
3 c. Area of High Forest by Planting Year Classes - "Other"	3c	18
4. Area of High Forest by Principal Species and Ownership	4	20
5. Standing Volume of Timber by Category and Ownership	11	26
6. Standing Volume of Timber in High Forest and Standards over Coppice by Principal Species and Planting Year Classes - All Woodland Ownerships	12	28
7. Standing Volume of Timber in High Forest and Standards over Coppice by Species Groups and Size Classes - All Woodland Ownerships	13	30

Non-Woodland Tree Diagrams		Relating to table No	Page
8.	Number of Live Trees of 7 cm dbh or greater by Category and Species Groups	16	42
9.	Number of All Live Trees by Species Groups and Size Classes	17	44
10.	Health of All Coniferous Trees of 7 cm dbh or greater by Size Classes	18b	46
11.	Health of All Broadleaved Trees of 7 cm dbh or greater by Size Classes	18c	48
12.	Standing Volume of Timber for Live Trees of 7 cm dbh or greater by Species Groups and Size Classes	19	50

Appendices

1.	Glossary of Terms and Abbreviations	52
2.	List of Species Recorded and Reported Upon - Woodlands	54
	List of Species Recorded but not Reported Upon Individually - Woodlands	55
	List of Species Recorded and Reported Upon - Non-Woodland Trees	56
	List of Shrub Layer Species Recorded	57
3.	Description of Soil Strata	58
4.	Criteria for the Assessment of the Health of Non-Woodland Trees	59
5a.	Life Expectancy by Species Groups, Size and Health of Coniferous species Reported Upon in the Non-Woodland Tree Tables	60
5b.	Life Expectancy by Species Groups, Size and Health of Broadleaved species Reported Upon in the Non-Woodland Tree Tables	61

CENSUS OBJECTIVES AND METHODS

OBJECTIVES

The general objectives of the Census were to take stock of the timber resources of Great Britain and to assess the environmental status of trees in the rural and urban landscape by counties or other administrative areas in England and Wales. Scotland was assessed by Forestry Commission Conservancies, using methods that varied slightly from those used in England and Wales.

The Census was divided into two main sections, the Woodland Survey and the Non-Woodland Tree Survey.

The first objective for the Woodland Survey was to provide an estimate of the total woodland area within the sampling frame of a county in England and Wales or a conservancy in Scotland. The data for Forestry Commission woodlands and for those in Dedication and Approved Woodland Schemes are on record so the survey was concerned only with "Other" woodland, but all three categories of ownership are included in this Report. The second objective was to provide estimates of woodland types, species, age classes and timber volumes.

The first objective for the Non-Woodland Tree Survey was to estimate the number of trees by their occurrence. For purposes of assessing their place in the landscape, trees were considered in terms of three categories; Isolated, Clumps and Linear Features. The last two terms are new to Census terminology so some words of explanation are required. A Clump is a small wood or group of trees in close canopy less than 0.25 hectare (ha) in extent. A Linear Feature is a line or strip of woody growth in close canopy, 20 metres (m) or less in overall width and more than 25 m long. The second objective for the Survey was to provide information on species, size classes, standing timber volumes and health of non-woodland trees.

METHODS

The Woodland Survey, which covered woodlands of 0.25 ha and over, was based on a three stage sampling system using the Ordnance Survey (O.S.) 1:50 000 maps, aerial photographs and ground surveys. The Non-Woodland Tree Survey was based on a two stage sampling system using aerial photographs and ground surveys.

Ground survey was used to collect data that could not be obtained from aerial photographs, and also to allow for changes that had occurred since the photographs were taken.

The Woodland Survey

For woodlands, the "woodland plates" (copies of the plates which print the solid green areas on O.S. 1:50 000 maps) prepared by the Ordnance Survey were marked to show Forestry Commission and Dedicated and Approved Woodlands. The boundaries of the remaining areas, "Other" woodland, were digitised to give a serial number, National Grid Reference and the area of each block. These blocks were stratified into six size classes; 0.25-1.99, 2.0-9.99, 10.0-19.99, 20.0-49.99, 50.0-99.99 and > 99.99 ha. As changes were likely to have occurred since the date of the O.S. survey, a random sample within each size class was selected from the list of digitised woods for aerial survey. The true boundaries were established for these and the areas re-calculated. The relationship between the areas so found and the digitised areas was used to establish a revised woodland area estimate for each county or conservancy as appropriate with a standard error no greater than ± 5 per cent. The area of extra woodland not recorded on the O.S. 1:50 000 maps was estimated in the course of the Non-Woodland Tree Survey as described below.

A sub-sample of woods was selected for ground survey. The size of this sub-sample was chosen to give an area estimate with a standard error of not more than ± 15 per cent on the most widely represented forest type. Stands were identified within this sub-sample of woods. Each of these stands was assessed for crop type, species, age, stocking, composition of the shrub layer (where present), top height and basal area (from which volumes were derived).

The Non-Woodland Tree Survey

Preparatory work indicated that stratification could make the sampling of Non-Woodland Trees more efficient. Accordingly the land area of Great Britain was classified into 24 soil groups. A pilot survey was carried out to assess the variability of the tree population using the soil groups as a basis for selection. Three samples in each group were selected at random. The size of each sample unit in England and

Wales was a National Grid 500 m square (0.25 square kilometres) and in Scotland was 250 m square (0.0625 square kilometres). From the pilot data, sampling strata for the main survey were derived by combining those soil groups that produced a similar mean number of trees and a similar variance. The sample size in each stratum was determined to obtain, at minimum cost, an estimate of the number of measurable isolated trees for a county in England and Wales or a Conservancy in Scotland, with a standard error not exceeding ± 25 per cent. A standard error limit of ± 30 per cent was also set for the number of trees of the most widely represented species of isolated tree in the county or Conservancy.

In the light of experience and also because of the need to contain costs, the size and groupings of samples for the main survey of England and Wales were changed after the survey of the first six counties (Berkshire, Devon, Humberside, Kent, Merseyside and Norfolk). Initially six sample 500 m National Grid squares were clustered together to form a strip 0.5 kilometre (km) wide by 3.0 km long (1.5 square kilometres). Subsequently the width of the strip was reduced to 0.25 km; this was done by reducing the dimensions of each sampling unit to measure 250 m by 250 m. These smaller units of 6.25 ha each were amalgamated into strips or clusters of 12 to give a total length of 3 km. This method of clustering samples was adopted in order to make it easier to obtain the required aerial photographic cover. To aid the final estimation and provide sufficient coverage, it was found necessary to have at least four sample clusters per stratum and 20 per county. The sample clusters were selected at random.

The use of 3 km long clusters was found to be impractical in Scotland where the physical geography and geology resulted in many of them crossing sample strata boundaries. It was therefore decided to make the clusters more compact and although the individual sample units remained unchanged at 250 m x 250 m they were arranged in two rows of four samples ie a block 1 km long and 500 m wide. Because the sampling frame in Scotland was the Conservancy, a very much larger area than the county which was adopted in England and Wales, the minimum number of clusters to be measured on the ground was raised from 20 to 60 and the number of clusters examined from photographs raised to 90.

All isolated trees, clumps and linear features were marked on stereo pairs of aerial photographs of each sample unit. Numbers of isolated trees were recorded and their crown diameters measured. The areas of clumps and the widths and lengths of linear features were also measured.

For the ground survey, a random sub-sample of two squares was chosen from each cluster of twelve in England and Wales or two squares from eight in Scotland. Each tree within these squares was assessed for species, health, location (roadside, waterside etc.) and also measured for diameter, total height and, for broadleaves only, timber height. Measurements of the widths and lengths of linear features and the areas of clumps were taken and each was assigned to a forest type. In addition any isolated extra woodland (not coloured green on the O.S. 1:50 000 map) was assessed for area and forest type.

A measurable tree was defined as having a diameter at breast height (dbh) of not less than 7 centimetres (cm), a persistent axis, and not pruned in such a way as to restrict its growth (an exception was made for pollarded trees). Trees less than 7 cm dbh were recorded if they were at least 1.5 m tall, had a persistent axis and were individuals rather than coppice shoots. In the case of highway and windbreak planting, any tree species, as opposed to shrub species, in clumps and linear features were included regardless of height.

An assessment of timber length was made for all measurable broadleaved trees in the ground survey. Timber length was defined as the height above the ground to 7 cm top diameter in young trees and from ground level to 15 cm top diameter in mature trees, or to the spring of the crown, whichever occurred first. To be assessed for volume, broadleaved trees were required to have a minimum of 2 m of straight timber. Trees with obvious stem rot, stem damage and twisted or deformed butts were given a timber length of zero. Forked trees with good growth in the upper stem were assigned a timber length derived from the length of the strongest fork. For conifer species, the volume was derived from the total height and the breast height diameter of the individuals.

Analysis of Results

The data collected in the Woodland Survey were used to provide population estimates for "Other" woodland. These were added to the Forestry Commission and Dedicated and Approved Woodland data. For Non-Woodland Trees the survey data were used to provide an estimate of the total population. The results are presented in the following tables and diagrams, together with explanatory notes and comments.

Data relating to trees and woodlands in National Parks (N.P.) and Areas of Outstanding Natural Beauty (A.O.N.B.) in England and Wales, although not given separately in this report, are stored in computer files. In Scotland data relating to local authority Regions are published in summarised form in the Reports for the Forestry Commission Conservancy in which they wholly or substantially fall. The results for Highland Region are contained in the North Scotland Report; Grampian, Tayside and Fife in that for East Scotland; Lothian, Borders, Dumfries and Galloway and Strathclyde in that for South Scotland and Central and Strathclyde in that for West Scotland.

GENERAL COMMENTS ON TABLE ENTRIES

In the 1947 Census, High Forest types were distinguished using a threefold classification into Coniferous, Mixed and Broadleaved. "Mixed" covered High Forest stands in which one group of species (coniferous or broadleaved) occupied 20 per cent or more of the stock. Since the 1960's, the convention adopted in describing High Forest types has been to distinguish only two: Mainly (that is more than 50 per cent) Coniferous and Mainly Broadleaved. This classification is now well established both at home and internationally.

When reading the numerical values within the Tables, it should be noted that the variances for the figures quoted can be large. For example, the aim of the Non-Woodland Tree Survey was to obtain a standard error not exceeding ± 25 per cent of the total number of isolated trees. The variance for any one species, however, may be bigger than this, and when a species is poorly represented the variance can be very large indeed. Equally, the fact that nil (—) entries appear against a particular species, size class, health class or volume does not necessarily mean that there are no trees of that species or category on the ground, but rather that these species or categories were so sparse that they were not picked up at the sampling intensity used.

Part One

Woodlands

**COMMENTARY ON THE RESULTS FOR WOODLANDS
IN GREAT BRITAIN**

General

The tables and report for Great Britain contain summaries and comments on the 1980 Survey, and comparisons with the 1947 and 1965 Census Surveys. The 1980 Survey set out to provide estimates of the area and composition of the woodlands on the mainland of Britain together with the following Islands: the Isle of Wight in England, Anglesey in Wales, and the islands of Arran, Bute, Islay, Jura, Mull, Skye and associated inner islands such as Raasay and Scalpay in Scotland.

Forestry Commission woodlands on the Outer Hebrides were included in the statistics as they represent a part of Skye forest, but the area of any other woodland on the Western Isles, Orkney and Shetland was excluded from the Survey, and also from the main tables of the Report.

Previous Surveys

The 1947 Census involved a complete assessment of all woods more than 2 ha in extent, and gave a detailed analysis by county and country of the position following the extensive war-time fellings. It was followed in 1951 by a sample survey of woods between 0.4 and 2.0 ha (1.5 acres). In 1965 Census results were required by marketing regions, based on groups of counties, and samples of woodland of 0.4 ha (1 acre) and greater were visited and assessed for crop and volume estimates. Owing to both the method and intensity of sampling adopted in 1965 the estimate of total woodland at that time is less precise than that for 1980.

Woodland Area

The reported woodland area at each of the three Surveys is shown below and adjustments have been made to bring the results to a common base by adding an allowance for woods between 0.25 and 2.0 ha in the case of the 1947 estimate, and 0.25 and 0.4 ha for the 1965 results.

Year	Area of land and inland water ha	Area of woodland ha	Minimum area of woodland ha	Estimated area of woodland 0.25 ha and over	Per cent of land area
1947	22 431 273	1 395 729	2.0	1 476 000	6.7
1965	22 431 449	1 742 245	0.4	1 751 000	7.8
1980	22 441 592	2 108 397	0.25	2 108 000	9.4

The total areas of land and inland water were obtained from the Ordnance Survey at the time of each Census and the changes in land area are the result of continuous resurvey and remeasurement.

Although the Western Isles, Orkneys and Shetlands were excluded from the Survey, some account should be taken of their land area and any woodland that they may contain. In addition to that part of Skye forest which has already been discussed, it is estimated that there are 160 ha of woods in "Other" ownership depicted on the O.S. 1:50 000 maps. Therefore it would appear that the total area of woodland in Great Britain is 2 108 560 ha within a land and inland water area of 22 997 785 ha, equivalent to a density of 9.2 per cent.

The estimated area of small woods in 1947 has been derived from a combination of results of the 1951 estimates of woods in the 0.4-2.0 ha class with 1980 estimates of the distribution of small woods. The survey report of the 1951 Census of Hedgerow and Park Timber and Woods under Five Acres estimated the total area of woods between 0.4 and 2.0 ha (1.5 acres) to be 72 155 ha (178.3 thousand acres), while in 1980 the area of woods less than 2 ha is estimated to be 109 755 ha. However, the 1951 area of small woods did not include those blocks between 0.25 and 0.4 ha in extent, which were sampled for the first time in 1980. It is possible to estimate from the 1980 distribution that there are approximately 9 400 ha in this size class. Consequently there is a difference of some 28 thousand hectares between the two estimates, for which the main reasons are:

1. The estimate of the area of small woods in 1951 was based on two independent one per cent samples of 6 inch to 1 mile O.S. maps. These were the latest versions available but in most cases were editions that dated from the nineteentwenties and thirties, and in some cases were pre 1914.
2. Some fragmentation of larger blocks will have occurred as a consequence of house building and road widening since 1947.

3. Woodland arising as a result of colonisation usually occurs initially as scattered small blocks and much of it would post-date the map editions used in the earlier Survey.

Nevertheless it would appear from the previous table that the total woodland area increased by some 275.0 thousand hectares between 1947 and 1965, and by 357 thousand hectares from 1965 to 1980.

The details of Forestry Commission and Dedicated and Approved Woodlands were obtained from records, while the remaining area in private ownership, termed "Other", was based upon the representation of woods on the Ordnance Survey 1:50 000 maps. Any changes to the boundaries of existing woodlands were accounted for during the course of survey. In addition, the sample units of the Non-Woodland Tree Survey were used to locate and estimate the area of any isolated blocks that were not depicted on the maps (extra woodland).

It is estimated that 61 thousand hectares of woodland shown on the maps no longer existed at the time of survey, whereas there were approximately 87 880 ha of "extra" woodland. Therefore it is probable that, allowing for both gains and losses, the maps underestimated the area of woodland by 26 880 ha. However, because the estimate of "extra" woodland is of low precision, it has not been combined with the results of the main Woodland Survey.

The 1980 distribution of woodland by country is shown in the table below, with the area in thousands of hectares.

Country	Woodland area (thousands of hectares)	Per cent of total	Woodland density per cent of land area
England	947	45	7.3
Wales	241	11	11.6
Scotland	920	44	12.6
Total	2 108	100	9.4

Woodland Ownership

Of the total of 2 108 thousand hectares in 1980, 892 thousand hectares were in Forestry Commission ownership and 1 216 thousand hectares in the hands of private owners. An analysis of woodland ownership over the years is given in percentage terms below.

Year	Forestry Commission per cent	Private per cent
1947	18	82
1965	38	62
1980	42	58

The table shows the substantial increase in the percentage of woodland owned by the Forestry Commission between the years 1947 and 1965. Since that time the total woodland area has expanded more rapidly, thanks to the efforts of both private owners and the state, so that the Forestry Commission's share of the woodland stock has increased slowly in percentage terms but rapidly in area terms. Most of the increase since 1947 has been the result of afforestation, although there has been restocking of felled or derelict land, especially in Scotland. There was a decrease in the area of private woodlands between 1947 and 1965 because either old woodland sites were converted to some other form of land use, or felled and devastated woodlands, along with some productive areas, were acquired by the Forestry Commission for clearance and restocking. Since 1965, despite the reduction in the private owners' share of the woodland, their actual area has increased by some 130 thousand hectares, resulting in more woodland in private ownership than in 1965.

The distribution and development of woodland is uneven and can be seen in the following table which shows the proportion of the total woodland area by country and by ownership during the last thirty years.

Per cent of Great Britain's Woodland Area at each Survey date

Country	Forestry Commission per cent			Private per cent			Total per cent		
	1947	1965	1980	1947	1965	1980	1947	1965	1980
England	8	13	12	46	37	33	54	50	45
Wales	3	7	6	6	5	5	9	12	11
Scotland	7	18	24	30	20	20	37	38	44
Total	18	38	42	82	62	58	100	100	100

As the values in the tables are proportions and not areas, actual increases in area may be masked. However, it can be observed that England's share of the woodland area has decreased from 54 per cent in 1947 to 45 per cent in 1980, whilst Wales' share has risen from nine per cent to 11 per cent, and that of Scotland from 37 per cent to 44 per cent. The Forestry Commission substantially increased its portion of the woodland between 1947 and 1965 but then, with the involvement of private owners in afforestation and some colonisation, the proportion of state woodland remained virtually unchanged in England and Wales, and increased only in Scotland. Private woodlands declined in area and proportion in the years after the war, and have lost a further four per cent since 1965. This, however, is against a background of afforestation by all ownerships so that private owners have managed to maintain their position in Wales and Scotland between 1965 and 1980, but English private owners now have a smaller proportion, as their rate of afforestation is less.

Distribution of Forest Types

Forest Type by Area and Ownership

Forest Type	Area in thousands of hectares						
	Forestry Commission		Private Woodland		Total		Per cent of total woodland area
	Area	Per cent of total	Area	Per cent of total	Area	Per cent of total	
Mainly Coniferous High Forest	819.3	62	497.5	38	1 316.8	100	62
Mainly Broadleaved High Forest	54.1	10	510.3	90	564.4	100	27
Total High Forest	873.4	46	1 007.8	54	1 881.2	100	89
Coppice with Standards	<1	<1	11.6	100	11.6	100	1
Coppice	1.0	4	26.6	96	27.6	100	1
Scrub	5.8	4	142.4	96	148.2	100	7
Cleared	11.5	29	28.3	71	39.8	100	2
Total	891.7	42	1 216.7	58	2 108.4	100	100

The table shows that there is more than twice as much Mainly Coniferous High Forest as there is Broadleaved High Forest, as might be expected with the expansion of afforestation. The remaining forest types, although they may be important locally, form a minor part of the total area. In addition, Table 2 of the main tables shows that 72 per cent of Mainly Broadleaved High Forest is in "Other" private ownership. This does not imply lack of management, but rather that some owners have either never joined, or have withdrawn from the formal Dedication or Approved Woodland schemes, although they continue to manage their woodlands on sound principles.

