FORESTRY COMMISSION

Census Report No. 1

CENSUS OF WOODLANDS 1947–1949

WOODLANDS OF FIVE ACRES AND OVER

LONDON: HER MAJESTY'S STATIONERY OFFICE
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PREFACE

This *Report* has been compiled by Mr. J. S. R. Chard, a Divisional Officer of the Forestry Commission, who, as Chief Census Officer, was in charge of the actual Survey. It has been edited for press by Mr. H. L. Edlin, Publications Officer, with the assistance of Mr. F. C. Hummel, Mensuration Officer, and of Mr. G. M. L. Locke, the present Census Officer. Both the actual Survey and the preparation of the Report were carried out under the supervision of Mr. W. H. Guillebaud, Deputy Director-General, and Mr. James Macdonald, Director of Research and Education.

The Maps on Plates VI and VII are reproduced by courtesy of the Director-General, Ordnance Survey, and the aerial photo on Plate VIII by permission of the Air Ministry. The British Tabulating Machine Company, Ltd., who assisted with the tabulation of the figures, kindly agreed to the reproduction of the Hollerith card shown as figure 3 on page 167.

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INTRODUCTORY OUTLINE

This *Report* is the second, and most substantial, of the publications which together will present the findings of the Census of Woodlands carried out by the Forestry Commission between 1947 and 1951. The first of these, entitled *Census of Woodlands, 1947-1949, Summary Report*, was published as an interim measure as Forest Record No. 3 (H.M.S.O., price 9d.) in 1951, in order to make the main results of the Census available as early as possible. This present *Report* includes all the data given in that earlier *Summary Report*, and reviews the Census findings at greater length and in greater detail.

Following the completion of this present Survey, a further survey was put in hand to ascertain the volume of timber standing in hedgerows, woods under five acres, and certain descriptions of "Unproductive" forest. The results will form the subject of a subsequent report.

Three other Census reports, now in preparation for England, Scotland and Wales respectively, will consist of summary tables giving details by counties of woods of five acres and over together with a brief account of the character of each county's woodlands.

Within the compass of the present *Report*, it is not possible to give full figures for individual counties, but nearly all the information is presented separately for Great Britain as a whole, and for England, Scotland and Wales, individually. It is likewise given separately for *all* the woodlands of each country, and for those in Private ownership and those in State Forests.

Part I of this *Report*, entitled "Purpose and Methods" (page 13), outlines the reasons for carrying out the Census survey, gives a brief historical account of earlier surveys, and describes the methods used in this 1947 to 1949 survey.

Part II, entitled "Census by Area" (page 29), is concerned with a consideration of the area of ground occupied by the woodlands of various descriptions, and not with their timber volume. The threefold division of the woodlands on a basis of ownership, into All Woodlands, Private Woodlands, and State Forests, makes it essential to sub-divide it into three sections namely A, B and C. This sub-division is essential, not only for administrative reasons, but also because there are great differences between the composition of the Private Woodlands and that of the State Forests, which frequently make any attempt to review the two together misleading.

Each section of Part II includes four chapters. In each case, the first chapter explains the scope of the Census survey. The second chapter deals with the most important analysis of the area surveyed, that is, its classification according to the "Type" or character of the woodland. By far the most important Type, both by area and economically, is the High Forest, and the third chapter of each section is therefore devoted to a detailed analysis of this Type under three main heads:—

(i) Its composition by age-classes.

(ii) Its composition by tree species.

(iii) The relationship of the principal tree species to the various age-classes.

In addition, the condition of the crops, in terms of stocking and tree form, is reviewed in those chapters concerned with Private Woodlands and State Forests. The fourth chapter in each section of Part II discusses the character of the remaining Types of woodland, namely, Coppice, Scrub, Devastated and Felled areas.

Part III of the *Report*, entitled "Volume and Increment Surveys" (page 135), is concerned with the timber volume of the woodlands and the rate by which it is increasing each year. Only two descriptions of woodland, the High Forest Type, and the standard trees of the Coppice-with-Standards sub-type, are considered therein.