The classification of crops has varied from survey to survey depending upon the aims and objectives of the assessment. In 1947 the objective was to ascertain the position after wartime fellings and the classification included such forest types as Devastated (crops from which most merchantable trees had been removed), and areas felled before or after September 1939. In 1965 the need to recognise these special categories had disappeared but, as the effects of exploitation were still evident in many of the

stands it was necessary to introduce new categories such as Utilisable Scrub and Worked and Unworked Coppice to accommodate woods in a transition stage. A further period of fifteen years has resulted in many crops developing either naturally, or as a result of man's intervention, from a less productive to a more productive category. However it can be difficult, particularly in the case of some broadleaved crops, to place them neatly and permanently within any consistent system of classification. For example, standards can be allowed to grow on and close canopy to the exclusion of coppice, so leading to a reclassification from Coppice with Standards to High Forest. Heavy selective felling in High Forest may lead to a classification as Scrub and also, over time, Scrub stands may improve enough in quality to be considered as High Forest. Therefore comparison of results for the distribution of forest types, particularly of broadleaved crops, is seldom straightforward and it is sometimes necessary to combine categories in order to show trends.

Distribution of Forest Types by Percentage of Woodland Area

Forest Type	Percentage of Woodland Area		
	1947	1965	1980
Coniferous High Forest	27	53	62
Broadleaved High Forest	25	20	27
Total High Forest	52	73	89
Coppice with Standards	7	<1	1
Coppice	3	1	1
Scrub	19	21	7
Cleared	19	5	2
Total	100	100	100

Note:

Scrub includes Devastated in 1947, and both Utilisable and Unutilisable Scrub in 1965. The table above illustrates the proportions of forest types found at each assessment but does not take into account the various minimum areas.

The geographical location of the two High Forest types is indicated in the following table, which analyses the proportion of the Great Britain totals of High Forest types and land area in each country.

Country	Percentage of Great Britain total			
	Coniferous High Forest	Broadleaved High Forest	Total High Forest	Total Land Area
England	29	76	43	58
Wales	13	11	12	9
Scotland	58	13	45	33
Total	100	100	100	100

The distribution of forest types is affected not only by the activities of the various woodland owners, but also by the sites available. Consequently England, with a high proportion of both urban and agricultural areas has a relatively low proportion of High Forest compared to its land area, whereas the converse applies to Scotland and Wales. Further, the availability of prime broadleaved woodland sites is less in these two countries than in England, so that not only do they have more land suitable for forestry, it is also more suitable for conifers. As a result England has most of the Broadleaved High Forest and also a higher density of this forest type, while Scotland dominates the conifer position and, along with Wales, has a relatively high density of conifers.

Mainly Coniferous High Forest

The Forestry Commission accounts for 62 per cent of the 1 321 thousand hectares of Mainly Coniferous High Forest shown in Table 4 of the main tables. Dedicated and Approved estates account for a further 29 per cent, while nine per cent is in "Other" private ownership. As a result of the type of sites available

for planting and the changes in choice of species over the years, the major coniferous species is Sitka spruce, with 526 thousand hectares, followed by the more traditional Scots pine with 241 thousand hectares and then by the relatively new species of Lodgepole pine, with 127 thousand hectares.

There are differences in choice of species among owners. Both the Forestry Commission and the Dedicated and Approved estates have adopted Sitka spruce and Scots pine as their major species, followed by Lodgepole pine for the Forestry Commission and by almost equal areas of Japanese/Hybrid larch and Norway spruce for the Dedicated and Approved woodlands. Among "Other" private owners the preference has been for Scots pine, Japanese/Hybrid larch, Norway spruce and Sitka spruce.

The planting year distribution of the current stock of woodland is shown by species in Table 5. Eighty five per cent of the conifer area is less than forty years of age. The P71-80 group accounts for 25 per cent of the coniferous area, the P61-70 group for 28 per cent, and the P51-60 group for 23 per cent. Although the bulk of the planting has taken place since 1941, there remain from plantings prior to that date 82 thousand hectares of Scots pine, 30 thousand hectares of Sitka spruce, 25 thousand hectares of Norway spruce and slightly less than 20 thousand hectares of European larch.

The area of woodland under conifers has risen from some 382 thousand hectares in 1947 to 917 thousand hectares in 1965 and to 1 321 thousand hectares in 1980, while the proportion of woodland area has risen from 27 per cent to 62 per cent. Obviously the rate of increase has not been consistent, as it was higher between 1947 and 1965 than it has been since that date. An examination of the various sections of Table 3 reveals that during the period 1941-50 the Forestry Commission accounted for 72 per cent of the planting, but in 1971-80 their share had fallen to 61 per cent, indicating the increased activity of private owners.

The relative importance of the major coniferous species at the time of the three Surveys is shown below.

Year	1st	2nd	3rd	4th
1947	Scots pine	Sitka spruce	Norway spruce	European larch
1965	Scots pine	Sitka spruce	Norway spruce	Jap./Hybrid larch
1980	Sitka spruce	Scots pine	Lodgepole pine	Norway spruce

Mainly Broadleaved High Forest

The area of Mainly Broadleaved High Forest, as shown in Table 4 of the main tables, is estimated to be 560 250 ha. As stated previously, England accounts for 76 per cent of this forest type, and 72 per cent is in "Other" private ownership. Oak is the dominant species, with 172 thousand hectares, more than twice the area of the next species, beech, which occupies 74 thousand hectares. Among the remainder ash has more than 69 thousand hectares, birch has 68 thousand hectares, and there are 65 thousand hectares of Mixed broadleaves. This last category represents a mix of major broadleaved species and also, along with the Other broadleaves group, includes elements of the minor species such as rowan, hornbeam and Field maple.

Within the planting year distribution, P71-80 accounts for three per cent of broadleaved area, the lowest of the groups, while the twenty years P41-60 see the origin of 25 per cent of broadleaved woodland, including extensive areas of birch, ash, oak and beech. Twenty two per cent occurs in the 1861-1900 group and other age groups each account for only six to eleven per cent of the area.

Both the area of Mainly Broadleaved High Forest and its proportion were reduced between 1947 and 1965, but since that time both factors have increased to such an extent that there is now substantially more Mainly Broadleaved High Forest than there was in 1947. The initial reduction came about as woodlands were acquired, cleared and replanted, usually with conifers, as part of the post war policy of returning the woodlands of Great Britain to full production. The increase since 1965 is a combination of several factors; land has been planted with broadleaves; the standards in Coppice with Standards have been allowed to close canopy and now form Broadleaved High Forest; there has been colonisation by birch, sycamore and ash, leading to High Forest through an intermediate stage of Scrub and finally, and most noticeable, the development of Scrub either naturally, or through deliberate management into a form or species capable of being reclassified as High Forest. For this reason birch and ash show strongly in the P41-60 age groups as they have colonised some of the Devastated sites of the period; likewise oak has been transferred from Coppice to Broadleaved High Forest, notably in South Wales.

There were 9 514 ha of elm present at the time of assessment; however, a reduction in the overall total must be expected as stands continue to succumb to Dutch elm disease.

The relative importance of the major broadleaved species in High Forest at the time of each Survey is shown below.

Year	1st	2nd	3rd	4th
1947	Oak	Beech	Ash	Birch
1965	Oak	Beech	Ash	Sycamore
1980	Oak	Beech	Ash	Birch

Coppice and Coppice with Standards

There are estimated to be 11 568 ha of Coppice with Standards and 27 564 ha of Coppice, representing a considerable reduction in area since 1947, although most of the change had taken place by 1965. South East England Conservancy accounts for 76 per cent of the area of coppice system crops, although there is evidence elsewhere of a renewed interest in this form of management. However, except for such isolated examples, there is very little fresh involvement in working either Coppice or Coppice with Standards. Stands previously classified as Coppice or Coppice with Standards have been cleared and restocked or have been allowed to develop naturally, some into Scrub, others into Broadleaved High Forest.

The principal species of Coppice are Sweet chestnut, followed by hornbeam and hazel. The dominant species of standard is oak.

Scrub

The area of Scrub has fallen over the years from 19 per cent of the woodland area in 1947 to seven per cent in 1980. There was a rise in 1965 largely because of the classification adopted. As might be expected, Scrub plays a minor part in Forestry Commission and Dedicated and Approved woodlands, and in fact 87 per cent lies in "Other" private ownership.

Not only has the area of Scrub changed since 1947, but also its location tends to be different. In the past Scrub has been found both on sites which would only yield poor crops and also on large areas of old woodland that had been felled or partly felled, but had timber producing potential. During the 1980 Survey, Scrub was found on the poor sites as before, and also as colonisation on old industrial sites, quarries, railways and some areas of old peat workings, as well as on agricultural areas where grazing had been discontinued, or where rabbit control had been effective.

Overall Broadleaved Position

As noted previously it is difficult to make direct comparisons with past results, especially where broadleaved species are concerned, but it is possible to draw some conclusions at a national level. As broadleaves still form a substantial proportion of the total area it is worth considering their overall position, thus overcoming some of the problems that arise through changes in classification. If the broadleaved areas of High Forest, Coppice with Standards, Coppice and Scrub are combined and allowance made for the effects of small woodland blocks, it would appear that the total area in England and Wales is probably slightly more than it was 30 years ago, whereas in Scotland it is less. On balance the total area of broadleaved woodland is much the same as it was in 1947. However, the composition of woodland has certainly changed and there are now about 70 thousand hectares less of oak, but more sycamore, ash and birch.

Standing Volume

It is estimated that there are 197 million cubic metres overbark of timber (\pm 1 per cent) in the woodlands of Great Britain, comprising 106 million cubic metres of coniferous timber and 91 million cubic metres of broadleaved timber. The Forestry Commission accounts for 33 per cent of the timber stocks, private owners for 67 per cent.

Analyses by forest type, ownership, planting year and size class are shown in Tables 11, 12 and 13. As might be expected, not only total area but also age structure determines which species carry the most volume, and also which ownership. It is for this reason that the Forestry Commission, with large areas of young conifer crops, accounts for 42 per cent of the woodland area but only 33 per cent of the volume. Similarly, their substantial areas of older broadleaves ensure that "Other" owners hold a 47 per cent share of the timber.

At the level of individual species oak has the most volume (32.9 million cubic metres) followed by Sitka spruce with 28 million cubic metres and Scots pine with nearly 28 million. The oak is old, with most of its volume in large diameter trees while Sitka spruce, although young and of small diameter has its volume spread over a large area, and Scots pine with only half the area of Sitka spruce, has enough volume throughout the older age distribution, especially in the years prior to 1940, to have an almost equivalent volume. Among the conifers Scots pine is followed by Norway spruce and Japanese/Hybrid larch, while beech and ash are next to oak in terms of volume.

The size class distribution is characteristic of the two High Forest types. Conifers tend to be of small diameter; 50 per cent of the timber is in the 7-20 cm dbh size class, 27 per cent in the 21-30 cm dbh class, 19 per cent in the 31-50 class and only four per cent in trees of greater than 50 cm dbh. Approximately 65 per cent of broadleaved volume occurs in trees that are greater than 30 cm dbh but, because of the incidence of broadleaved crops in the P41-60 age class, there is a substantial volume in each of the two smaller size classes.

Volume estimates were produced for both the 1947 and the 1965 Surveys, and whilst the standards of measurement were similar to those of 1980 the overall estimates are affected by the minimum area and classification differences.

The 1947 volume of 108 million cubic metres (including an allowance for the volume in small woods) rose to 124 million cubic metres in 1965 (allowing for the volume in woods of 0.25-0.4 ha) and has since risen to 197 million cubic metres in 1980. The rate of volume increase which was relatively small between 1947 and 1965, and has been much larger since then, can be expected to continue to rise rapidly as the large areas planted during the last twenty-five years move into the measurable size category. Most of this volume increase will be of coniferous timber.

The percentage of volume found in the two High Forest types by ownership and by species is shown in the table below.

Volume by Ownership Classes as a Percentage of Total Standing Volume

Ownership Class	Category	1947	1965	1980
Forestry Commission	Coniferous	11	22	30
	Broadleaved	4	3	2
	Total	15	25	32
Private	Coniferous	31	29	24
	Broadleaved	54	46	44
	Total	85	75	68
All	Coniferous	42	51	54
	Broadleaved	58	49	46
	Total	100	100	100

There has thus been a substantial change in the composition of the growing stock from broadleaved to coniferous timber during the last thirty years. However, the proportional change was greatest between 1947 and 1965 when nine per cent of the volume moved from broadleaves to conifers, but since that time only a further three per cent has changed categories. This is a reflection of the increased area of Broadleaved High Forest and its associated volume that is present in 1980.

The Forestry Commission share of the volume has doubled to 32 per cent in 1980 but even so, private owners still hold 68 per cent of the total standing volume.

**Distribution of Volume by Major Species Groups In High Forest
as a Percentage of Total Standing Volume**

Species Group	1947	1965	1980
Pines	20	23	18
Spruces	8	14	21
Larches	8	10	9
Oak	27	20	17
Beech	13	10	8
Sycamore, ash and birch	10	10	12

Within the broad context of increased standing volume in both coniferous and broadleaved timber, there is a developing trend in distribution as newly planted areas begin to produce measurable timber and the older, traditional species consequently become less important in percentage terms. The proportion of volume in larches is virtually unchanged, pines, after a surge in 1965 are hardly less than their 1947 levels, whilst the spruces have moved from an eight per cent share in 1947 to 21 per cent in 1980.

There has been a steady decline in the contribution of oak and beech, resulting both from their reduced area and also the increased volume of other species. Sycamore, ash and birch now account for 12 per cent of the total volume, a slight improvement on the 1947 and 1965 levels.

All tables, both in terms of area and volume, indicate that the proportion of coniferous timber will continue to increase, with major contributions coming from Sitka spruce and the pines. This will overshadow any increase in volume that will come from broadleaved areas and so depress their proportion.

In estimating the standing volumes no allowance has been made for location or for any planning, conservation or amenity restrictions, so that it must not be assumed that all the volume in the tables is available for harvesting.

DIAGRAM 1

WOODLAND AREA BY OWNERSHIP

Great Britain



Note: Circle not to scale

FC: Forestry Commission Woodland
D&A: Dedicated and Approved Woodland
Other: "Other" Woodland

TABLE 1 **SUMMARY OF AREAS BY OWNERSHIP**

Area of Great Britain (including inland water): 22 441 592 hectares.

	Hectares	% Woodland Area
Area of Forestry Commission Woodland	891 715	42
Area of Dedicated and Approved Woodland	512 787	24
Area of "Other" Woodland	703 895	34
Total Area of Woodland over 0.25 ha	2 108 397	100

NOTES:

The areas of Forestry Commission and Dedicated and Approved Woodlands were taken from the forest records; these are assumed to be accurate. Any uncertainty, therefore, arises in the estimate of "Other" Woodlands.

The O.S. 1:50 000 First Series maps used in the survey were compiled photographically from the O.S. Seventh Series one inch to one mile maps which were last revised for major changes between 1953 and 1977. Where they were available use was made of Second Series sheets.

The estimated total woodland area is 2 108 397 ha (\pm 4 303 ha or 0.2 per cent). This represents 9.4 per cent of the land and inland water area of Great Britain. In addition, an estimated area of 87 880 ha not represented on the maps but found during the ground sample, has not been included in the above total because of the limited information about the composition of this extra woodland and the substantial standard error attached to the estimate.

Some of the land shown on the maps as woodland has been reclassified by the Census either because the land use has changed or because it did not fall within the definition of woodland used in the survey. It is estimated that there were approximately 61 060 ha in this category.

Small Woods

Details of Forestry Commission and Dedicated and Approved Woodlands are not available as the data for these ownerships are not recorded by individual woodland blocks.

"Other" Woodlands Only

	Woods 0.25-1.99 ha	Woods 2.0-9.99ha
Total Number of Woods	108 460	62 180
Total Area of Woods	109 755 ha	242 840 ha
Mean Area of Woods	1.01 ha	3.91 ha

DIAGRAM 2

AREA OF WOODLAND BY
FOREST TYPE AND OWNERSHIP

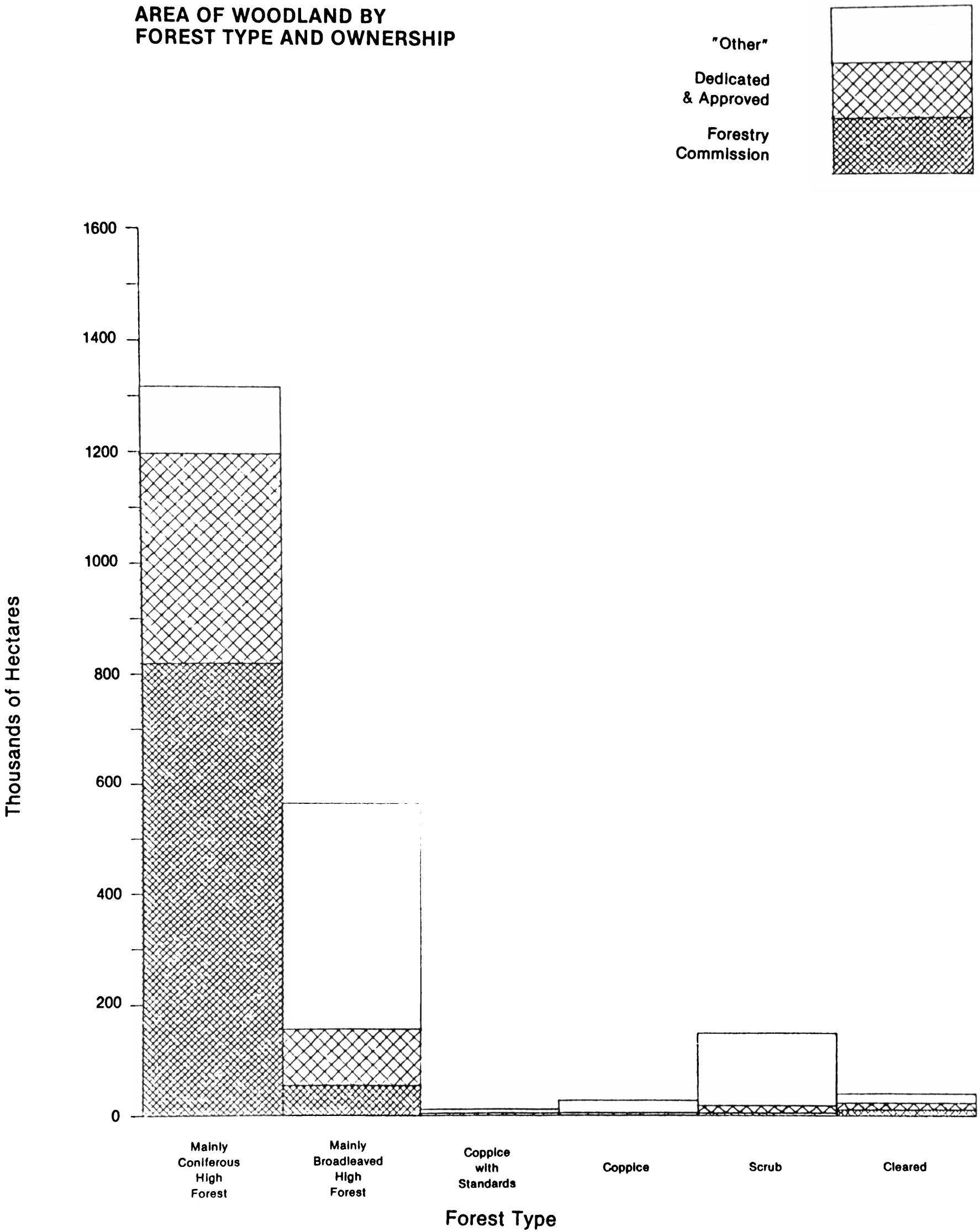


TABLE 2 **AREA OF WOODLAND BY FOREST TYPE AND OWNERSHIP**

Hectares

Forest Type	Forestry Commission area % of total	Dedicated and Approved area % of total	"Other" area % of total	Total area % of total
Mainly Coniferous High Forest	819 303 92	377 649 73	119 856 17	1 316 808† 62
Mainly Broadleaved High Forest	54 132 6	101 320 20	408 966* 58	564 418† 27
Total High Forest	873 435 98	478 969 93	528 822 75	1 881 226† 89
Coppice with Standards	32 <1	4 544 1	6 992 1	11 568† 1
Coppice	1 000 <1	4 504 1	22 060 3	27 564† 1
Scrub	5 750 1	12 800 3	129 682 19	148 232† 7
Cleared	11 498 1	11 970 2	16 339 2	39 807† 2
Total	891 715 100	512 787 100	703 895 100	2 108 397 100

NOTES:

* This figure for Mainly Broadleaved High Forest contains 14.9 per cent of Coppice origin.

† Standard errors on the area estimates of forest types are as follows:

Mainly Coniferous High Forest	± 0.4 per cent
Mainly Broadleaved High Forest	± 1.1 per cent
Total High Forest	± 0.3 per cent
Coppice with Standards	± 14.0 per cent
Coppice	± 8.5 per cent
Scrub	± 3.5 per cent
Cleared	± 4.0 per cent

In this table, areas of the two categories of High Forest have been derived by allocating the area of each individual High Forest stand to either Mainly Broadleaved High Forest if 50 per cent or more of the area comprised broadleaved species, or to Mainly Coniferous High Forest if more than 50 per cent of the area comprised coniferous species.

DIAGRAM 3

AREA OF HIGH FOREST TYPES BY PLANTING YEAR CLASSES

ALL WOODLAND OWNERSHIPS

MAINLY CONIFEROUS

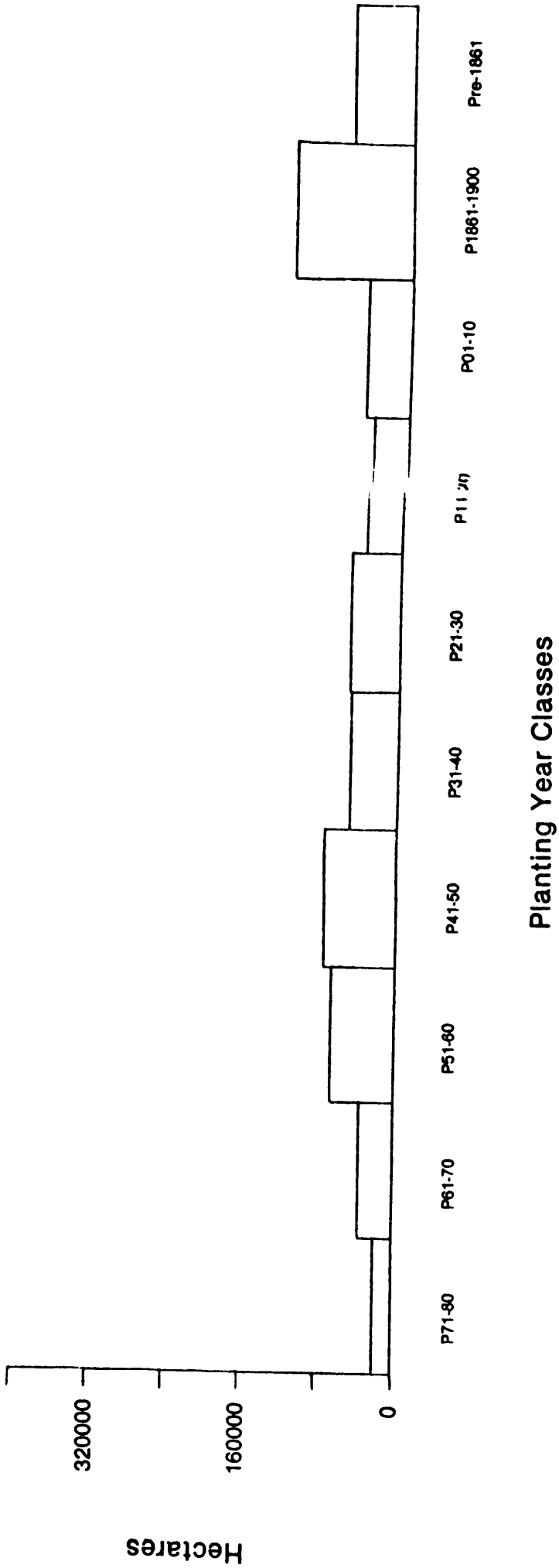
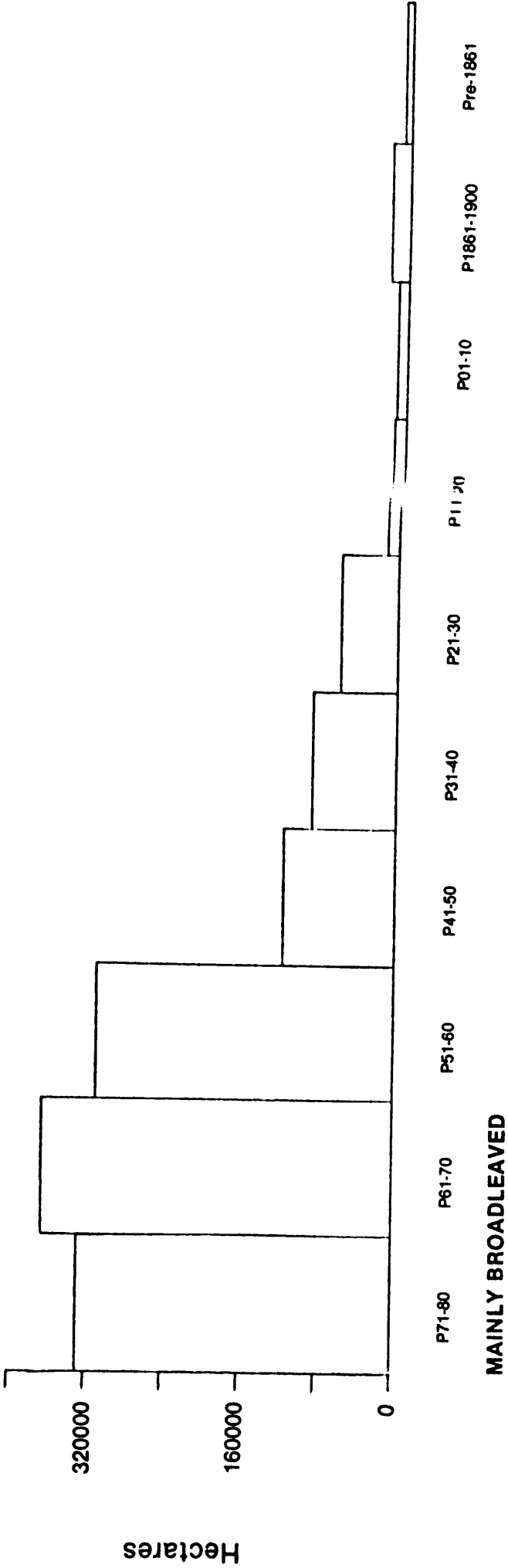


TABLE 3 AREA OF HIGH FOREST TYPES BY PLANTING YEAR CLASSES

All Woodland Ownerships										Hectares
High Forest	Planting Year Classes									Total
	P71-80	P61-70	P51-60	P41-50	P31-40	P21-30	P11-20	P01-10	P1861-1900	Pre-1861
Mainly Coniferous	328 630	365 806	310 271	116 785	87 581	59 144	12 197	10 915	18 733	6 746
Mainly Broadleaved	19 244	35 435	66 356	75 389	49 424	51 172	36 455	45 785	122 666	62 492
Total	347 874	401 241	376 627	192 174	137 005	110 316	48 652	56 700	141 399	69 238
										1 881 226

NOTE:

In Tables 3, 3a, 3b and 3c areas of the two categories of High Forest have been derived by allocating the total area of each individual High Forest stand to Mainly Broadleaved High Forest if 50 per cent or more of the area comprised broadleaved species, or to Mainly Coniferous High Forest if more than 50 per cent of the area comprised coniferous species.

AREA OF HIGH FOREST BY PLANTING YEAR CLASSES AND OWNERSHIPS

DIAGRAM 3a
Forestry Commission Woodland

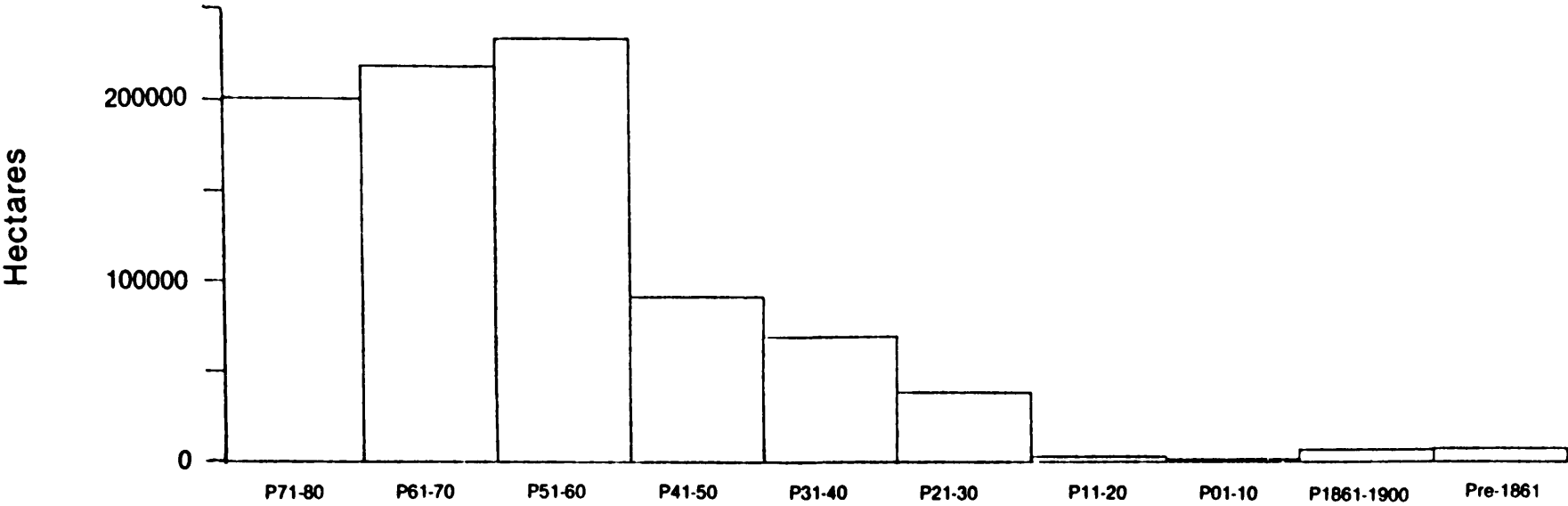


DIAGRAM 3b
Dedicated and Approved Woodland

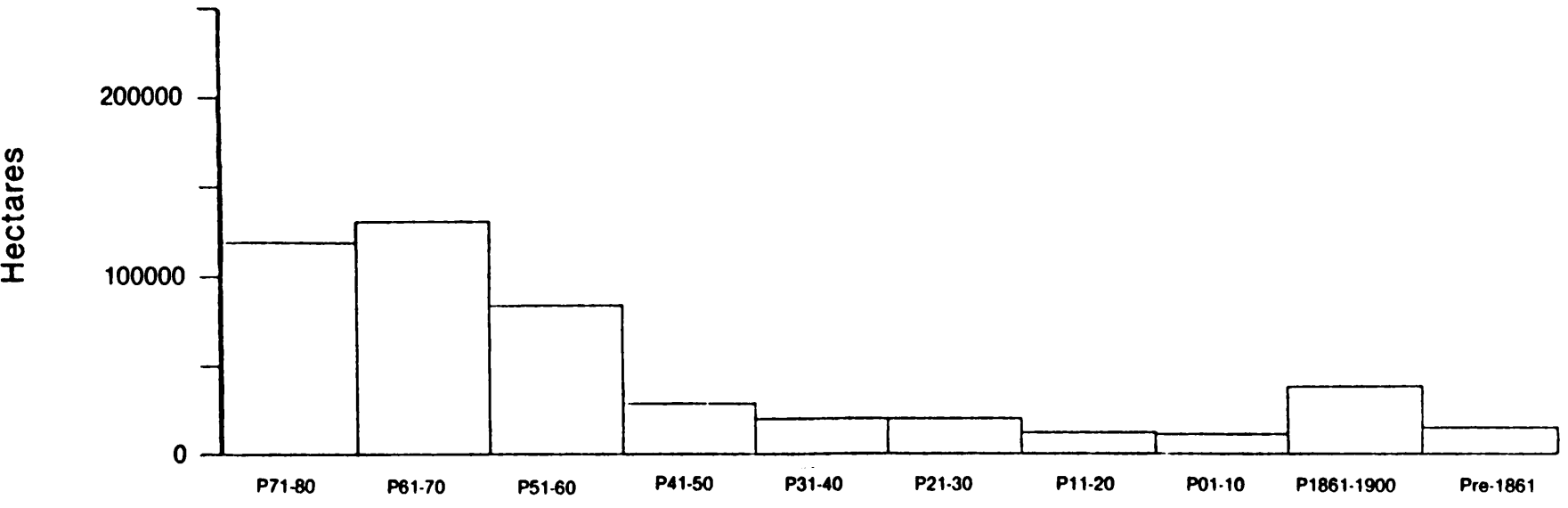
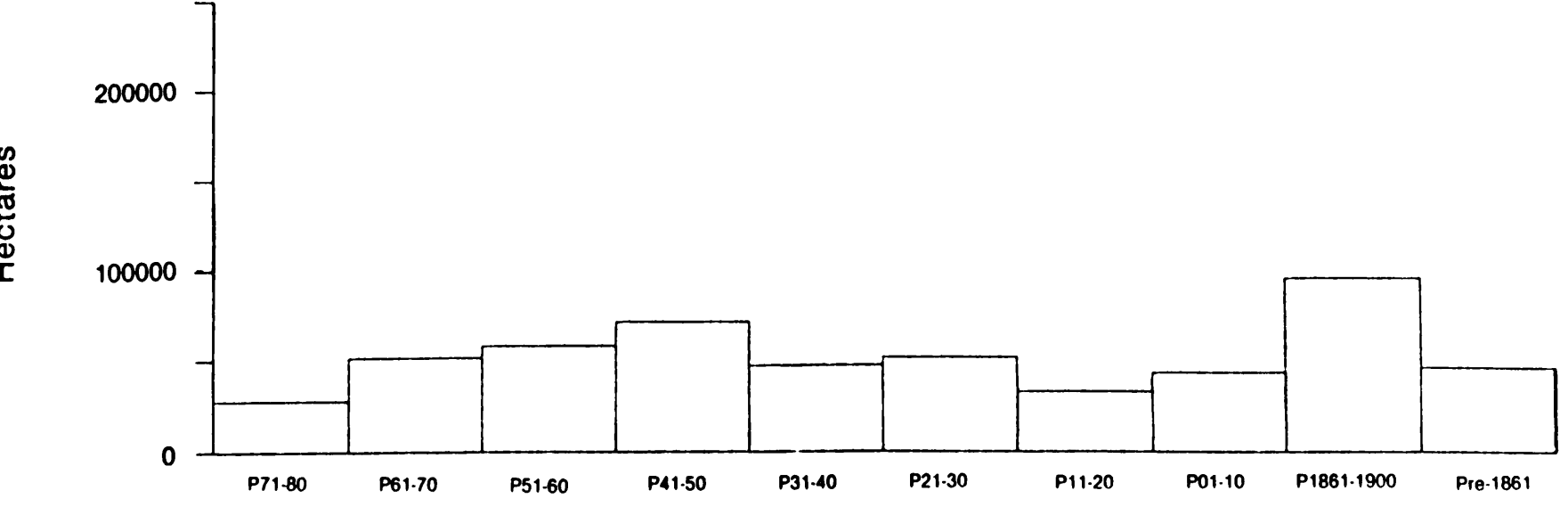


DIAGRAM 3c
"Other" Woodland



Planting Year Classes

AREA OF HIGH FOREST TYPES BY PLANTING YEAR CLASSES
AND OWNERSHIPS

TABLE 3aForestry Commission WoodlandHectares

High Forest	Planting Year Classes										Total
	P71-80	P61-70	P51-60	P41-50	P31-40	P21-30	P11-20	P01-10	P1861-1900	Pre-1861	
Mainly Coniferous	199 043	215 075	219 662	83 621	62 334	34 726	1 431	911	1 999	501	819 303
Mainly Broadleaved	1 731	3 884	14 583	8 131	7 065	3 710	1 654	910	5 121	7 343	54 132
Total	200 774	218 959	234 245	91 752	69 399	38 436	3 085	1 821	7 120	7 844	873 435

TABLE 3bDedicated and Approved WoodlandHectares

High Forest	Planting Year Classes										Total
	P71-80	P61-70	P51-60	P41-50	P31-40	P21-30	P11-20	P01-10	P1861-1900	Pre-1861	
Mainly Coniferous	113 957	119 608	72 533	22 283	14 318	15 268	6 465	4 811	6 583	1 823	377 649
Mainly Broadleaved	5 166	11 020	11 335	6 325	5 640	4 654	5 889	6 334	31 764	13 193	101 320
Total	119 123	130 628	83 868	28 608	19 958	19 922	12 354	11 145	38 347	15 016	478 969

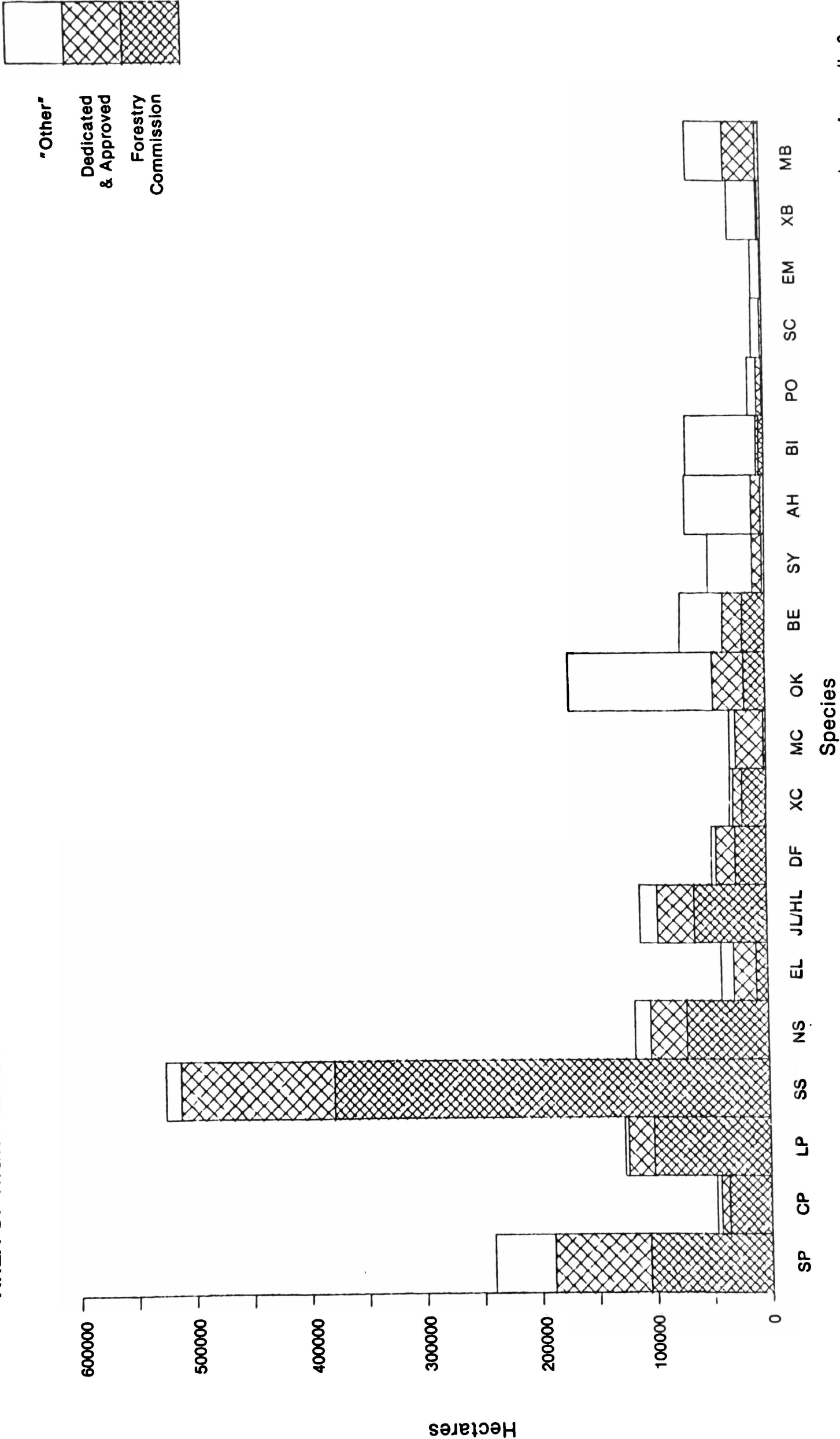
TABLE 3c"Other" WoodlandHectares

High Forest	Planting Year Classes										Total (S.E.)
	P71-80	P61-70	P51-60	P41-50	P31-40	P21-30	P11-20	P01-10	P1861-1900	Pre-1861	
Mainly Coniferous	15 630	31 123	18 076	10 881	10 929	9 150	4 301	5 193	10 151	4 422	119 856 (± 4%)
Mainly Broadleaved	12 347	20 531	40 438	60 933	36 719	42 808	28 912	38 541	85 781	41 956	408 966 (± 2%)
Total	27 977	51 654	58 514	71 814	47 648	51 958	33 213	43 734	95 932	46 378	528 822 (± 1%)

NOTE:
* This total contains 14.9 per cent of Coppice origin.