Part IV, entitled "Comparisons and Conclusions" (page 155), presents a brief comparison between the results of this Census and those of earlier surveys, and gives the main conclusions reached by this 1947-1949 Census.

Eleven Plates make up the central inset, following page 112. Plates I to V and IX to XI show representative areas of the main Types of woodland discussed in Part II. Plates VI, VII and VIII relate to Chapter 2, "Method of Survey", and show how the six-inch Ordnance Survey maps were used as a basis for all the area data here presented.

Appendices I to IV, pages 165 to 189, relate to Chapter 2, entitled "Method of Survey", and show details of documents used (in Figures 1 to 8) and methods employed. Appendix V, page 190, relates to Chapter 16, entitled "Survey of Volume Increment", and gives certain data used in the special investigation of the increment of broadleaved trees.

Appendix VI, page 191, relates to Part II, entitled "The Census by Area", as a whole. It is the only portion of this *Report* to present figures on a county basis, and comprises twenty tables. Its purpose is to provide an analysis by counties, of the main sub-divisions, such as those by Type of woodland, discussed in the area census which makes up Part II.

Appendix VII, page 232, gives details of the areas of woodland surveyed in the State Forests, classified by Forest units and conservancies.

Appendix VIII, page 238, consists of nineteen maps. Map 1, Maps 3 to 6, and Maps 8 to 14, express graphically certain of the information by counties previously given in tabular form in Appendix VI. Map 2, presented for comparison with Map 3, is based on the 1924 Census, and is included to show changes in the relative productivity of the woodlands between 1924 and 1947. Map 7 shows the distribution of the 302 State Forests that were included in the 1947 Census Survey.

Appendix IX, page 258, is a histogram comparing the productive and unproductive areas of the woodlands of the country, at various dates between 1913 and 1947.

Appendix X, page 259, gives details of a special additional survey which was carried out in the State Forests only.

Appendix XI, page 263, provides information on the principal "minor species" of trees encountered in Private Woodlands.

PART I

PURPOSE AND METHODS

CHAPTER 1

THE PURPOSE OF THE CENSUS

This census was carried out between January, 1947, and June, 1949. Its purpose was to provide a detailed classification by area, based on the six-inch Ordnance Survey maps, of all woods five acres and over in extent (and exceeding one chain (66 feet) in width), according to type of crop, age-class, condition, and species, and to assess the proportion of this area which could be considered suitable for economic management as part of the potentially productive woodland of the country.

In addition, it was required to obtain global figures for the volume of standing timber, classified by principal species and main categories of size, and to assess the current annual volume increment. Volumes were obtained by a process of sampling, which was carried out concurrently with the later stages of the area survey and was completed by October 1949.

The necessity for such a comprehensive census arose from the inadequacy of existing data for the detailed planning and execution of forest policy. Earlier surveys were not only subject to certain inherent defects and omissions but they had been thrown completely out of date by the widespread fellings of British woodlands between 1939 and 1945.

Former Surveys

Statutory Returns

The only reasonably comprehensive records of British woodlands prior to 1914 were compiled from statutory returns. This information was summarised in 1913 for England and Wales by the Board of Agriculture, and in 1914, for Scotland, by the Board of Agriculture for Scotland (*Agriculture Statistics—England and Wales 1913*, Cd. 7325; *Scotland, 1914*, Cd. 7958). In each case the schedules were distributed by local officers of the Board of Customs and Excise to woodland owners who gave particulars under the headings:

(*a*) Coppice including Coppice-with-Standards,

(*b*) Plantations under ten years old,

(*c*) Other Woods.

In order to obtain additional information required in connection with the supply of timber for national defence during the War of 1914 to 1918, a Survey of Scottish woodlands was undertaken by the Timber Supply Department in February, 1918, and completed in the following year. A similar survey was started in England and Wales but was not finished. The results in each case were of value only for the immediate uses for which they were required, and were never published.

Forestry Commission Census of 1924

One of the first acts of the Forestry Commission after its constitution in 1919 was to draw up plans for a complete census of British woodlands, in order to take stock of the position after the extensive war fellings of 1914 to 1918.