DIAGRAM 4

AREA OF HIGH FOREST BY PRINCIPAL SPECIES AND OWNERSHIP



Note: For an explanation of the abbreviations used, see Appendix 2.

TABLE 4 AREA OF HIGH FOREST BY PRINCIPAL SPECIES AND OWNERSHIP

Hectares

Species	Forestry Commission			Dedicated and Approved			"Other"			Total Area of all Woodland
	Area	Percentage		Area	Percentage		Area	Percentage		
		Of Category	Of all Species		Of Category	Of all Species		Of Category	Of all Species	
Scots pine	105 859	13	12	83 184	22	17	51 994	42	9	241 037
Corsican pine	36 602	4	4	6 717	2	1	3 932	3	1	47 251
Lodgepole pine	101 391	12	12	22 402	6	5	3 275	3	1	127 068
Sitka spruce	379 229	47	45	133 514	36	28	13 158	11	2	525 901
Norway spruce	71 353	9	8	31 526	8	7	13 968	11	3	116 847
European larch	10 101	1	1	19 494	5	4	10 819	9	2	40 414
Jap./Hybrid larch	63 355	8	7	32 347	9	7	15 647	12	3	111 349
Douglas fir	26 906	3	3	16 484	4	3	4 009	3	1	47 399
Other conifers	21 112	3	2	7 599	2	2	2 949	2	1	31 660
Mixed conifers	2 360	<1	<1	24 325	6	5	5 365	4	1	32 050
Total conifers	818 268	100	94	377 592	100	79	125 116	100	24	1 320 976†
Oak	18 481	34	2	27 586	27	6	125 923	31	24	171 990
Beech	19 553	35	3	17 145	17	3	37 238	9	7	73 936
Sycamore	2 291	4	<1	8 427	8	2	38 708	10	7	49 426
Ash	2 933	5	<1	8 315	8	2	58 333	15	11	69 581
Birch	4 150	8	1	2 646	3	1	61 335	15	12	68 131
Poplar	1 469	3	<1	4 538	5	1	7 583	2	1	13 590
Sweet chestnut	622	1	<1	1 704	2	<1	7 545	2	1	9 871
Elm	219	<1	<1	948	1	<1	8 347	2	2	9 514
Other broadleaves	2 149	4	<1	1 489	1	<1	25 489	6	5	29 127
Mixed broadleaves	3 300	6	<1	28 579	28	6	33 205	8	6	65 084
Total broadleaves	55 167	100	6	101 377	100	21	403 706*	100	76	560 250†
Total	873 435	100	100	478 969	100	100	528 822	100	100	1 881 226

NOTES:

* Contains 14.9 per cent of Coppice origin.

† The standard errors of the area estimates of High Forest are as follows:

Total conifers ± 0.4 per cent

Total broadleaves ± 1.1 per cent

The total area of conifer and of broadleaved species in this and subsequent High Forest tables differs from the total area classified as Mainly Conifer and Mainly Broadleaved in Tables 2 and 3. The reason for this is that here the actual percentages of species in each stand have been totalled.

TABLE 5 AREA OF HIGH FOREST BY PRINCIPAL SPECIES AND PLANTING YEAR CLASSES

All Woodland Ownerships										Hectares	
Species	P71- 80	P61- 70	P51- 60	P41- 50	P31- 40	P21- 30	P11- 20	P01- 10	P1861- 1900	Pre- 1861	Totals
Scots pine	15 378	48 538	67 609	27 638	22 865	27 605	6 244	6 417	13 306	5 437	241 037
Corsican pine	8 416	13 451	10 880	4 111	5 473	3 723	492	294	346	65	47 251
Lodgepole pine	48 797	50 240	25 558	1 022	1 085	346	18	2	—	—	127 068
Sitka spruce	208 855	153 888	90 470	42 583	22 558	6 835	367	110	184	51	525 901
Norway spruce	10 337	31 041	32 253	18 233	16 473	6 367	1 018	458	569	98	116 847
European larch	2 603	6 179	7 379	4 906	7 050	4 750	2 057	2 696	2 422	372	40 414
Jap./Hybrid larch	19 260	24 135	44 840	11 518	6 928	3 694	601	225	131	17	111 349
Douglas fir	6 497	15 805	14 216	2 827	2 534	4 156	586	244	335	199	47 399
Other conifers	4 886	13 697	9 276	1 130	991	651	168	185	530	146	31 660
Mixed conifers	4 360	8 495	7 586	2 537	2 015	2 081	1 273	972	2 109	622	32 050
Total conifers	329 389	365 469	310 067	116 505	87 972	60 208	12 824	11 603	19 932	7 007	1 320 976
Oak	2 228	2 863	7 317	11 692	9 423	12 133	12 497	20 143	60 965	32 729	171 990
Beech	2 510	6 313	11 057	4 577	3 968	2 500	2 725	5 232	18 098	16 956	73 936
Sycamore	2 383	4 375	5 920	9 004	6 319	4 882	3 837	3 650	7 187	1 869	49 426
Ash	1 722	2 706	7 615	13 524	9 854	11 151	5 826	6 475	8 747	1 961	69 581
Birch	2 776	8 820	17 194	20 341	8 759	5 367	2 758	1 103	852	161	68 131
Poplar	2 007	4 463	4 732	1 032	326	594	301	38	75	22	13 590
Sweet chestnut	354	366	1 143	1 147	1 163	978	769	973	1 480	1 498	9 871
Elm	156	219	356	1 045	948	1 360	651	1 012	3 132	635	9 514
Other broadleaves	1 521	1 903	4 738	6 550	2 806	5 026	1 914	1 192	2 777	700	29 127
Mixed broadleaves	2 831	3 768	6 527	6 769	5 464	6 115	4 533	5 259	18 136	5 682	65 084
Total broadleaves	18 488	35 796	66 599	75 681	49 030	50 106	35 811	45 077	121 449	62 213	560 250
Total	347 877	401 265	376 666	192 186	137 002	110 314	48 635	56 680	141 381	69 220	1 881 226

NOTE:
The standard errors of the estimates of totals in this Table are the same as those given for Table 4.

TABLE 7

AREA OF COPPICE BY PRINCIPAL SPECIES

All Woodland Ownerships
Hectares

Sub Type		Principal Species of Coppice					Total	
		Sycamore	Ash	Sweet chestnut	Hornbeam	Hazel		Other species
With Standards	ha	119	193	5 275	1 697	1 465	2 819	11 568
	%	1	2	45	15	13	24	100
Coppice Only	ha	2 380	1 554	13 816	1 716	1 630	6 468	27 564
	%	9	6	50	6	6	23	100
Total	ha	2 499	1 747	19 091	3 413	3 095	9 287	39 132
% of Coppice Total		6	4	49	9	8	24	100

NOTE:

"Other species" includes mixtures of the above five named species as well as other minor species of coppice eg birch and oak.

TABLE 8

AREA OF COPPICE WITH STANDARDS BY PRINCIPAL SPECIES OF BOTH COPPICE AND STANDARDS

All Woodland Ownerships
Hectares

Principal Species of Standard	Principal Species of Coppice						Total
	Sycamore	Ash	Sweet chestnut	Hornbeam	Hazel	Other species	
Conifers	—	—	16	4	—	—	20
Oak	101	173	4 897	1 594	1 444	2 792	11 001
Ash	8	20	—	88	21	27	164
Sweet chestnut	—	—	353	—	—	—	353
Other broadleaves	10	—	9	11	—	—	30
Total	119	193	5 275	1 697	1 465	2 819	11 568
% of Total	1	2	45	15	13	24	100

TABLE 9 **AREA OF SCRUB BY PRINCIPAL SPECIES**

All Woodland Ownerships

Hectares

Principal Species	Area	% of Total
Conifers	2 444	2
Oak	18 054	12
Beech	1 070	1
Sycamore	2 366	2
Ash	7 876	5
Birch	63 260	42
Sweet chestnut	264	<1
Alder	8 363	6
Hornbeam	410	<1
Hazel	8 561	6
Willow	4 964	3
Other broadleaves	30 600	21
Total	148 232	100

NOTE:

The main species comprising "Other broadleaves" are hawthorn and willow.

TABLE 10 PRINCIPAL SPECIES OF THE SHRUB LAYER BY FOREST TYPES

"Other" Woodlands Only

Forest Type	Principal Species of Shrub Layer in Order of Total Area					
	First	Cover*	Second	Cover*	Third	Cover*
Coniferous High Forest	Elder	<1	Rhododendron	<1	Other shrubs	<1
Broadleaved High Forest	Hazel	6	Hawthorn	2	Elder	2
Coppice with Standards	Other shrubs	3	Hawthorn	1	Elder	<1
Coppice	Other shrubs	1	Hazel	<1	Hawthorn	<1
Scrub	Hazel	4	Sallow	2	Hawthorn	1
Cleared	Elder	<1	Hazel	<1	Hawthorn	<1

NOTE:

* "Cover" is the percentage of the ground area of each forest type covered by the named species. Figures relate only to "Other" Woodlands since Forestry Commission and Dedicated and Approved Woodland records do not contain data on this feature.

DIAGRAM 5

STANDING VOLUME OF TIMBER BY CATEGORY AND OWNERSHIP

All Woodlands

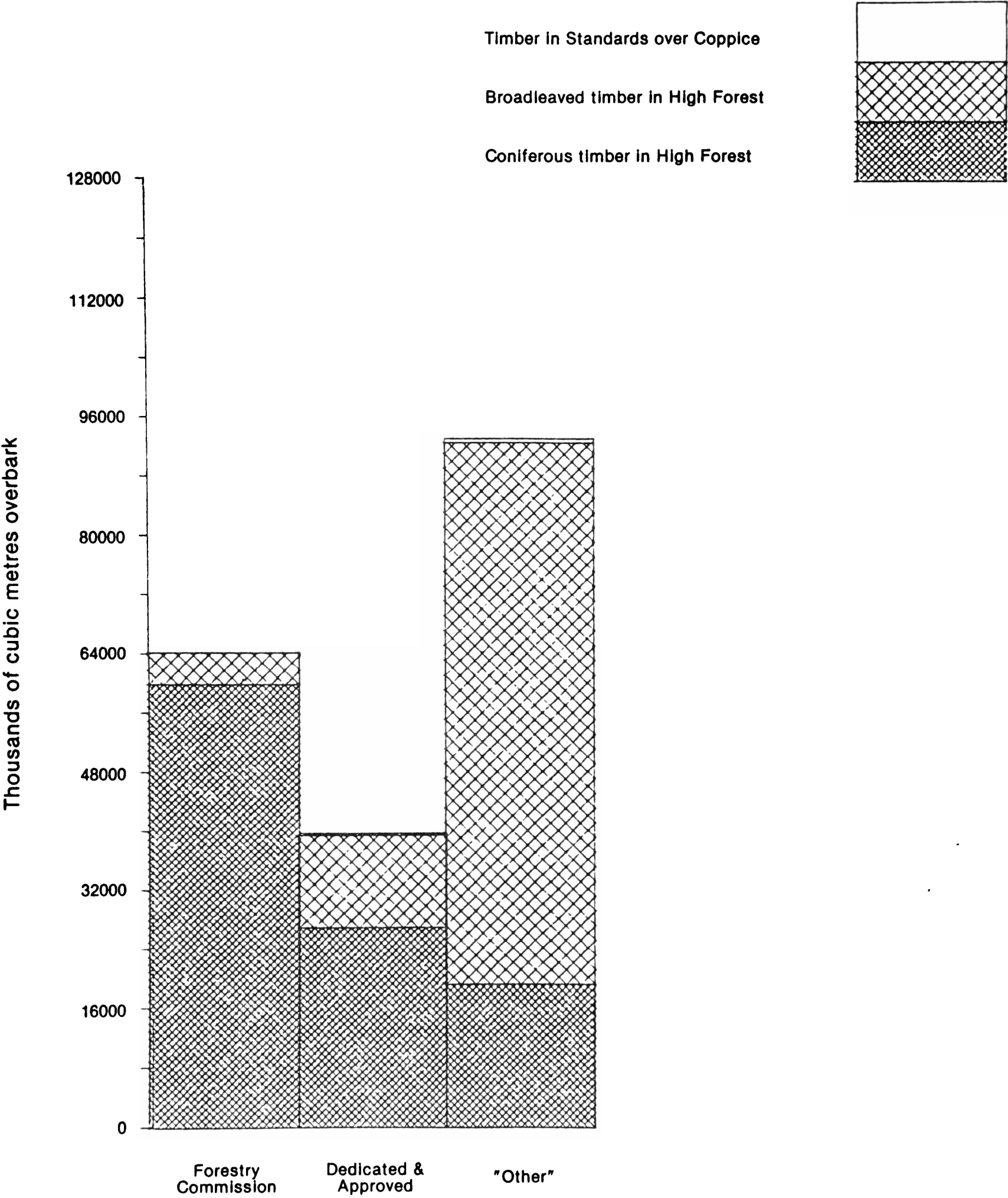


TABLE 11

STANDING VOLUME OF TIMBER BY CATEGORY AND OWNERSHIP

All Woodlands

Thousands of cubic metres overbark

Volume Category	Forestry Commission	Dedicated and Approved	"Other"	Total (S.E.)
In High Forest				
Coniferous Timber	59 968.9	27 019.1	19 290.1	106 278.1 (± <1%)
Broadleaved Timber	4 305.3	12 573.8	73 435.5	90 314.6 (± 2%)
Total High Forest	64 274.2	39 592.9	92 725.6	196 592.7 (± <1%)
Timber in Standards over Coppice	2.6	304.3	536.5	843.4 (± 13%)
Total*	64 276.8	39 897.2	93 262.1	197 436.1 (± <1%)

NOTE:

* No volume estimate is made for Scrub or Coppice.