This survey started in the autumn of 1921, but was not completed until the end of 1926; however, as most of the work was done in 1924, that year was adopted as the date of the census, and statistics collected in other years were adjusted accordingly. (Forestry Commission *Report on Census of Woodlands and Census of Production of Home Grown Timber, 1924.* H.M.S.O., 1928 (Out of Print.)).

In England and Wales, most of the work of collection was done on a voluntary basis by private individuals (County Organisers) selected for their extensive knowledge of the woodlands in their particular districts. The County Organisers were supplied with copies of six-inch Ordnance Survey quarter-sheets, on which was marked the outline of each individual wood exceeding two acres in extent. These maps were then forwarded to woodland owners who were asked to indicate on them the types and age-classes of their woods.

In Scotland the information was similarly recorded on six-inch Ordnance Survey quarter-sheets but the work was done partly by the Commissioners' regular Local Correspondents and partly by the technical staff of the Commission.

In the returns, the woodlands were divided into two main classes:

(*a*) Economic or potentially productive—*i.e.*, woods maintained or capable of being maintained for the production of timber for commercial purposes.

(*b*) Uneconomic—*i.e.*, woods not maintained for timber production, but primarily serving some other purpose.

The first category was divided into High Forest (sub-divided by age-classes), Coppice and Coppice-with-Standards, Scrub and Felled or Devastated woods. The second category included amenity woods, shelter belts and park timber.

This method, although it was the only one practicable at the time, contained certain inherent defects, of which the most important were variations in the fullness and accuracy of the returns submitted, and local differences in the interpretation of the instructions for classification. It was therefore realised that a more careful survey would eventually become necessary.

Other Surveys

In the meantime two privately-sponsored surveys were being carried out, and these must be mentioned.

The first, the Land Utilisation Survey of Britain, an independent research organisation set up under the auspices of the London School of Economics (University of London), recorded the use of every acre of land in the country, including woodland, on six-inch Ordnance Survey sheets, and subsequently published this information in a series of coloured maps on the scale of one inch to one mile. The maps were explained and analysed in a series of Reports, one for each administrative county. Publication of the Reports began in 1937 and was completed in 1946.

Woodland was classified as:

(*a*) High Forest (coniferous, mixed and broadleaved),

(*b*) Coppice and Coppice-with-Standards,

(*c*) Scrub,

(*d*) Felled.

Unfortunately the areas for each type were not set out in detail, and the value of the survey from a forestry viewpoint consists mainly of the record of

total woodland area for each county, and its distribution in relation to other types of land use.

The second survey was undertaken in 1937 by the National Home Grown Timber Council, and comprised a census of the woods of Hertfordshire. Although on a small scale, it was a useful piece of pioneering for later work, and established the value of using specially trained surveyors for the enumeration, in place of untrained voluntary workers. In this Survey the woods were classified in considerable detail, an ocular estimate was made of their timber contents, and brief silvicultural notes were written for each area. This information was recorded on cards which, by a system of coding and indexing, permitted mechanisation of the work of sorting and tabulating.

Forestry Commission Census of 1938

During this period international developments were giving increasing cause for concern as to the extent to which stocks of home-grown timber might be available to tide the nation over the emergency of another war. The Forestry Commissioners accordingly carried out small trial surveys in the autumn of 1937, in two English and two Scottish counties, to test methods and procedure. At the beginning of 1938, they set up a Census and Plans Branch charged with undertaking a census of all woods of five acres or more in extent, and with preparing plans for the rapid increase of home timber production in the event of hostilities.

The technical staff consisted of a Divisional Officer in charge, assisted by two District Officers and twelve (later sixteen) surveyors, of whom the majority were university graduates in forestry; several of these men had had previous experience on the trial surveys and the National Home Grown Timber Council census. The work was directed from Headquarters, in London, where the office staff consisted of one chief clerk and three (later six) other clerks. Counties were surveyed in groups, a district office being set up at a convenient centre in each region.