DIAGRAM 6

STANDING VOLUME OF TIMBER IN HIGH FOREST AND STANDARDS OVER COPPICE BY
PRINCIPAL SPECIES AND PLANTING YEAR CLASSES

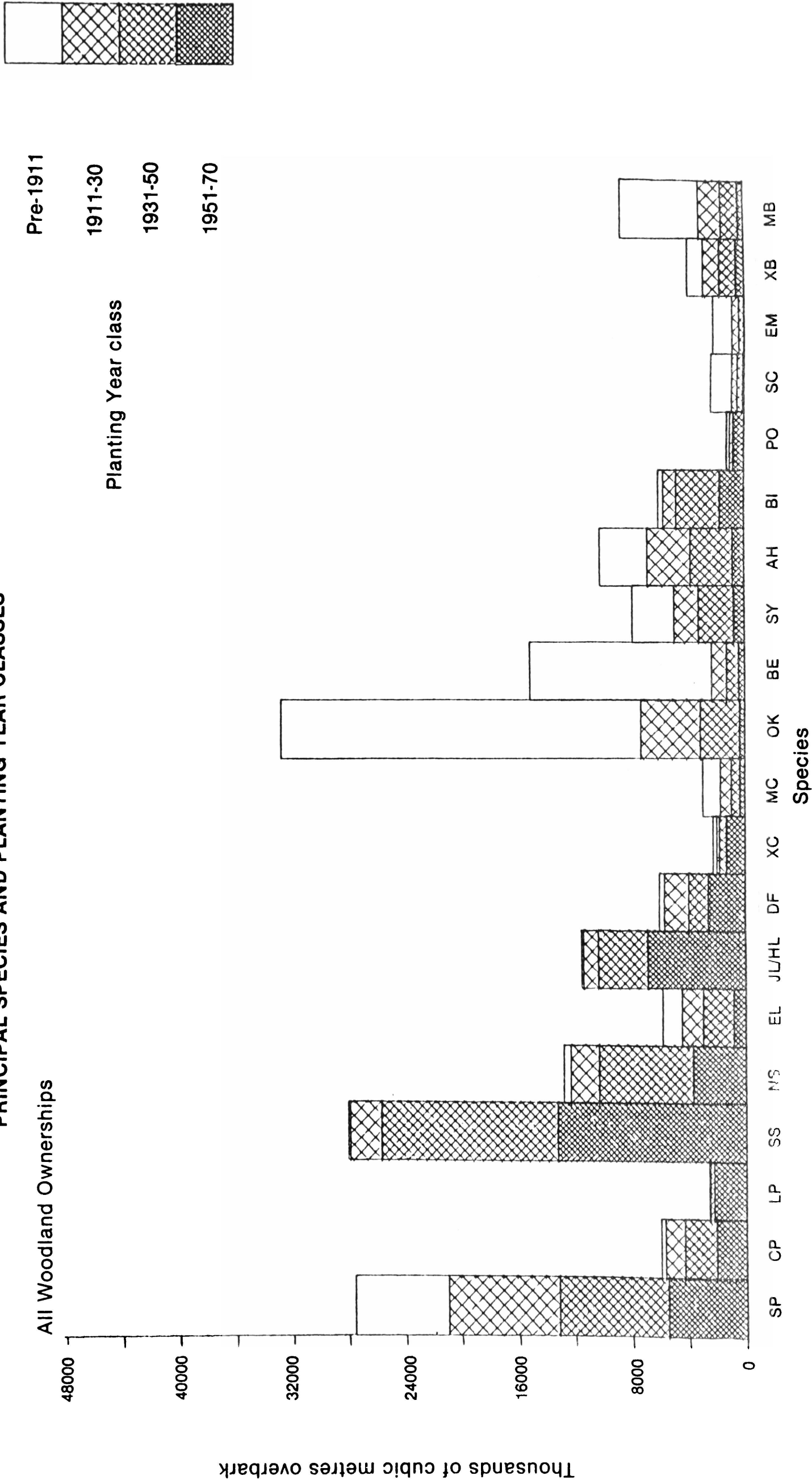


TABLE 12

STANDING VOLUME OF TIMBER IN HIGH FOREST AND STANDARDS OVER
COPPICE BY PRINCIPAL SPECIES AND PLANTING YEAR CLASSES

All Woodland Ownerships

Thousands of cubic metres overbark

Species	P61- 70	P51- 60	P41- 50	P31- 40	P21- 30	P11- 20	P01- 10	P1861- 1900	Pre- 1861	Total
Scots pine	1 140.9	4 414.5	3 378.3	4 333.6	6 261.9	1 570.6	1 710.7	3 386.5	1 500.6	27 697.6
Corsican pine	718.4	1 413.6	824.6	1 416.4	1 186.9	183.6	105.3	150.5	32.4	6 031.7
Lodgepole pine	763.6	1 521.0	119.1	163.9	53.2	4.9	0.7	—	—	2 626.4
Sitka spruce	3 928.6	9 385.2	7 132.0	5 378.8	2 080.6	141.7	45.1	75.9	19.1	28 187.0
Norway spruce	786.1	2 967.6	2 995.4	3 622.9	1 692.2	328.4	150.2	302.3	46.5	12 891.6
European larch	237.4	632.4	784.6	1 357.3	1 009.2	501.6	627.7	626.1	97.9	5 874.2
Jap./Hybrid larch	1 633.7	5 295.2	2 013.9	1 470.3	915.6	158.3	68.5	57.8	5.0	11 618.3
Douglas fir	879.5	1 749.5	593.4	773.7	1 494.3	224.9	107.1	172.5	91.0	6 085.9
Other conifers	397.9	945.7	224.8	278.9	122.0	42.9	57.3	153.8	51.7	2 275.0
Mixed conifers	49.6	331.0	250.3	346.4	474.5	314.6	254.7	791.6	179.5	2 992.2
Total conifers	10 535.7	28 655.7	18 316.4	19 142.2	15 290.4	3 471.5	3 127.3	5 717.0	2 023.7	106 279.9
Oak	29.4	341.6	1 383.5	1 408.8	1 996.0	2 226.4	3 814.4	14 210.6	7 483.1	32 893.8
Beech	34.3	396.6	362.3	512.6	465.0	590.9	1 438.4	5 868.1	5 551.6	15 219.8
Sycamore	233.0	551.7	1 350.5	1 119.8	931.2	812.9	759.0	1 718.8	488.4	7 965.3
Ash	135.6	696.4	1 627.0	1 358.5	1 966.8	1 105.6	1 135.8	1 680.2	534.0	10 239.9
Birch	386.3	1 365.6	2 170.2	894.2	636.0	306.7	192.5	134.3	23.3	6 109.1
Poplar	243.7	538.6	168.9	70.7	117.4	75.7	8.4	22.1	6.0	1 251.5
Sweet chestnut	7.3	97.4	224.0	194.4	217.4	167.3	284.0	479.1	685.1	2 356.0
Elm	5.0	34.2	151.5	208.9	376.8	131.5	251.3	880.8	175.5	2 215.5
Other broadleaves	84.0	508.1	734.2	451.3	823.5	333.9	244.5	736.6	147.5	4 063.6
Mixed broadleaves	61.4	335.2	621.6	625.6	885.0	714.2	992.4	3 488.1	1 118.2	8 841.7
Total broadleaves	1 220.0	4 865.4	8 793.7	6 844.8	8 415.1	6 465.1	9 120.7	29 218.7	16 212.7	91 156.2
Total	11 755.7	33 521.1	27 110.1	25 987.0	23 705.5	9 936.6	12 248.0	34 935.7	18 236.4	197 436.1

NOTE:

The standard errors of the estimates of totals in this Table are the same as those given for Table 13.

DIAGRAM 7

STANDING VOLUME OF TIMBER IN HIGH FOREST AND STANDARDS OVER COPPICE BY SPECIES GROUPS AND SIZE CLASSES

All Woodland Ownerships

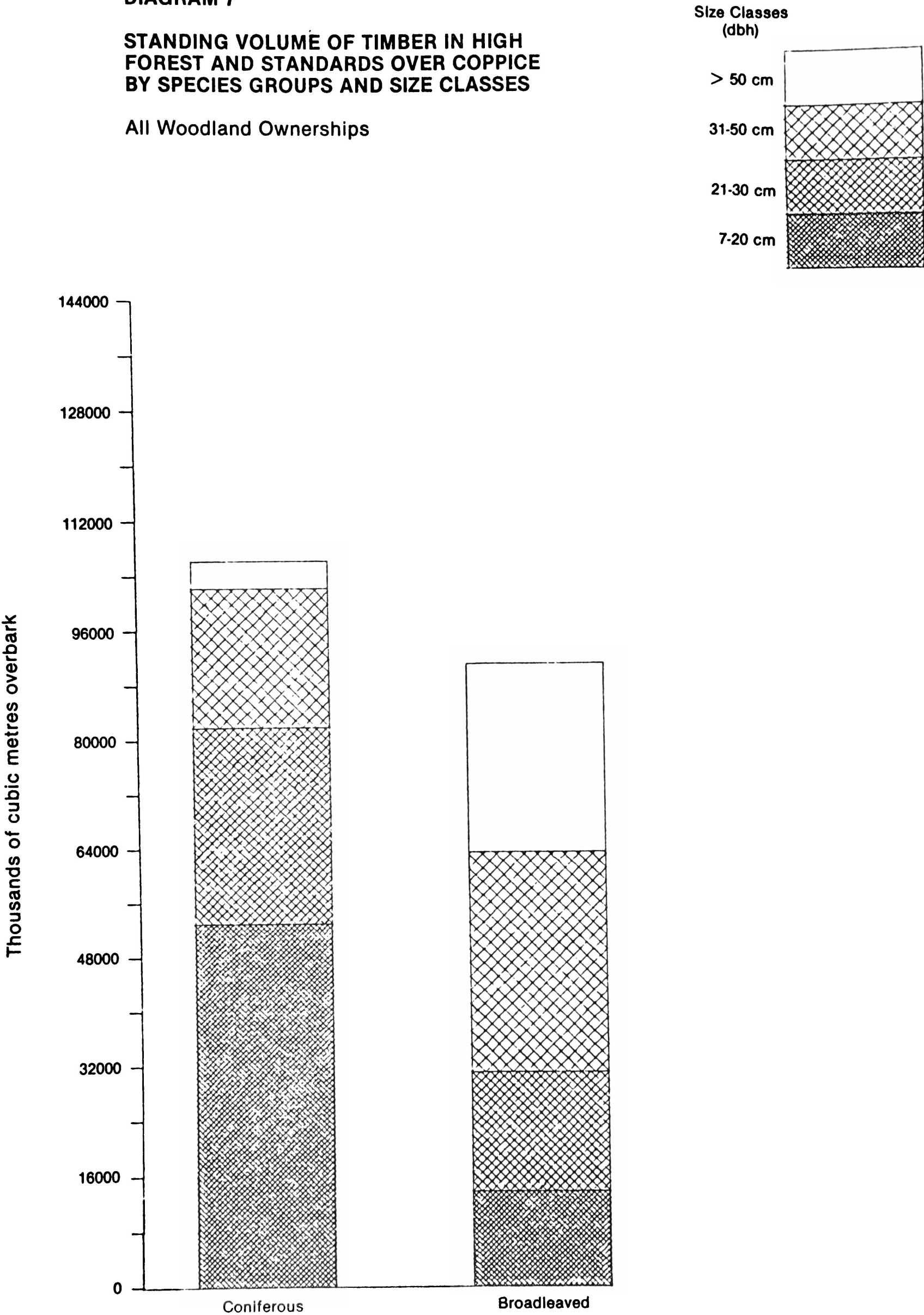


TABLE 13
**STANDING VOLUME OF TIMBER IN HIGH FOREST AND STANDARDS
OVER COPPICE BY PRINCIPAL SPECIES AND SIZE CLASSES**

All Woodland Ownerships
Thousands of cubic metres overbark

Species	Size Class (dbh)				Total
	7-20 cm	21-30 cm	31-50 cm	>50 cm	
Scots pine	10 063.7	8 148.0	7 602.1	1 883.8	27 697.6
Corsican pine	2 592.0	1 883.4	1 363.3	193.0	6 031.7
Lodgepole pine	2 519.7	99.4	7.3	—	2 626.4
Sitka spruce	18 643.1	6 764.4	2 598.2	181.3	28 187.0
Norway spruce	7 469.1	3 679.9	1 576.2	166.4	12 891.6
European larch	1 259.0	2 105.3	2 268.3	241.6	5 874.2
Jap./Hybrid larch	5 386.0	4 100.3	2 032.0	100.0	11 618.3
Douglas fir	2 525.0	984.4	1 858.8	717.7	6 085.9
Other conifers	1 409.2	403.2	311.1	151.5	2 275.0
Mixed conifers	1 115.5	775.0	682.9	418.8	2 992.2
Total conifers	52 982.3	28 943.3	20 300.2 (± 2.2%)	4 054.1 (± 7.5%)	106 279.9 (± 0.8%)
Oak	2 803.2	5 024.6	13 875.3	11 190.7	32 893.8
Beech	1 374.0	1 113.7	4 554.8	8 177.3	15 219.8
Sycamore	1 372.5	1 860.0	3 311.3	1 421.5	7 965.3
Ash	2 142.2	2 755.8	3 877.5	1 464.4	10 239.9
Birch	3 115.9	1 868.1	1 020.2	104.9	6 109.1
Poplar	89.8	303.8	738.9	119.0	1 251.5
Sweet chestnut	277.7	306.0	622.5	1 149.8	2 356.0
Elm	219.3	308.2	974.4	713.6	2 215.5
Other broadleaves	1 048.3	1 073.7	1 130.9	810.7	4 063.6
Mixed broadleaves	1 347.3	2 725.0	2 241.4	2 528.0	8 841.7
Total broadleaves	13 790.2	17 338.9	32 347.2 (± 2.2%)	27 679.9 (± 4.2%)	91 156.2 (± 1.9%)
Total	66 772.5	46 282.2	52 647.4 (± 1.6%)	31 734.0 (± 3.9%)	197 436.1 (± 1.0%)

NOTE:
The figures in brackets are standard errors.

Part Two

Non-Woodland Trees

COMMENTARY ON THE RESULTS FOR NON-WOODLAND TREES
IN GREAT BRITAIN

PREVIOUS FORESTRY COMMISSION SURVEYS

The 1950-51 Census of Hedgerow Trees and Small Woods provided estimates of the volume of hedgerow and park trees by Forestry Commission Conservancies in England, Wales and Scotland whereas the corresponding survey carried out in 1965 was confined to England south of a line drawn between the rivers Mersey and Humber.

SAMPLE STRATA USED IN THE 1980 CENSUS

Soil groups were used as the basis for the selection of sampling strata and twenty four of these groups were recognised in Great Britain. The names and descriptions of the various soil groups are given in Appendix 3.

The sample size was chosen with the objective of estimating firstly, the total number of isolated trees in each county of England and Wales and each conservancy in the case of Scotland, with a precision of ± 25 per cent or better, and secondly, the species, health, size classes and timber volumes of all non-woodland trees. As the figures in this Report are a summation of the results from counties or conservancies, it is to be expected that the precision of the estimate of the number of isolated trees would normally be higher for Great Britain than for any of the constituent parts and is, in fact, 3.4 per cent. The precisions for the various countries are: 3.8 per cent in England, 7.6 per cent in Wales and 13.7 per cent in Scotland.

RESULTS

General

Although non-woodland trees do occur on Forestry Commission land, it can be assumed that virtually the whole of this category is privately owned.

The total number of trees in Great Britain with a diameter at breast height of 7 cm or more is 87.9 million (± 4 per cent), distributed as shown below.

Millions of trees				
Category	Coniferous	Broadleaved	Total	Per cent of Total
Isolated Trees	2.0	16.1	18.1	21
Clumps	4.0	28.6	32.6	37
Linear Features	3.3	33.9	37.2	42
Total	9.3	78.6	87.9	100

In Great Britain linear features and clumps each account for about 40 per cent of the number of trees of 7 cm dbh and over. Coniferous species account for 11 per cent of the total with pines and cypresses as the major species groups. Amongst the broadleaves, ash is the predominant species followed by oak and then by alder.

The distribution by countries is as follows:

Country	Total number of trees of 7 cm dbh and greater (millions)			Per cent of total	Tree density per square kilometre	
	Coniferous	Broadleaved	Total		Average	Range
England	5.2	57.2	62.4	71	478	116 - 1216
Wales	1.5	11.1	12.6	14	606	483 - 889
Scotland	2.6	10.3	12.9	15	177	52 - 286
Great Britain	9.3	78.6	87.9	100	392	52 - 1216

The tree densities for Scotland and Great Britain given in the previous table are based on the land and inland water areas which exclude the Island Areas of the Western Isles, Orkneys and Shetlands. If the islands are included, the densities for Scotland and Great Britain become 164 and 382 respectively.

From the previous table, it will be seen that any consideration of the Great Britain figures is affected by the fact that England accounts for over 70 per cent of the total measurable tree numbers and dominates any analysis of the results. Thus, England accounts for a little over half the total number of coniferous trees and falls below this proportion only in trees in linear features. Likewise, almost three quarters of the broadleaved population occurs in England, accounting for 80 per cent of isolated trees, 73 per cent of trees in clumps and 68 per cent of trees in linear features. The three countries, however, show different patterns in the distribution of tree numbers by categories, species and certain other features; it is these aspects that are mainly highlighted in the discussion that follows. The proportions of numbers of trees of 7 cm dbh and greater by country and category are shown below.

Category	England			Wales			Scotland		
	Conifers	Broad-leaves	Total	Conifers	Broad-leaves	Total	Conifers	Broad-leaves	Total
Isolated Trees	2%	21%	23%	1%	15%	16%	3%	10%	13%
Clumps	4%	34%	38%	5%	26%	31%	8%	33%	41%
Linear Features	2%	37%	39%	6%	47%	53%	9%	37%	46%
Total	8%	92%	100%	12%	88%	100%	20%	80%	100%

Wales and Scotland have a higher proportion of their trees as linear features, whereas in England isolated trees are relatively more important. Conifers account for 20 per cent of the Scottish total but only eight per cent of the English total.

Isolated Trees

There are 18.1 million isolated trees of 7 cm dbh or more divided into two sub-categories; 8.0 million growing along major land use boundaries such as hedges, walls and fences and 10.1 million in open positions. Boundaries in urban areas were often difficult to assess and consequently all trees in urban situations were classed as being in open positions, irrespective of actual location. It should be noted that owing to problems of access to many gardens and enclosures, it was necessary on occasion to estimate the dimensions of trees visible from a public right of way.

The distribution of isolated trees of 7 cm dbh and over by category and country is shown below.

Country	Boundary	Open	Total	Millions of trees
				Per cent of total
England	6.0	8.3	14.3	79
Wales	1.4	0.7	2.1	12
Scotland	0.6	1.1	1.7	9
Great Britain	8.0	10.1	18.1	100

From the above table it will be seen that of the 18.1 million trees, almost 80 per cent are located in England. The distribution of numbers between boundary and open grown trees is interesting in that in both England and Scotland about 60 per cent are classed as being open grown whereas in Wales the percentage is only 33 per cent. The high proportion of open grown trees in England is known to be due in part to the large concentration in urban areas but it would appear that the distribution is somewhat different in Wales and Scotland, where these areas are less significant. In Wales, the trees tend to occur along boundaries, whereas in Scotland, they occur more frequently in open grown situations.

Conifers account for eight per cent of the isolated tree population in Wales, nine per cent in England and 24 per cent in Scotland, with the figure for Great Britain amounting to 11 per cent. Cypresses are the most frequently occurring coniferous species group in Great Britain, accounting for 37 per cent of the coniferous total as a result of their predominance in England and Wales. Pines occupy second place in Great Britain with 23 per cent, although they are the most numerous species group among the Scottish conifers.

Broadleaved species account for nearly 90 per cent of the total of this category, with ash the most important at 23 per cent of the Great Britain total. Normally occurring as a boundary tree, its dominance in England makes it important on the national scale, although oak is the most frequently represented species in Wales and birch in Scotland. Oak is the second most important species, occupying 22 per cent followed by the 18 per cent of the Other broadleaved species group which includes a wide variety of species, many of them ornamental, and usually present as garden, street or park plantings.

Clumps

There are over 5.6 million clumps covering an area of nearly 100 thousand hectares and including nearly 33 million trees. Over 70 per cent of each of these totals occur in England. The average number of trees per clump in Great Britain lies between five and six, the same as for England and Wales. England accounts for about 72 per cent of the total number of trees in this category, Scotland for 16 per cent and Wales for 12 per cent. Scotland, however, accounts for about a quarter of all the coniferous trees in clumps.

Pines are the most important coniferous species group with nearly 33 per cent of the Great Britain coniferous total, followed by cypresses with 26 per cent, whose importance arises largely through their use as garden and ornamental trees. For the same reason, the third most important coniferous species group is Other conifers with 587 thousand trees.

Broadleaved species account for nearly 90 per cent of the trees in this category, with ash clearly the most important. This species accounts for no less than 21 per cent of the Great Britain broadleaved total and dominates the category in both England and Wales. It is followed by birch with 16 per cent and sycamore and oak each with 12 per cent. Alder accounts for 10 per cent of the Great Britain clump total and is significant in all three countries, particularly in Wales, where it is second in importance.

Linear Features

Linear features include trees in close canopy in well grown avenues, along boundaries and in shelterbelts; this category accounts for an estimated 37.2 million trees. Coniferous species account for nine per cent of the total with spruces accounting for nearly a third. This species group occurs mainly in shelterbelts and is the most important conifer in both Scotland and Wales. Pines are the next most important species group with 21 per cent, followed by cypresses with 19 per cent.

Of the broadleaved species, alder dominates with 19 per cent; it occupies the leading position in Scotland and is second in both England and Wales. It normally occurs in pure groups along streamsides and in other damp situations and often gives the impression of a woodland block rather than a narrow, but densely stocked, strip. It is closely followed by ash with 17 per cent, oak with 16 per cent and sycamore with 12 per cent.

Size Class Distribution

In addition to the trees with a minimum dbh of 7 cm, there are 20.5 million well grown trees recorded as being below this limit. Of this total, 64 per cent are in England, 14 per cent in Wales and 22 per cent in Scotland. To be included in this group, trees had to have a single stem and show every likelihood of being able to grow on; coppice shoots were excluded. It is therefore probable that this estimate of small trees is conservative.

Table 17 shows that when the under 7 cm dbh size class is included, the total number of trees in Great Britain increases from 87.9 million to 108.5 million, a rise of 23 per cent. The proportional rise in numbers is similar in all three countries. The percentage number of trees in each of the diameter classes is as follows.

Diameter Class	Conifers	Broadleaves	Total
Under 7 cm	8%	11%	19%
7-20 cm	5%	36%	41%
21-30 cm	1%	13%	14%
31-50 cm	2%	14%	16%
Over 50 cm	<1%	10%	10%
Total	16%	84%	100%

The effect of the inclusion of these small trees is most evident in the coniferous category where the tree numbers are nearly doubled. Over 40 per cent of these small trees are spruce and this is a measure of their use in shelterbelts. Cypressess, however, account for nearly 28 per cent of the small coniferous tree numbers and this fact indicates the increasing frequency with which these ornamental species are to be found in urban parks and, particularly, in suburban gardens. The treescape in our towns and cities is likely to undergo a marked change in character if a substantial proportion of these trees grow to maturity. Pines account for 21 per cent of the smallest class and, like spruce, are often grown for shelter in upland areas.

The addition of these small trees to the broadleaves total increases it to 90.9 million, a rise of more than 15 per cent. The young trees are predominantly Other broadleaves, many of them a consequence of urban planting, but there are also substantial numbers of sycamore, birch and ash. The inclusion of the small trees does not materially alter the overall species ranking of broadleaves since ash and oak remain in first and second places, but Other broadleaves now becomes third in importance, followed by sycamore, alder and birch.

More than three quarters of coniferous trees are less than 20 cm dbh with 47 per cent in the smallest size class and 30 per cent in the 7-20 cm dbh class. The two middle range size categories, encompassing trees between 21 and 50 cm dbh, each account for about 10 per cent of the total and the over 50 cm dbh class for only three per cent.

Among broadleaves, however, the pattern differs in that the two smallest size classes account for only 56 per cent of the broadleaved total, with over three times as many trees in the 7-20 cm dbh class as there are in the less than 7 cm dbh class. Of the remaining three size classes, the 31-50 cm dbh class contains 15.2 million trees, accounting for more trees than the 21-30 cm dbh class (13.7 million) and the over 50 cm dbh class (10.7 million). When species are considered, oak and beech tree numbers are weighted towards the larger size classes whilst the ash, sycamore and birch populations, although well represented in most classes, predominate in the 7-20 cm dbh class.

The numbers of trees in the two smallest size classes seem sufficient to permit continuing recruitment to the larger diameters. However, since a fifth of these small trees are conifers, including a high proportion of ornamental species, and because ash, sycamore, birch and alder dominate the younger broadleaved numbers, it is probable that such recruitment will produce a different species distribution in the future.

Health

All live non-woodland trees of 7 cm dbh and greater were assessed for health and a count was made of dead trees. This latter category covered trees of all species which were already dead and, also, in the case of elm, those affected by Dutch elm disease and in a dying condition.

Table 18a shows the overall position with 73 per cent in good health, 18 per cent in moderate health, three per cent in poor health and six per cent dead or dying. The distribution in each of the three countries is shown below.

Country	Good	Moderate	Poor	Dead
England	73%	17%	3%	7%
Wales	85%	11%	2%	2%
Scotland	66%	29%	4%	1%
Great Britain	73%	18%	3%	6%

If the influence of dead trees on the percentages is removed, it is evident that Wales has a much higher proportion of healthy trees than England and the latter a higher percentage than that for Scotland. The percentages classed as poor do not vary much, although Wales has the lowest percentage and Scotland the highest. In Scotland it is reasonable to assume that the rather more exposed situations and generally poorer growing conditions have resulted in the increased percentages in the lower health ratings.

In conifers nearly 85 per cent of the trees are classed as being in good health and of the two per cent classed as dead, the main species are pines and spruces. Larches account for about 40 per cent of the trees in the poor health category.

In broadleaves, 72 per cent of the trees are classed as being in good health and of the three per cent classed as being in poor health, ash, elm, oak and willow account for the highest numbers. Understandably, elm accounts for the bulk of the seven per cent by numbers classed as dead, but there are also numerous dead alder and ash, although their numbers are small in relation to their overall totals.

Standing Volume

It is estimated that there is a standing volume of 28 million cubic metres overbark (\pm 4.4 per cent) in non-woodland trees in Great Britain. Of this total, 3.0 million cubic metres are coniferous and 25 million cubic metres broadleaved. England accounts for 75 per cent of the total volume, 68 per cent of the conifer volume and 76 per cent of the broadleaved volume, and so exerts a very marked effect on the Great Britain totals and their distribution by species and size classes. Table 19 analyses volume by species and size class and shows that the distribution of volume differs from that by numbers of trees.

Forty-one per cent of the coniferous volume occurs in pines, eight per cent in spruces, 15 per cent in larches, six per cent in cypresses and 30 per cent in Other conifers. In the case of the last named species group, the trees are generally of large size with no less than 70 per cent of their volume in the over 50 cm dbh size class. The volume of the pines tends to be concentrated in the two largest size classes and that of the larches in the 31-50 cm dbh class. Spruces, on the other hand, have a fairly regular distribution of volume throughout the classes, whereas with the cypresses it is predominantly held in the smallest diameter class.

In broadleaved species, oak is clearly dominant and accounts for no less than 35 per cent of the broadleaved total. It is followed by ash with 17 per cent, beech with 11 per cent and sycamore with 10 per cent. More than two thirds of the standing volume is in the over 50 cm dbh size class. Oak has over 80 per cent of its volume contained in these large trees, beech about 75 per cent, sycamore about 60 per cent and ash about 55 per cent. The relative proportions of the major broadleaved species of 7 cm dbh and greater in terms of tree numbers and volumes are shown below.

Percentage	Oak	Beech	Sycamore	Ash	Birch	Poplar	Sweet chestnut	Horse chestnut	Alder	Lime	Elm	Willow	Other b/leaves
of numbers	16	6	12	20	10	2	1	1	12	2	4	4	10
of volume	35	11	10	17	1	4	1	3	6	4	4	2	2

This table again illustrates the effect of the weighting of the volume of oak and beech towards the larger size classes and the reverse situation in the case of birch, Other broadleaves and, to a lesser extent, alder, where tree numbers are relatively high in relation to volume.

Although all trees of 7 cm dbh and greater were eligible for volume assessment, it was often found that broadleaved trees had no volume because of damage or poor form in the first two metres butt length.

Not all the volume quoted in the tables is available for harvesting as assessments were made without reference to the location of trees or to any other constraints.

Comparison with Previous Surveys

It is impossible to make comparisons of Great Britain values with those of the 1965 Survey which was confined to counties in the southern half of England. Furthermore, when comparing the estimates of the current Survey with those of 1951, the following points must be considered.

1. In 1951 the minimum area for woodland was 0.4 ha while in 1980 it was 0.25 ha.
2. The sampling intensity used in the 1980 Survey was much higher than in previous surveys. In 1951 the ground area sampled was approximately 1 ha in every 8 000 ha of land area, whereas in 1980 the sample was 1 ha in every 900 ha in England and Wales and 1 ha in 2 500 ha in Scotland, thus producing more precise figures.
3. The minimum size of tree considered for volume was 20 cm dbh in 1951 compared with 7 cm dbh in 1980.
4. Dutch elm disease has had an effect on the elm population in many parts of the country.
5. The differing sampling techniques, which in 1980 included stratification by soil groups, are also likely to have had an effect, particularly in Scotland, where the non-woodland tree resource is very unevenly distributed.

All these factors combine to make it difficult to make detailed comparisons of the results of one survey with another, but it is possible to draw some general conclusions.

Comparisons of Tree Numbers

In 1951 the total number of trees of 7 cm dbh and over recorded for Great Britain was 73.3 million. This figure needs to be reduced to allow for trees in woods of 0.25-0.4 ha to make it comparable with the 1980 total. The adjusted 1951 total is estimated to be 70.3 million trees. During the last thirty years, therefore, the total number of non-woodland trees has apparently risen by about 18 million or about 25 per cent. This, however, is the overall change and is not distributed uniformly through the size classes. The extent of such change is, however, difficult to quantify partly because of the adoption of the metric system, which results in the class limits not being exactly comparable, and partly because in the 1951 Survey Report there is no summarised information on the diameter distribution of "firewood" trees, i.e. crooked, short-boled or defective trees, or "short" trees, those with stem lengths of between six and ten feet (2-3 m). The absence of this information means that an overall tree distribution by size classes cannot be accurately derived. However, since 1951 it seems likely that there has been a near doubling of tree numbers in the 7-20 cm dbh class, and a 43 per cent increase in tree numbers in the 31-50 cm dbh class. This situation is apparent in each of the three countries but it must be stressed that there are regional and local variations in the pattern and the recruitment position will not be as satisfactory in some areas as in others.

Volume Comparison

The results of the 1951 and 1980 Surveys are shown in the following table after adjustments to the 1951 figures to exclude the volume occurring in woods of 0.25-0.4 ha and to include an allowance for the fact that volume measurements in 1951 were confined to trees over 20 cm in diameter.

Millions of cubic metres		
	1951	1980
Coniferous volume	2.1	2.9
Broadleaved volume	26.2	25.0
Total	28.3	27.9

These figures indicate that there has been a rise in coniferous volume in the thirty years between the two surveys. Increases have taken place in both England and Scotland, whilst the volume in Wales has remained constant. In the case of broadleaved volume, there has been a slight reduction in the Great Britain total, with Wales and Scotland showing increases and England a substantial drop mainly due to the loss of elm. The change in species volume for Great Britain is set out in the table below; the figures for 1951 are unadjusted values and have been taken directly from the Report.

Millions of cubic metres					
1951			1980		
Species	Volume	Per cent	Species Group	Volume	Per cent
Scots pine	0.8	3	Pines	1.2	4
Norway spruce	0.2	<1	Spruces	0.2	1
European larch	0.2	<1	Larches	0.4	1
Other conifers	0.9	3	Other conifers	1.1	4
Total conifers	2.1	7	Total conifers	2.9	10
Oak	9.0	31	Oak	8.8	32
Beech	2.5	9	Beech	2.7	10
Sycamore	2.1	7	Sycamore	2.6	9
Ash	3.8	13	Ash	4.1	15
Birch	0.1	<1	Birch	0.4	1
Sweet chestnut	0.1	<1	Sweet chestnut	0.4	1
Elm	5.7	20	Elm	1.0	4
Other broadleaves	3.7	13	Other broadleaves	5.0	18
Total broadleaves	27.0	93	Total broadleaves	25.0	90
Total	29.1	100	Total	27.9	100

The coniferous species groups recognised at each survey do not correspond exactly but it appears likely that pines, larches and Other conifers are rather more important now than they were in 1951, whilst spruces have maintained their previous level.

Among the broadleaves, the significant change is the position of elm which has dropped from being the second most important species overall, to the eighth. The volumes and percentages of the more important named species have remained relatively constant with sycamore showing a modest increase and Other broadleaves a substantial increase over the 1951 levels.

**TABLE 14 SUMMARY OF NUMBERS OF LIVE ISOLATED
TREES AND CLUMPS AND LENGTH OF LINEAR FEATURES**

Thousands of trees and clumps

Total Number of Isolated Trees	18 078 (± 3.4%)
Total Number of Clumps	5 676 (± 4.8%)
Total Length of Linear Features	100 200 km (± 5.5%)

NOTES:
The figures in brackets are standard errors.
Densities per square kilometre are as follows:

Number of Isolated trees	— 81
Number of Clumps	— 25
Length of Linear Features	— 0.45 km

TABLE 15 AREA OF CLUMPS BY SPECIES GROUPS

Hectares

Species Group	Clumps
Mainly Coniferous	7 411
Mainly Broadleaved	91 333
Total	98 744

DIAGRAM 8

NUMBER OF LIVE TREES OF 7 CM DBH
OR GREATER BY CATEGORY AND
SPECIES GROUPS

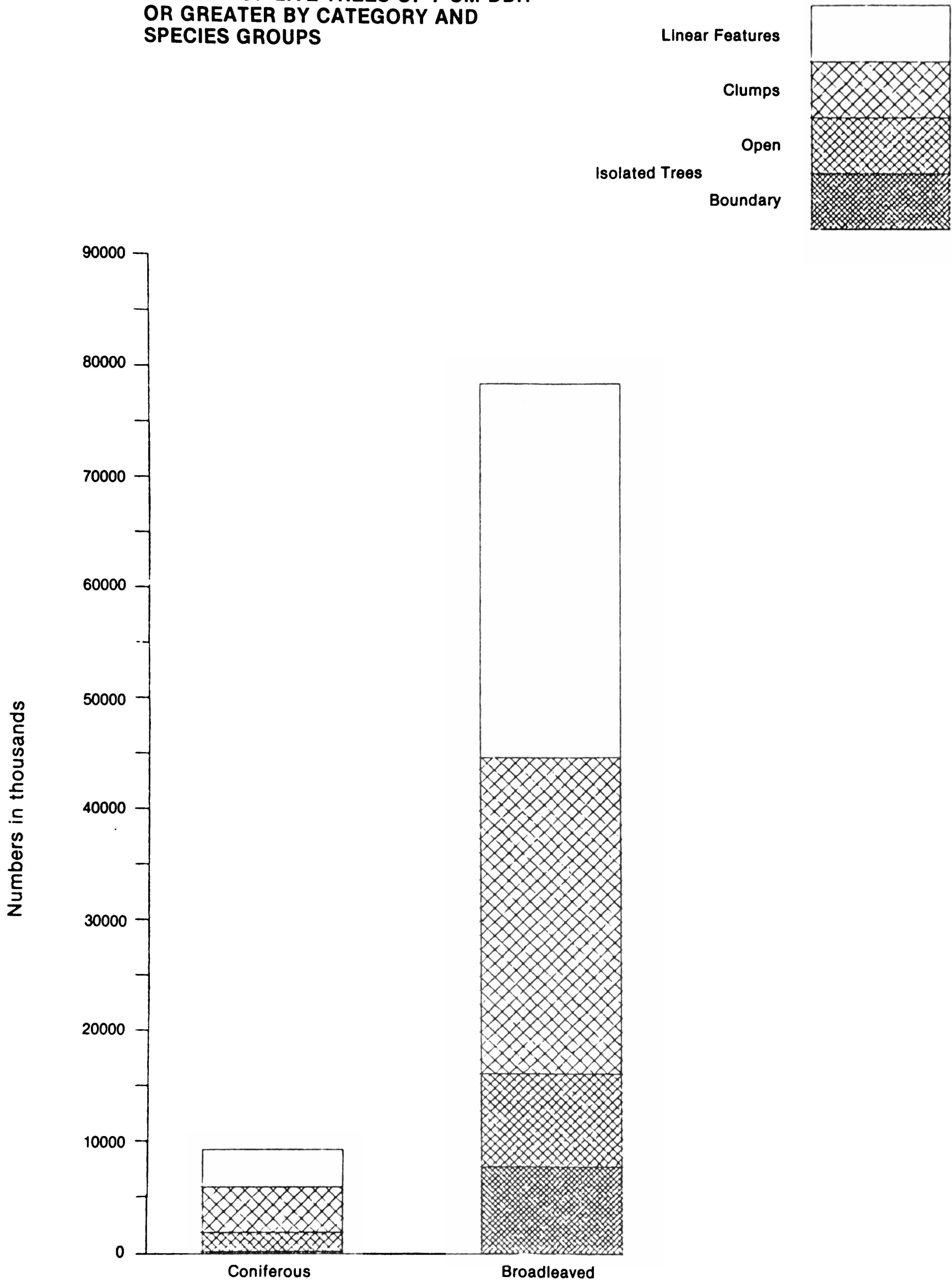


TABLE 16

NUMBER OF LIVE TREES OF 7 CM DBH OR GREATER
BY CATEGORY AND PRINCIPAL SPECIES

Thousands of trees

Species	Isolated Trees		Clumps	Linear Features	Total (S.E.)
	Boundary	Open			
Pines	93	355	1 321	687	2 456
Spruces	45	151	512	1 069	1 777
Larches	26	138	574	544	1 282
Cypresses	32	680	1 048	630	2 390
Other conifers	32	374	587	411	1 404
Total conifers	228	1 698	4 042	3 341	9 309 (± 10%)
Oak	2 498	1 066	3 399	5 302	12 265
Beech	294	265	1 425	2 547	4 531
Sycamore	653	979	3 569	4 110	9 311
Ash	2 702	983	6 012	5 895	15 592
Birch	205	913	4 550	2 386	8 054
Poplar	133	333	566	946	1 978
Sweet chestnut	19	16	110	337	482
Horse chestnut	56	232	226	244	758
Alder	238	200	2 814	6 568	9 820
Lime	60	376	377	519	1 332
Elm	183	189	1 062	1 696	3 130
Willow	272	418	1 407	1 480	3 577
Other broadleaves	474	2 395	3 085	1 842	7 796
Total broadleaves	7 787	8 365	28 602	33 872	78 626 (± 4%)
Total	8 015	10 063	32 644	37 213	87 935 (± 4%)

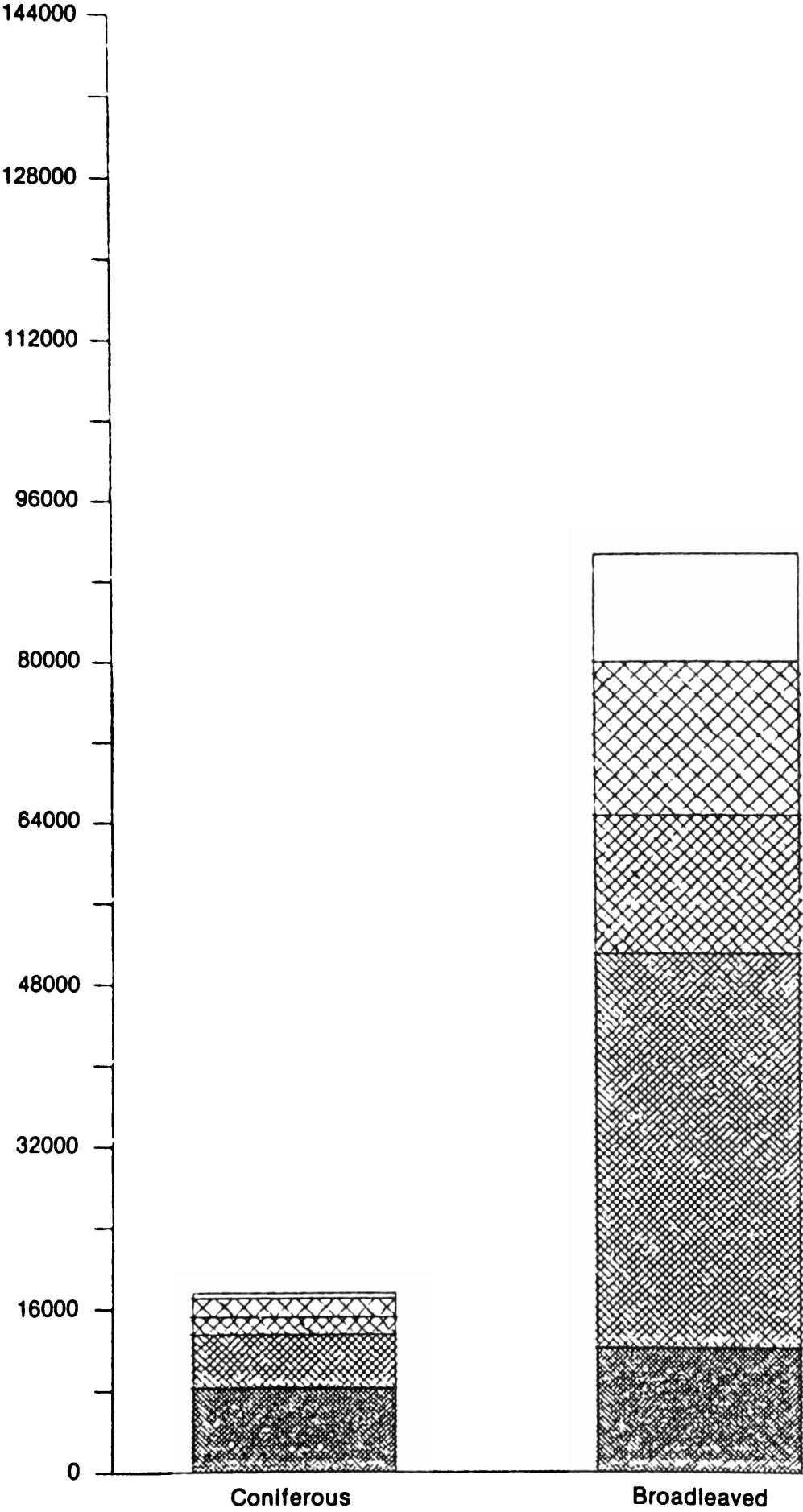
NOTE:

In addition, within Great Britain there are the following trees:

Species	Isolated Trees	Clumps	Linear Features	Total (S.E.)
Trees < 7cm dbh All species	9 857	5 572	5 090	20 519 (± 10%)
Dead and Dying All species	1 494	1 591	2 139	5 224 (± 8%)

DIAGRAM 9
NUMBER OF ALL LIVE TREES BY
SPECIES GROUPS AND SIZE CLASSES

Numbers in thousands



Size Classes
(dbh)

> 50 cm

31-50 cm

21-30 cm

7-20 cm

< 7 cm

TABLE 17

NUMBER OF ALL LIVE TREES BY PRINCIPAL SPECIES
AND SIZE CLASSES

Thousands of trees

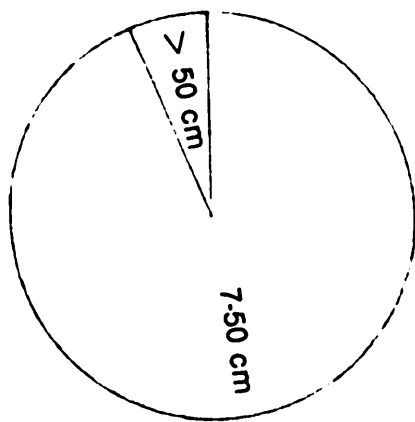
Species	Size Class (dbh)					Total
	< 7 cm	7-20 cm	21-30 cm	31-50 cm	> 50 cm	
Pines	1 773	742	615	875	224	4 229
Spruces	3 476	1 364	234	141	38	5 253
Larches	206	420	370	440	52	1 488
Cypresses	2 310	2 089	196	89	16	4 700
Other conifers	508	641	294	289	180	1 912
Total conifers	8 273	5 256	1 709	1 834	510	17 582
Oak	747	2 979	1 820	3 412	4 054	13 012
Beech	214	1 457	867	1 124	1 083	4 745
Sycamore	1 687	4 943	1 564	1 778	1 026	10 998
Ash	1 567	7 987	2 385	3 247	1 973	17 159
Birch	1 610	6 109	1 254	620	71	9 664
Poplar	503	921	397	438	222	2 481
Sweet chestnut	15	253	108	59	62	497
Horse chestnut	163	148	117	194	299	921
Alder	715	4 943	2 605	1 986	286	10 535
Lime	157	366	254	407	305	1 489
Elm	180	1 522	559	640	409	3 310
Willow	765	1 845	537	482	713	4 342
Other broadleaves	3 923	5 484	1 231	862	219	11 719
Total broadleaves	12 246	38 957	13 698	15 249	10 722	90 872
Total	20 519	44 213	15 407	17 083	11 232	108 454

NOTE:

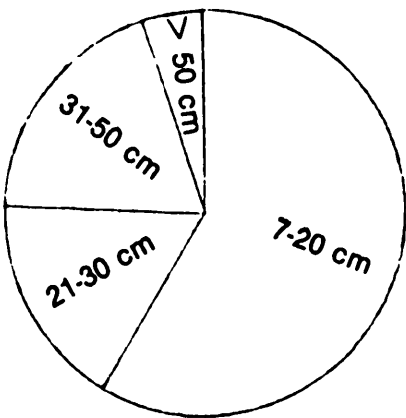
The average number of all live trees per square kilometre is 483.