All woods, or areas shown as woodland, on the six-inch Ordnance Survey sheets, and exceeding five acres in extent, were inspected and classified as:

(*a*) High Forest (coniferous, mixed and broadleaved),
(*b*) Coppice and Coppice-with-Standards,
(*c*) Scrub,
(*d*) Felled or Devastated,
(*e*) Derelict,
(*f*) Lost (disafforested).

High Forest was further classified by age-classes, and both High Forest, Coppice and Coppice-with-Standards by condition. For all types of crop an ocular estimate was made of the contents of each stand by species and "assortments" or size categories of produce. Each category was coded and the information was recorded by marking appropriate numbered frames on the field form; final computations of area and of volume were made in the office, and completed data were then transferred to a series of punched cards for mechanised sorting and tabulation.

In order to provide a statistical check on the accuracy of the ocular estimates, and to pick up information about the area and contents of woods less than five acres in extent, a carefully controlled sampling survey was carried out simultaneously with the main census. The sampling areas were located by reference to the six-inch Ordnance Survey quarter-sheets. One quarter-sheet in every five was selected at random. A perforated celluloid grid was placed over it

and a series of 54 pin holes was pricked in the north-west quarter (*i.e.*, the portion six inches deep and nine inches wide at the top left-hand of the quarter sheet). The area thus demarcated, covering $1\frac{1}{2}$ square miles, was inspected on the ground; and the location of each pin hole falling within the boundaries of existing woodland was taken as the centre of a sample plot, circular in shape and one-tenth of an acre in size. The plots were laid out with tapes, and all measurable trees falling within their boundaries were recorded; sample trees were girthed and their heights taken by hypsometer.

When war broke out in September, 1939, the census had been completed for about 18 per cent. of the woodland area of England and Wales, and 50 per cent. of the woodland area of Scotland. Complete surveys had been made of the counties of Nottingham, Lincoln, Sussex, Flint, Denbigh, Caernarvon, Anglesey, Merioneth, Montgomery, Caithness, Sutherland, Ross and Cromarty, Nairn, Moray, Banff, Aberdeen, Kincardine, Angus, Fife, Kinross, and Clackmannan, while parts of the counties of Yorkshire (West Riding), Derby, Leicester, Rutland, Shropshire, Cardigan, Radnor, Inverness and Perth had also been covered.

Estimates of the timber resources of the whole country were by then urgently required, and to give these with any degree of accuracy more information was required about the counties which had not been surveyed. Circumstances having made impossible the completion of this census, it was decided, before stopping the field work altogether, to make a rapid sampling survey of these unsurveyed counties with the object of determining the proportion of woodland falling in the different types, and the variations in volume per acre, species and assortments.

This "flying survey" was carried out by a modification of the original sampling procedure. In order to reduce the work involved, and so save time, a lower intensity of sampling was accepted, and the sampling areas were selected systematically, spaced across the unsurveyed counties at the intersections of a grid of 25 mile squares. The four six-inch Ordnance Survey quarter-sheets falling nearest to each point of intersection were prepared for sampling as before, and the subsequent field procedure was identical.

Computation of the final results was based on a transformation of the areas of types and age-classes obtained in the 1924 census, adjusted to conform with those changes which had been found to occur in the counties which were fully surveyed.

Although the 1938-1939 census, if it had been completed, would have given a more detailed and accurate record of British woodlands than any previous survey, the method adopted contained defects, which did not become apparent until the work was well advanced. The most serious, in the circumstances, was the fact that it could only be carried out by a highly qualified and specially trained staff, the shortage of which restricted the rate of progress. Moreover, the assessment of volumes, at the same time as survey and classification by areas, not only slowed the work as a whole, but necessitated the spending of a disproportionate amount of time in irregularly stocked and less productive types of woodlands in which volume estimation was naturally more difficult. In spite of this, the figures and information obtained were of great value in the early stages of the war, and for the formulation of post-war policy.

Ministry of Supply Survey, 1942

The progress of war fellings was so rapid that the Ministry of Supply, which had, by 1942, taken over the Home Timber Production Department set up by the Forestry Commission at the outbreak of war, soon became concerned

over the adequacy of the flying survey data and was faced with the necessity of carrying out another census in order to obtain an up-to-date picture. In Scotland, this was done by a complete stocktaking of all utilisable stands of timber, and was based on the one-inch Ordnance Survey maps. But in England and Wales, where the individual woods are smaller and more diverse in character, the limited time available led to the adoption of a sampling method.