DIAGRAM 10

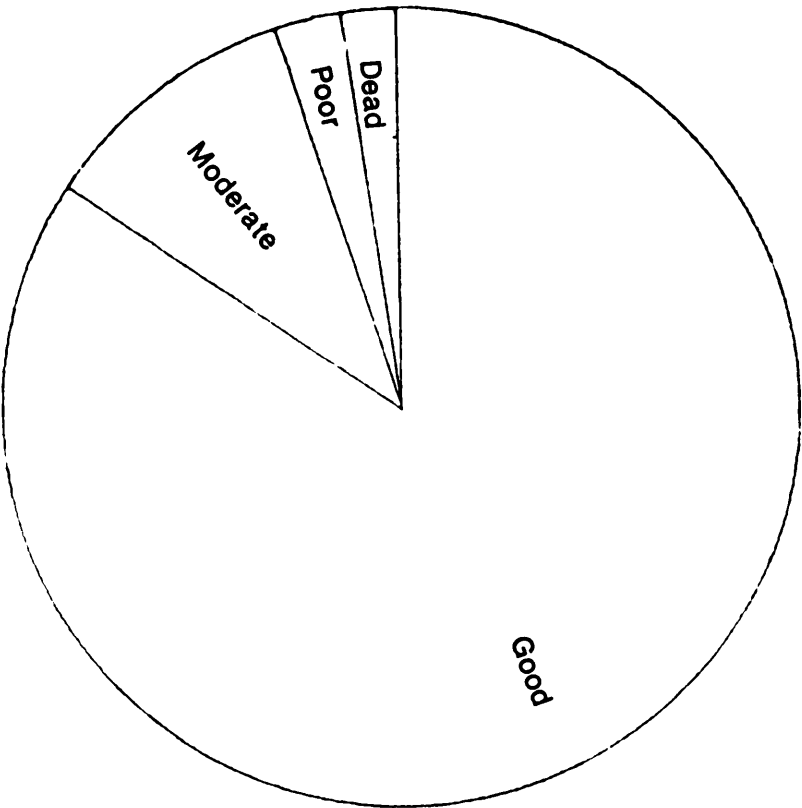
HEALTH OF ALL CONIFEROUS TREES OF 7 CM DBH OR GREATER BY SIZE CLASSES



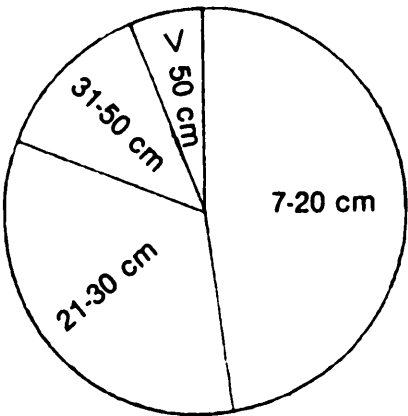
Dead



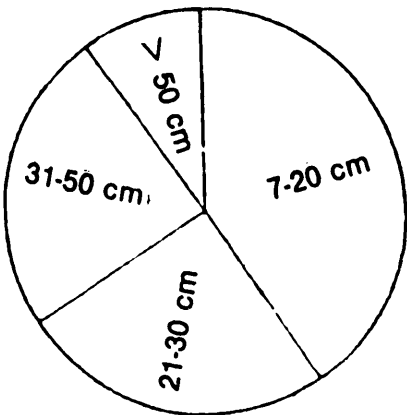
Good



Health expressed as a proportion of the total population



Poor



Moderate

Note: The sizes of the circles are not to scale

HEALTH OF ALL TREES OF 7 CM DBH OR GREATER BY PRINCIPAL SPECIES
AND SIZE CLASSES

TABLE 18aALL SPECIESThousands of trees

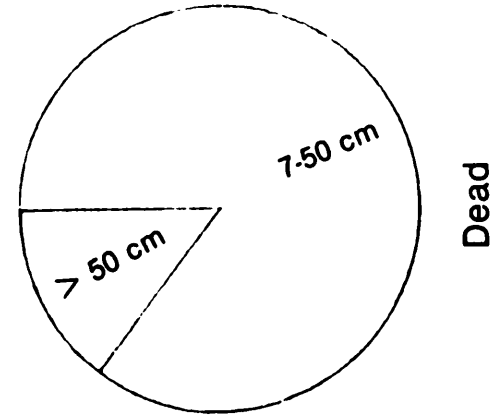
Species	dbh class cm	Health Class			Dead and Dying
		Good	Moderate	Poor	
Total conifers	7-20	4 726	409	121)
	21-30	1 371	254	84	) 201
	31-50	1 557	244	33)
	> 50	396	99	15	) 13
	Total	8 050	1 006	253	214
Total broadleaves	7-20	31 919	6 295	743)
	21-30	10 441	2 832	425	) 4 272
	31-50	11 122	3 457	670)
	> 50	6 920	2 926	876	) 738
	Total	60 402	15 510	2 714	5 010
Total	7-20	36 645	6 704	864)
	21-30	11 812	3 086	509	) 4 473
	31-50	12 679	3 701	703)
	> 50	7 316	3 025	891	) 751
	Total	68 452	16 516	2 967	5 224

TABLE 18bCONIFERSThousands of trees

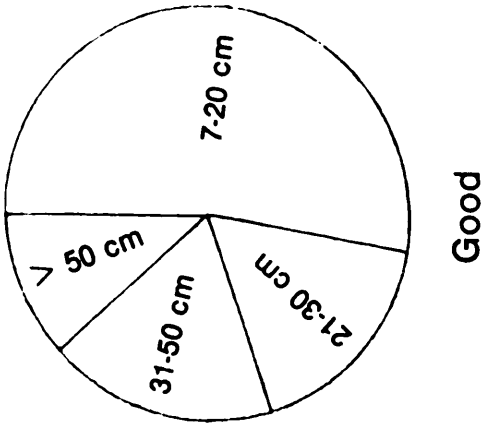
Species	dbh class cm	Health Class			Dead and Dying
		Good	Moderate	Poor	
Pines	7-20	625	102	15)
	21-30	472	128	15	) 73
	31-50	775	89	11)
	> 50	168	51	5	) 8
	Total	2 040	370	46	81
Spruces	7-20	1 242	89	33)
	21-30	183	34	17	) 70
	31-50	118	13	10)
	> 50	30	6	2) —
	Total	1 573	142	62	70
Larches	7-20	307	67	46)
	21-30	267	59	44	) 20
	31-50	319	111	10)
	> 50	37	14	1) —
	Total	930	251	101	20
Cypresses	7-20	2 021	62	6)
	21-30	189	7	—	) 5
	31-50	87	2	—)
	> 50	16	—	—) —
	Total	2 313	71	6	5
Other conifers	7-20	531	89	21)
	21-30	260	26	8	) 33
	31-50	258	29	2)
	> 50	145	28	7	) 5
	Total	1 194	172	38	38
Total conifers	7-20	4 726	409	121)
	21-30	1 371	254	84	) 201
	31-50	1 557	244	33)
	> 50	396	99	15	) 13
	Total	8 050	1 006	253	214

DIAGRAM 11

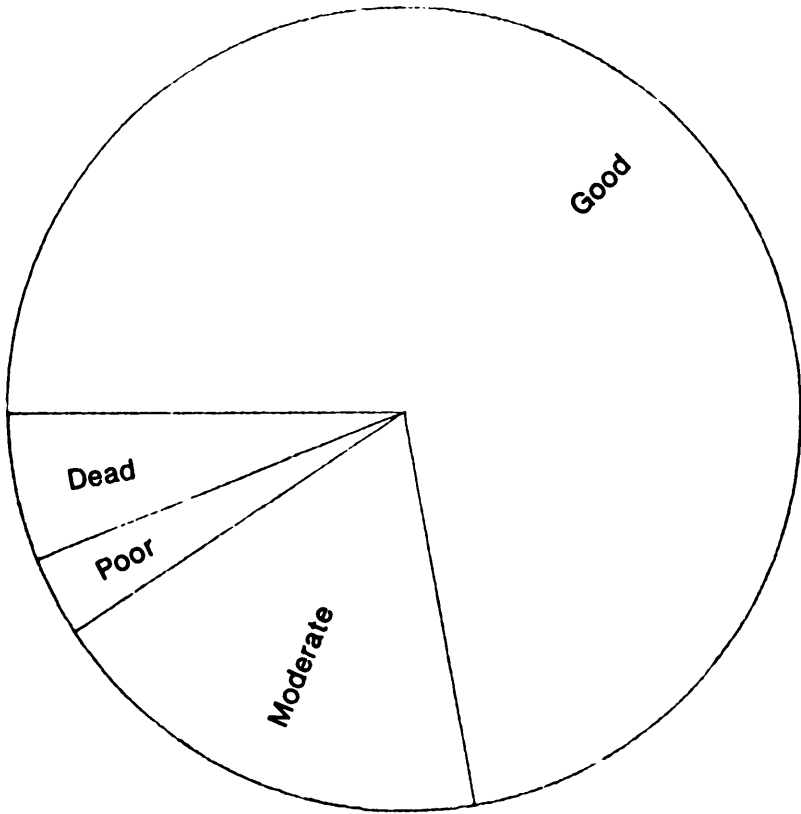
HEALTH OF ALL BROADLEAVED TREES OF 7 CM DBH OR GREATER BY SIZE CLASSES



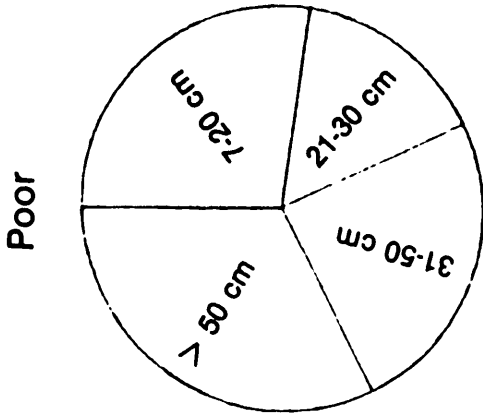
Dead



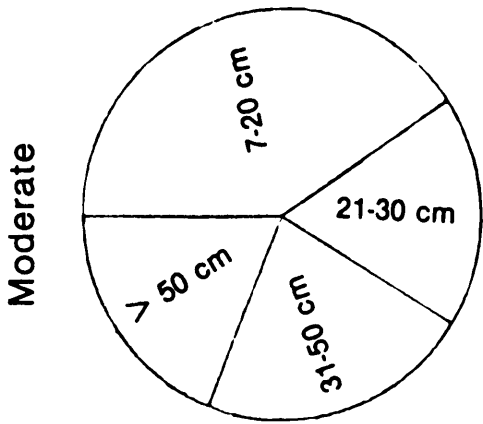
Good



Health expressed as a proportion of the total population



Poor



Moderate

Note: The sizes of the circles are not to scale

HEALTH OF ALL TREES OF 7 CM DBH OR GREATER BY PRINCIPAL SPECIES AND SIZE CLASSES

TABLE 18c

BROADLEAVES

Thousands of trees

Species	dbh class cm	Health Class			Dead and Dying
		Good	Moderate	Poor	
Oak	7-20	2 656	281	42)
	21-30	1 545	243	32)
	31-50	2 694	640	78)
	> 50	2 863	965	226	20
	Total	9 758	2 129	378	84
Beech	7-20	1 189	253	15)
	21-30	613	235	19)
	31-50	831	272	21)
	> 50	817	215	51	17
	Total	3 450	975	106	44
Sycamore	7-20	4 394	503	46)
	21-30	1 285	258	21)
	31-50	1 493	247	38)
	> 50	758	246	22	6
	Total	7 930	1 254	127	40
Ash	7-20	6 455	1 394	138)
	21-30	1 721	569	95)
	31-50	2 150	830	267)
	> 50	1 042	698	233	31
	Total	11 368	3 491	733	118
Birch	7-20	4 529	1 495	85)
	21-30	867	330	57)
	31-50	370	234	16)
	> 50	44	15	12	1
	Total	5 810	2 074	170	73
Poplar	7-20	714	194	13)
	21-30	336	50	11)
	31-50	353	77	8)
	> 50	162	56	4	5
	Total	1 565	377	36	24
Sweet chestnut	7-20	74	168	11)
	21-30	24	83	1)
	31-50	27	21	11)
	> 50	40	18	4	—
	Total	165	290	27	3

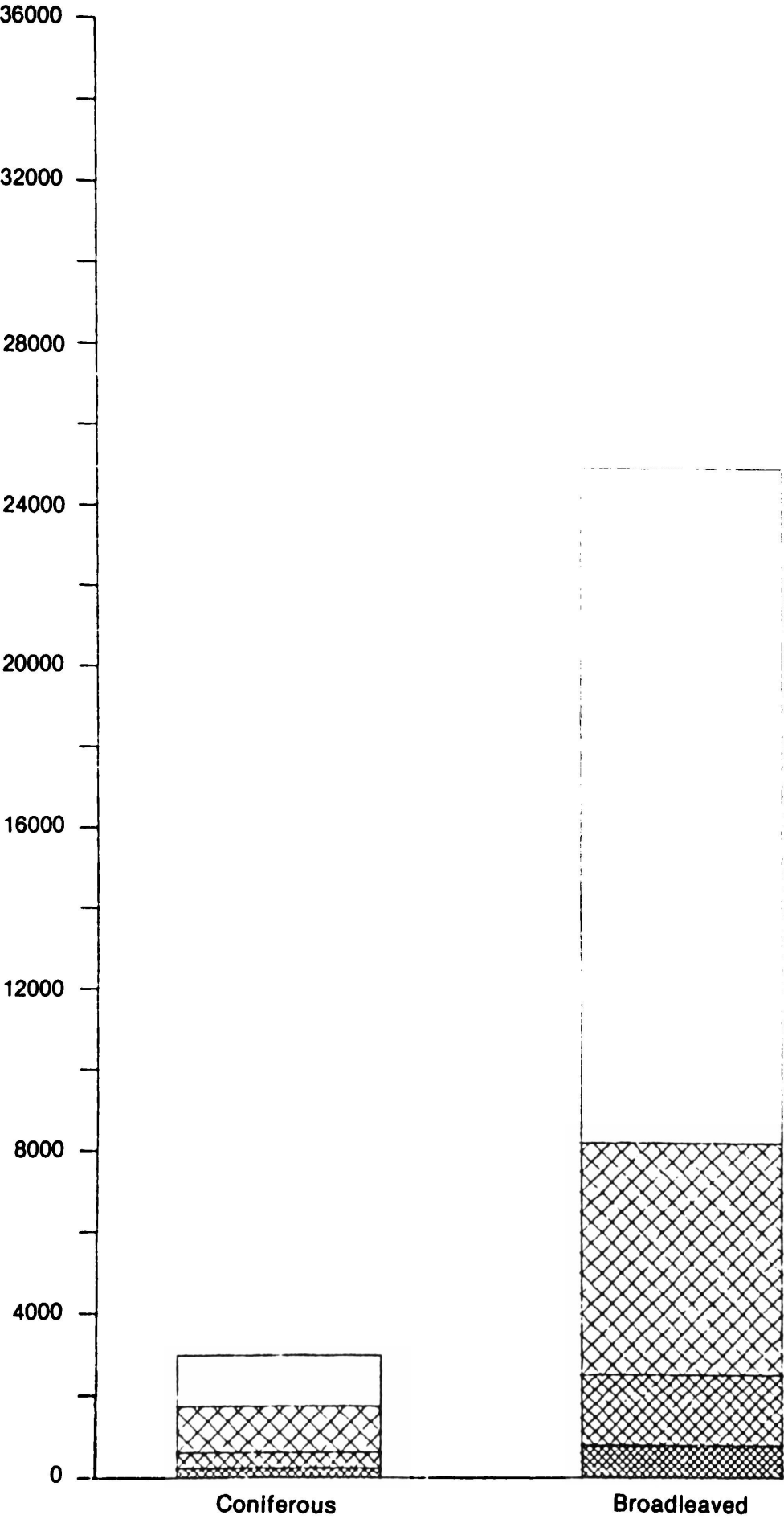
Thousands of trees

Species	dbh class cm	Health Class			Dead and Dying
		Good	Moderate	Poor	
Horse chestnut	7-20	134	12	2)
	21-30	108	8	1)
	31-50	148	45	1)
	> 50	234	60	5	—
	Total	624	125	9	2
Alder	7-20	4 229	651	63)
	21-30	2 027	527	51)
	31-50	1 389	560	37)
	> 50	144	115	27	54
	Total	7 789	1 853	178	153
Lime	7-20	288	70	8)
	21-30	209	44	1)
	31-50	357	48	2)
	> 50	228	73	4	—
	Total	1 082	235	15	2
Elm	7-20	1 098	259	165)
	21-30	323	165	71)
	31-50	366	170	104)
	> 50	178	112	119	590
	Total	1 965	706	459	4 384
Willow	7-20	1 516	262	67)
	21-30	366	144	27)
	31-50	307	116	59)
	> 50	298	263	152	14
	Total	2 487	785	305	24
Other broadleaves	7-20	4 643	753	88)
	21-30	1 017	176	38)
	31-50	637	197	28)
	> 50	112	90	17	—
	Total	6 409	1 216	171	59
Total broadleaves	7-20	31 919	6 295	743)
	21-30	10 441	2 832	425)
	31-50	11 122	3 457	670)
	> 50	6 920	2 926	876	738
	Total	60 402	15 510	2 714	