In the first instance (A Scheme), systematically selected six-inch Ordnance Survey maps, representing five per cent. of the total land area of England and Wales (one quarter-sheet in twenty), were examined in two stages covering two and a half per cent. each. This was followed by a second five per cent. sample (B Scheme); and subsequently by the complete survey of selected areas, and (in some cases) counties, which were of particular importance from the point of view of timber production (C Scheme).

The woods were classified by type, age-class, and condition, in the same manner as in the 1938-1939 census, but the assortments recorded in the volume estimates were varied. At the same time, in addition to woods over five acres in extent, one wood in every five of those under five acres was surveyed. State woodlands and areas completely surveyed in the 1938-1939 census were excluded; and adjustments were made for these in computing the results, which were worked up on the basis of the total area of woodland shown on the latest revisions of the one-inch Ordnance Survey maps, calculated from intercepts. The full ten per cent. sample (Schemes A and B) on which these final estimates were based was surveyed by the end of 1942, after which work on the C Scheme was continued on a reduced scale until the end of 1945.

In an undertaking carried out in the difficulties and stress of war-time, the urgency of the moment inevitably required certain compromises and approximations in the methods of survey and computation, which in the ordinary course of events would have been avoided. In spite of this, the 1942 census attained its main object by providing a revised global figure for the total timber volume of the country, and of the proportions suitable for the various kinds of production. It made a further contribution to the data required for the formulation of post-war forest policy, but like its predecessor, it suffered the disadvantage of being rapidly thrown out of date by the still unabated progress of felling.

Home Timber Production During the War (1939 to 1945)

The full story of the contribution made to the war effort by British woodlands has been told elsewhere. (*Home Timber Production*, 1939-1945, by Russel Meiggs. London, 1949.) The volume of timber actually produced, after conversion, is set out briefly in Table 1 below.

PRODUCTION OF HOME GROWN TIMBER
SEPT. 1939—DEC. 1945

Table 1 — Thousands of cubic feet

Country	Sawn Hardwoods	Sawn Softwoods	Sawn Mining	Round Mining	Total
England and Wales	233,563	118,371	46,369	190,510	588,813
Scotland	18,347	126,019	64,724	98,579	307,669
Great Britain	251,910	244,390	111,093	289,089	896,482

This table gives details of the total production of home-grown timber by categories, amounting in all to nearly 900 million cubic feet. Allowing conservatively for an average loss on conversion of 25 per cent, this represents a standing volume of at least 1,200 million cubic feet, hoppus measure, over bark, slightly more than one-third of the 3,372 million cubic feet estimated, in 1938-1939, to be the total volume of woodland, park and hedgerow timber standing at the outbreak of war.

Practically the whole of this amount was taken from private woodlands, for although State Forests contributed 51¼ million cubic feet, the greater part of the plantations made by the Forestry Commissioners since 1919 were still too young to yield useful produce. At the outset an effort was made, through the control afforded by felling licences, to reserve the immature crops, but as the scarcity of various classes of material increased, this practice could not be maintained. Shortages of man-power often imposed the need for a concentration of work in clear fellings, even in cases where thinnings over a wider area might have given an equivalent yield. Some types of woodland suffered more heavily than others. The overwhelming need throughout was for softwoods, and Scotland, where the growing stock is predominantly coniferous, was called upon to meet a high proportion of this demand. With hardwoods, the demand, as always, tended to be selective, both by species and by qualities, and stocks of certain categories such as prime ash and veneer beech were all but exhausted. In some cases, good was done by clearing poor-growing neglected stands which would have been difficult to market in normal times, but the large surplus of second and third quality oak present in mature broadleaved woodlands remained relatively hard to dispose of; the proportion of waste involved in its conversion was often large, while attempts to substitute it for other and scarcer timbers were not always successful.

While coppice woods made some small contribution to the production of round mining timber, and standards, hedgerow and park trees to the production of sawn hardwoods, by far the greater part of the 1,200 million cubic feet which was felled came from High Forest stands, and this quantity could not have been obtained by the cutting over, either completely or on a selective basis, of much less than half a million acres of woodland. Changes of this magnitude had a profound effect on the structure of our woodlands. The changes which took place during the war made it more than ever necessary to have an accurate stocktaking of the country's present resources.

CHAPTER 2

METHOD OF SURVEY

British woodlands are characterised by relatively small size, multiplicity of ownership, and by the diverse character of individual blocks, scattered over a countryside which, although predominantly agricultural in character, is frequently broken up by urban and industrial development. Although recent large scale afforestation is beginning to change this pattern in some parts of the country, the only considerable regions in which the density of woodland approaches conditions typical of other parts of Europe occur in south-east England and the north-east of Scotland. Despite these disadvantages of

dispersal, few woods lie at any great distance from a public road, and all but the more recent plantations are accurately shown on the six-inch Ordnance Survey maps, which are revised from time to time according to the progress of development in different counties or districts.

The methods of survey appropriate to such conditions had already been largely established by earlier work, and practically all requirements for the present census could therefore be foreseen.

A complete enumeration was necessary, and it had to be carried out in the shortest possible time. The essentials were to employ specially trained staff, to base the survey on the six-inch Ordnance Survey map, to avoid waste of effort in the inspection of very small woods and in the estimation of the contents of individual stands, to adopt a classification which would give information comparable with previous records, and to codify the data to facilitate booking and permit the mechanisation of sorting and tabulation.

Trial Survey of 1946

In June, 1946, the Forestry Commission set up a small staff to investigate the problem and to draw up proposals. This was placed under supervision of the Director of Research and Education, and consisted of an officer with administrative experience of similar work in the Colonial Forest Service, a District Officer with previous service on both the 1938-1939 and 1942 surveys, and two surveyors who had been engaged continuously on the 1942 sampling survey and subsequent C Scheme, referred to in Chapter 1.

Trial surveys were carried out in parts of Sussex, Kincardineshire and Nottinghamshire, and finally, after agreement had been reached on the main procedure, a census was started for the County of Bedford.

During this period, instructions and definitions were tested and modified, and possible rates of progress under varying conditions were assessed. Concurrently with the field work, technical advice was obtained on various methods of machine tabulation, and attention was given to the possible use of air photographs as an aid to demarcation and enumeration on the ground.

The main conclusions reached were that a full census could be completed in about thirty months; that private and State woodlands should be dealt with separately; that England, Scotland and Wales should each be dealt with separately; that a central office should be established for administration, to co-ordinate the field work, to handle the sorting and tabulation of data, and to store records; and that volume sampling should be carried out after completion of the area survey.

It was also decided that September 30th, 1947, was the most convenient date to use as a datum line for all facts recorded. This coincides with the close of the "Forest Year", for which all the statistics and *Annual Reports* of the Forestry Commission are made up. This, in turn, has been so fixed because it coincides with both the start of the annual season for tree-planting, which extends from October in one year to April in the next, and also with the virtual cessation of the annual growth of tree crops.

Survey by Area, 1947-1949

Details of Classification

The Census of Woodlands covered only those woods of five acres or more in total extent, and every such wood in the country was visited and classified; an annotated copy of the general survey instructions is shown in Appendix II, page 176.

The principle of classification is based on the concept of the Stand, which may be defined as any area of woodland, one acre or more in extent, which is uniform for purposes of description. It was found that in most cases individual woods had to be broken up into a number of Stands.

Stands were determined by inspection and by reference to the six-inch Ordnance Survey map, isolated blocks of woodland less than five acres in extent or less than one chain in width being disregarded. The method of demarcation and of numbering is indicated in Plates VI and VII (central inset) which are reproductions of an actual census map after the surveyor's original pencilled detail had been inked in for permanent record. Plate VIII (central inset) shows an air photograph of part of the same area, for comparison.