DIAGRAM 12

STANDING VOLUME OF TIMBER FOR LIVE
TREES OF 7 CM DBH OR GREATER BY
SPECIES GROUPS AND SIZE CLASSES

Thousands of cubic metres overbark



Size Classes
(dbh)

> 50 cm

31-50 cm

21-30 cm

7-20 cm

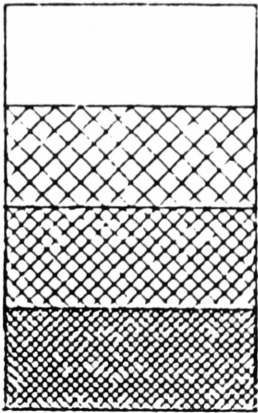


TABLE 19

STANDING VOLUME OF TIMBER FOR LIVE TREES OF 7 CM DBH OR GREATER BY PRINCIPAL SPECIES AND SIZE CLASSES

Thousands of cubic metres overbark

Species	Size Class (dbh)				Total
	7-20 cm	21-30 cm	31-50 cm	>50 cm	
Pines	33.1	139.2	602.8	446.9	1 222.0
Spruces	60.2	56.9	75.8	56.1	249.0
Larches	31.2	85.9	233.9	96.5	447.5
Cypresses	74.7	37.7	45.0	31.2	188.6
Other conifers	32.8	71.7	157.8	616.9	879.2
Total conifers	232.0	391.4	1 115.3 (± 15%)	1 247.6 (± 21%)	2 986.3 (± 13.0%)
Oak	72.1	195.4	1 375.9	7 175.5	8 818.9
Beech	38.9	118.9	494.1	2 046.1	2 698.0
Sycamore	115.2	221.2	696.3	1 548.3	2 581.0
Ash	195.3	359.4	1 316.2	2 265.7	4 136.6
Birch	82.3	103.5	126.1	56.6	368.5
Poplar	41.7	91.8	275.7	482.5	891.7
Sweet chestnut	20.8	26.5	30.5	292.2	370.0
Horse chestnut	2.9	15.1	91.3	574.3	683.6
Alder	129.6	370.5	610.3	310.3	1 420.7
Lime	8.3	33.6	201.5	724.9	968.3
Elm	24.9	63.7	229.1	641.7	959.4
Willow	44.7	59.3	117.4	347.3	568.7
Other broadleaves	25.1	43.6	135.1	294.6	498.4
Total broadleaves	801.8	1 702.5	5 699.5 (± 6%)	16 760.0 (± 5%)	24 963.8 (± 4.0%)
Total	1 033.8	2 093.9	6 814.8 (± 6%)	18 007.6 (± 5%)	27 950.1 (± 4.0%)

NOTE:

The figures in brackets are standard errors.

Approved Woodland

Privately owned woodland included in a Forestry Commission scheme where the owners could not, or did not wish to, enter into the long-term, legally-binding arrangement of Dedication.

Broadleaved High Forest of Coppice Origin

Crops of Coppice origin which have a mean breast height diameter of more than 15 cm and are assessed by the same criteria as Broadleaved High Forest.

Cleared

Woodland areas which are marked green on the O.S. 1:50 000 map, but at the time of the Survey were found to be cleared of trees and had not been converted to another land use.

Clump

A small woodland or group of trees of less than 0.25 ha.

Coppice

Crops of marketable broadleaved species that have at least two stems per stool and are either being worked or capable of being worked on rotation. With the exception of hazel coppice, more than half the stems should be capable of producing 3 m timber lengths of good form. Coppice crops with a mean breast height diameter greater than 15 cm are assessed as B.H.F. of Coppice origin.

Coppice with Standards (C.W.S.)

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.

Dedicated Woodland

Privately owned woodland within the Forestry Commission Dedication Scheme. In return for financial assistance, an owner accepts a continuing obligation by Deed or Agreement of Covenant to manage these woodlands in accordance with a Plan of Operations which is designed to secure sound forestry practice.

Diameter Breast Height (dbh)

Diameter of a tree rounded down to the nearest centimetre at a point on the tree 1.3 m above ground level.

Disforested

Woodland areas which are marked green on the O.S. 1:50 000 map, but at the time of survey were found to be under another land use, eg agriculture, buildings.

Extra Woodland

Areas of woodland over 0.25 ha in extent found during the Survey but not marked green on the O.S. 1:50 000 map.

Forestry Commission Woodland (FC)

Woodland owned by, on lease to or managed by the Forestry Commission.

High Forest (H.F.)

Stands of trees having a canopy density of 20 per cent or more, or, in the case of young stands which have not closed canopy, occupying 20 per cent or more of the ground at normal spacing. More than half of the crop should be capable of producing 3 m timber lengths of good form and be of merchantable species.

Linear Feature

Strips of woody vegetation less than 20 m mean width, crown edge to crown edge, and more than 25 m long.

Mainly Broadleaved High Forest

High Forest (q.v.) containing 50 per cent or more by area of broadleaved species.

Mainly Coniferous High Forest

High Forest (q.v.) containing more than 50 per cent by area of coniferous species.

"Other" Woodland

Woodland which is neither in Forestry Commission ownership or management nor included in a Dedication or Approved Woodland Scheme.

Planting Year (P. Year)

The year in which the trees were planted or regenerated naturally. With older crops it was often necessary to estimate the P. Year.

Planting Year Class

A group of planting years.

Scrub

All inferior crops where more than half the trees are of poor form, poor timber potential or composed of unmarketable species, and so do not qualify as either High Forest or Coppice.

Shrub Layer

A layer of woody plants below the tree canopy.

Woodland

Area of woody growth greater than 0.25 ha in area and at least 20 m wide. Where the stocking density was less than 20 per cent or there was evidence of recent woody growth, the area was described as cleared, otherwise it was allocated to a forest type.

APPENDIX 2

LIST OF SPECIES RECORDED AND REPORTED UPON — WOODLAND

English Name	Standard Abbreviation	Botanical Name
Scots pine	SP	<i>Pinus sylvestris</i> L.
Corsican pine	CP	<i>Pinus nigra</i> var. <i>maritima</i> (Ait.) Melville
Lodgepole pine	LP	<i>Pinus contorta</i> Douglas ex Loud.
Sitka spruce	SS	<i>Picea sitchensis</i> (Bong.) Carr.
Norway spruce	NS	<i>Picea abies</i> (L.) Karst.
European larch	EL	<i>Larix decidua</i> Miller
Japanese/Hybrid larch	JL	<i>Larix kaempferi</i> (Lamb.) Carr.
	HL	<i>Larix x eurolepis</i> Henry
Douglas fir	DF	<i>Pseudotsuga menziesii</i> (Mirb.) Franco
Other conifers*	XC	
Mixed conifers	MC	
Oak	OK	<i>Quercus robur</i> L.
		<i>Quercus petraea</i> (Matt.) Lieblein.
Beech	BE	<i>Fagus sylvatica</i> L.
Sycamore	SY	<i>Acer pseudoplatanus</i> L.
Ash	AH	<i>Fraxinus excelsior</i> L.
Birch	BI	<i>Betulus</i> spp.
Poplar	PO	<i>Populus</i> spp.
Sweet chestnut	SC	<i>Castanea sativa</i> Mill.
Alder	AR	<i>Alnus</i> spp.
Elm	EM	<i>Ulmus</i> spp.
Hornbeam	HBM	<i>Carpinus betulus</i> L.
Hazel	HAZ	<i>Corylus avellana</i> L.
Willow		<i>Salix</i> spp.
Other broadleaves*	XB	
Mixed broadleaves	MB	

* Included within Other conifers and Other broadleaves are some species which were recognised in the Survey but are of such limited occurrence as to preclude their individual inclusion in the Report.

LIST OF SPECIES RECORDED BUT NOT REPORTED UPON INDIVIDUALLY — WOODLAND

English Name	Standard Abbreviation	Botanical Name
Other pine	XP	<i>Pinus</i> spp.
Other spruce	XS	<i>Picea</i> spp.
Western hemlock	WH	<i>Tsuga heterophylla</i> (Raf.) Sarg.
Western red cedar	RC	<i>Thuja plicata</i> D.Don.
Cypresses		<i>Cupressus</i> spp.
		<i>Chamaecyparis</i> spp.
		<i>x Cupressocyparis leylandii</i> (Jacks. Dallim.) Dallim.
Grand fir	GF	<i>Abies grandis</i> Lindl.
Noble fir	NF	<i>Abies procera</i> Rehd.
Other fir	XF	<i>Abies</i> spp.
Redwoods		<i>Sequoia sempervirens</i> (D.Don) End.
		<i>Sequoiadendron giganteum</i> (Lindl.) Buchholz
Yew		<i>Taxus baccata</i> L.
Other conifers	XC	
Other oak		<i>Quercus</i> spp.
Norway maple	NOM	<i>Acer platanoides</i> L.
Horse chestnut	HCH	<i>Aesculus hippocastanum</i> L.
Lime	LI	<i>Tilia</i> spp.
English elm**	EEM	<i>Ulmus procera</i> Salis.
Wych elm**	WEM	<i>Ulmus glabra</i> Huds.
Nothofagus	N	<i>Nothofagus</i> spp.
Prunus (Cherries)		<i>Prunus</i> spp.
Ornamentals		
Other broadleaves	XB	

** For the purposes of the Report, English elm and Wych elm were included as elm.

NOTE:
In certain circumstances the following were also recorded as Woodland species:

Rowan	<i>Sorbus aucuparia</i> L.
Holly	<i>Ilex aquifolium</i> L.
Field maple	<i>Acer campestre</i> L.
Whitebeam	<i>Sorbus aria</i> agg.

APPENDIX 2 (contd)

LIST OF SPECIES RECORDED AND REPORTED UPON — NON-WOODLAND TREES

English Name	Standard Abbreviation	Botanical Name
Pines		<i>Pinus</i> spp.
Spruces		<i>Picea</i> spp.
Larches		<i>Larix</i> spp.
Cypresses		<i>Cupressus</i> spp.
		<i>Chamaecyparis</i> spp.
		<i>x Cupressocyparis leylandii</i> (Jacks. Dallim.) Dallim.
Other conifers	XC	
Oak	OK	<i>Quercus robur</i> L.
		<i>Quercus petraea</i> (Matt.) Lieblein.
Beech	BE	<i>Fagus sylvatica</i> L.
Sycamore	SY	<i>Acer pseudoplatanus</i> L.
Ash	AH	<i>Fraxinus excelsior</i> L.
Birch	BI	<i>Betula</i> spp.
Poplar	PO	<i>Populus</i> spp.
Sweet chestnut	SC	<i>Castanea sativa</i> Mill.
Horse chestnut	HCH	<i>Aesculus hippocastanum</i> L.
Alder	AR	<i>Alnus</i> spp.
Lime	LI	<i>Tilia</i> spp.
Elm	EM	<i>Ulmus</i> spp.
Willow		<i>Salix</i> spp.
Other broadleaves	XB	

NOTE:
Although the above species are given in the Report the total list of species recorded was the same as for Woodland.

LIST OF SHRUB LAYER SPECIES RECORDED

English Name	Botanical Name
Rowan*	<i>Sorbus aucuparia</i> L.
Field maple*	<i>Acer campestre</i> L.
Blackthorn	<i>Prunus spinosa</i> L.
Hawthorn	<i>Crataegus monogyna</i> Jacq.
Rhododendron	<i>Rhododendron</i> spp.
Holly*	<i>Ilex aquifolium</i> L.
Elder	<i>Sambucus</i> spp.
Broom	<i>Sarothamnus scoparius</i> (L.) Wimmer ex Koch.
Gorse	<i>Ulex</i> spp.
Privet	<i>Ligustrum vulgare</i> L.
Dogwood	<i>Cornus sanguinea</i> L.
Sallow	<i>Salix caprea</i> L.
Box	<i>Buxus sempervirens</i> L.
Whitebeam*	<i>Sorbus aria</i> agg.
Spindle	<i>Euonymus europaeus</i> L.
Yew*	<i>Taxus baccata</i> L.
Hornbeam*	<i>Carpinus betulus</i> L.
Hazel	<i>Corylus avellana</i> L.
Willow*	<i>Salix</i> spp.
Other shrubs	
Mixed shrubs	

*These species have on occasion been recognised as tree species.

APPENDIX 3

DESCRIPTION OF SOIL STRATA

Reassessment of Soil Survey of England and Wales 1:1 million Soil Map for Woodland Surveys

The Forestry Commission Census Section sought advice from the Soil Survey of England and Wales and the Forestry Commission's own Site Studies Branch on soils to be recognised for Census purposes. The object was to produce a map showing broad site types relevant to tree growth potential. As a result, the 71 soil units shown on the 1:1 million soil map were combined to produce 16 soil groups.

A further variable was recognised which overrode the new soil strata units: potential soil moisture deficit (PSMD). Deficits more or less than 150 millimetres (mm) were distinguished at county level; counties with >150 mm PSMD were considered dry (namely, those east of and including Nottinghamshire, Lincolnshire, Leicestershire, Northamptonshire, Oxfordshire, Berkshire and Hampshire), and counties in the 100-150 mm zone were intermediate. Wet uplands (<100 mm PSMD) were already separated (units 12 to 16 in the list below).

Soil Groups

1. Sandy; well drained.
2. Alluvial and "valley" soils; with groundwater.
3. Lowland peaty and humose soils; with groundwater.
4. Rendzinas over chalk and limestone; well drained.
5. Brown calcareous soils; well drained.
6. Lowland brown earths; mainly well drained.
7. Deeply leached brown earths; mainly over chalk.
8. Podzols; well drained.
9. Sandy soils, some podzolisation, with groundwater.
10. Surface-water gleys and other clayey soils.
11. Surface-water gleys over compacted silty or loamy beds. (High Weald.)
12. Brown earths; uplands.
13. Stagno-podzols; humose or peaty; often with iron-pan and rock.
14. Surface-water gleys in moist climates.
15. Peaty or humose surface-water gleys.
16. Hill peat.
17. Urban.

Reassessment of the Macaulay Institute for Soil Research 1:625 000 Soil Map for Woodland Surveys

Discussions with staff of the Macaulay Institute for Soil Research made it apparent that although many of the soil groups adopted for England and Wales could also be utilized for Scotland there was a need for some additional groups. After further advice from Site Studies Branch, seven additional groupings were adopted. Some of these are best described as complexes to cater for changes in soil type that take place over short distances.

18. Western seaboard complex.
19. Peaty gley complex.
20. West coast igneous peaty complex.
21. North and west coast rock and peat complex.
22. Blanket peatlands.
23. Mountain tops.
24. Coarse textured alluvium, high groundwater.

CRITERIA FOR THE ASSESSMENT OF THE HEALTH OF NON-WOODLAND TREES

For all living trees, health was estimated in three categories; good, moderate and poor.

Symptoms of poor health were:

a. Crown deterioration, indicated by:

abnormally small, sparse or unhealthily discoloured foliage;
premature discolouration of foliage or defoliation;
extensive dieback, breakage or shedding of limbs in the upper crown (disregarding 10 per cent of dieback in oak).

b. Bole deterioration, indicated by:

diseased, dead or missing areas of bark including decayed wood;
death of large limbs;
advanced and hazardous decay following lopping;
suspected internal decay of swollen boles.

c. Instability, indicated by:

wind - rock symptoms of displaced soil at the base of the bole;
exposure of root system through erosion.

From an assessment of the presence or otherwise of any of the above symptoms the condition of each tree was classified as good, moderate or poor. All assessments were external from ground level.

If none of the above symptoms were present, the health of the tree was assessed as "good".

If one symptom only was present, the health was assessed as "moderate".

If more than one symptom was present, tree health was assessed as "poor".

There were occasions, particularly in summer, when the general appearance of a tree was unsatisfactory, and then the surveyor, if in doubt, recorded tree health as "moderate".

NOTES:

1. Dead branches or areas of dead bark in beech automatically classified the tree health as "poor".

2. Elm was treated on its own, as the symptoms of Dutch elm disease can occur very quickly during the latter part of the summer. For prognosis, the general health of the tree was compared with those around it. Checks were made for dead leaves, twigs, branches and 'shepherds crooks' as well as for beetle emergence holes in the bark. Areas of dead or peeling bark indicated serious loss of health.

APPENDIX 5a

LIFE EXPECTANCY BY SPECIES GROUPS, SIZE AND HEALTH OF CONIFEROUS SPECIES
REPORTED UPON IN THE NON-WOODLAND TREE TABLES

Years

Species Groups	Pines Larches			Spruces Douglas fir Other firs			Other conifers		
	Good	Mod.	Poor	Good	Mod.	Poor	Good	Mod.	Poor
Health									
Size Class (dbh)									
7 - 20 cm	180	90	40	150	70	30	100	60	30
21 - 50 cm	100	60	20	90	50	20	80	50	20
51 - 80 cm	80	50	10	70	40	10	60	40	10
> 80 cm	50	20	—	40	20	—	40	20	—

NOTES:

The object of this table is to give a broad assessment of life expectancy of non-woodland trees, thus allowing forecasts to be made of the likely changes in the tree population in the landscape.

The years of life expectancy are broad national figures, assuming normal conditions over the period. Allowance must be made for local climatic and soil conditions.

Redwoods and yew in good health must be considered separately from all other conifers as both species may live a very considerable time.

APPENDIX 5b

LIFE EXPECTANCY BY SPECIES GROUPS, SIZE AND HEALTH OF BROADLEAVED SPECIES
REPORTED UPON IN THE NON-WOODLAND TREE TABLES

Years

Species Groups	Oak Sweet chestnut			Sycamore Lime			Beech† Elm†			Ash			Horse chestnut Willow Alder Poplar			Birch		
	Good	Mod.	Poor	Good	Mod.	Poor	Good	Mod.	Poor	Good	Mod.	Poor	Good	Mod.	Poor	Good	Mod.	Poor
Health																		
Size Class (dbh)																		
7 - 20 cm	> 300	> 250	100	> 200	> 150	60	> 150	80	—	100	70	30	80	50	20	50	20	—
21 - 50 cm	> 250	> 200	90	> 200	> 100	50	> 100	60	—	80	50	20	50	30	10	30	10	—
51 - 80 cm	> 200	> 150	70	> 150	> 100	40	90	40	—	60	40	10	30	10	—	20	—	—
> 80 cm	> 150	> 100	50	> 100	> 80	20	60	30	—	40	30	—	10	—	—	10	—	—

NOTES:

The object of this table is to give a broad assessment of life expectancy of non-woodland trees thus allowing forecasts to be made of the likely changes in the tree population in the landscape.

The years of life expectancy are broad national figures, assuming normal conditions over the period. Allowance must be made for local climatic and soil conditions.

The species in this table are only those found in Table 18c. The species in the "Other broadleaves" category, namely those recognised in the Non-Woodland Tree Survey, but not reported upon individually in Table 18c, cover such a wide range of life expectancies that it is not feasible to classify them in any meaningful way.

† In the case of elms, consideration must be given to the local incidence of Dutch elm disease. The life expectancy stated above assumes that the trees will be free of this particular threat. No life expectancy is given for beech or elm in poor health because of the likelihood of Beech bark disease and Dutch elm disease; such trees may live for some time or be dead next year.