For each Stand so demarcated a Stand Data Form was prepared, and this was completed in duplicate, by filling in the appropriate references of county, map number, stand number, surveyor and date of survey, and by placing a cross in each of the various code frames required to indicate the classification adopted. Figs. 1 and 2 are reproductions of a completed Stand Data Form. (See pages 164 and 166.)

The main classification was first of all into Private Woodlands and State (Forestry Commission) Forests, and within this into nine types:

(*a*) Coniferous High Forest.
(*b*) Mixed High Forest.
(*c*) Broadleaved High Forest.
(*d*) Coppice-with-Standards.
(*e*) Coppice.
(*f*) Scrub.
(*g*) Devastated.
(*h*) Felled.
(*i*) Lost (disafforested).

Of these, Coppice-with-Standards was sub-divided according to the type of coppice: Mainly Chestnut, Mainly Hazel, Mainly Oak, and "Mixed or Other". Felled areas were sub-divided according to the date of felling: before 1st September, 1939, and since 1st September, 1939.

The three High Forest types were broken down into nine age-classes:—

(*a*) 1 to 10 years.
(*b*) 11 to 20 years.
(*c*) 21 to 30 years
(*d*) 31 to 40 years.
(*e*) 41 to 60 years.
(*f*) 61 to 80 years.
(*g*) 81 to 120 years.
(*h*) Over 120 years.
(*i*) Uneven-aged.

The Uneven-aged class, if two-storied, was further divided into "Underplanting" and "Natural Regeneration".

The three High Forest types and the Standards in Coppice-with-Standards, were assessed for condition, *i.e.*, by Tree Form as Elite, Satisfactory, Poor or Bad, and by Stocking as Overstocked, Satisfactory, Poor or Bad. Together

with Coppice, Scrub and Devastated, they were also classified by species: Principal (the dominant or best represented species in the crop) and Subsidiary (the next most important tree species in mixture).

Both Principal and Subsidiary Species were sub-divided into Conifers and Broadleaved, with a selection of sixteen representatives in each group. These were, respectively:

Conifers:

(*a*) Scots pine (*Pinus sylvestris* L.)
(*b*) Corsican pine (*P. laricio* Poir = *P. nigra* var. *calabrica* Schneid.)
(*c*) Lodge-pole pine (*Pinus contorta* Doug.)
(*d*) European larch (*Larix europaea* D.C. = *L. decidua* Mill.)
(*e*) Japanese larch (*L. leptolepis* Gord.)
(*f*) Hybrid larch, (*L. eurolepis* Henry)
(*g*) Norway spruce, (*Picea excelsa* Link. = *P. abies* Karst.)
(*h*) Sitka spruce (*P. sitchensis* Carr.)
(*i*) Douglas fir (*Pseudotsuga douglasii* Carr. = *P. taxifolia* Brit.)
(*j*) Tsuga (hemlock) (*Tsuga heterophylla* Sarg.)
(*k*) Lawson cypress (*Chamaecyparis lawsoniana* Parl.)
(*l*) Grand fir (*Abies grandis* Lindl.)
(*m*) Common silver fir (*A. pectinata* D.C. = *A. alba* Mill.)
(*n*) Noble fir (*A. nobilis* Lindl. = *A. procera* Rehd.)
(*o*) Thuya (western red cedar or arborvitae) (*Thuja plicata* D. Don.)
(*p*) "Other conifers";

Broadleaved Trees:

(*a*) Oaks (*Quercus pedunculata* Ehrh. = *Q. robur* L. and *Q. sessiliflora* Salis. = *Q. petraea* Liebl.)
(*b*) Ash (*Fraxinus excelsior* L.)
(*c*) Beech (*Fagus sylvatica* L.)
(*d*) Birch (*Betula verrucosa* Ehrh. = *B. pendula* Roth, and *B. pubescens* Ehrh.)
(*e*) Spanish or sweet chestnut (*Castanea sativa* Mill.)
(*f*) Sycamore (*Acer pseudoplatanus* L.)
(*g*) Common alder (*Alnus glutinosa* Gaertn.)
(*h*) Hazel (in Coppice, Scrub, or Devastated only) (*Corylus avellana* L.)
(*i*) Hornbeam (*Carpinus betulus* L.)
(*j*) Poplars (*Populus* spp.)
(*k*) Limes (*Tilia* spp.)
(*l*) Elms (*Ulmus* spp.)
(*m*) Willows (*Salix* spp.)
(*n*) Norway maple (*Acer platanoides* L.)
(*o*) Cherry or gean (*Prunus avium* L.)
(*p*) "Other broadleaved" species.

Finally the area under survey (of which the Stand might form the whole or part) was classified according to its apparent suitability for economic management, as Suitable, Doubtful or Unsuitable.

On the reverse of the Stand Data Form, certain additional information was recorded, according to circumstances, but was not coded or classified. This included an assessment of the proportion by species of all trees forming more than ten per cent. of the crop; an indication of the age-range of High Forest stands recorded as Uneven-aged; notes on variations in Tree Form, Stocking or species distribution; the identification of species recorded as Other Conifers or Other Broadleaved; and reference to any operations in progress at the time of survey.

Although the same classification was applied to both Private Woodlands and State Forests, opportunity was taken in the latter case to combine the census survey with a detailed post-war stock-taking, which took into account the progress of establishment in all the Forestry Commissioners' plantations and forecast the treatment which would be required by each area within the next five years. Details are given in Appendix X, page 259.

Since the effective date of survey was taken to be the 30th September, 1947, any Private Woodlands acquired by the Forestry Commissioners after that date were classified in the census as if they had still remained in private ownership.

Organisation and Progress of Field Work

In January, 1947, headquarters was set up at the Forest Research Station at Alice Holt, on the borders of Hampshire and Surrey, and a sub-office was opened for Scotland in Edinburgh.

Administration, accounting and establishment were placed under the Chief Research Officer. A Chief Census Officer, stationed at Alice Holt, was put in charge of the work, with assistant Census Officers for England and Wales and for Scotland respectively. These latter were concerned with the survey of Private Woodlands only. The Census of State Forests, which was carried out by the Forestry Commission's local staff, was taken during the latter part of 1947 and the first half of 1948.

In Private Woodlands, the initial stages of the work were handicapped by the difficulties of the post-war period, including lack of transport, restrictions on man-power, delays in printing and in the supply of equipment of all kinds, and shortage of accommodation for travelling staff, while the severe winter delayed field work. These obstacles were all overcome, and by May, 1947, steady progress was being made.

The average number of field staff employed throughout the survey was forty; this varied from month to month and reached a maximum of seventy in August 1948. Owing to the temporary nature of the work, the turnover of staff was fairly large, and altogether one hundred and eleven persons were employed for varying periods.

The total of 111 surveyors included 31 former members of the Women's Timber Corps, 8 former members of the Polish Forest Service, 7 of the Home Timber Production Department, and 6 of the Indian and Colonial Forest Services; 27 forestry graduates, and 16 university students of forestry were also employed, as well as 8 men who had seen service on private estates.

The employment of women for this type of work was not so surprising as might appear. Many of those selected had had as much as seven years experience as surveyors and measurers with the Home Timber Production Department, and several had seen service with the North German Timber Control; with this background, and under their own supervisors, they did excellent work. Forestry graduates, on the whole, did not remain long before

taking up permanent appointments elsewhere, and the employment of students was confined mainly to the summer vacations; both types of men were, however, able to pick up the work with a minimum of training and they tackled it with interest and enthusiasm. Polish foresters were recruited through the Polish Resettlement Corps, and comprised seasoned and highly qualified officers whose judgment and forest sense were of great assistance to all with whom they worked.

Each pair of surveyors was provided with a car or light van and consisted of a leader, who was experienced in methods and procedure, and an assistant, who was either being trained or had had a shorter period of service. At first, both members of a pair worked together on the same map, but later, when the junior was fully competent, he would be left to survey a large block of woodland while the senior covered scattered and outlying areas, returning to collect his colleague later in the day.

Groups of surveyors, usually four to six pairs, were placed under the charge of a supervisor, whose job was to organise their work and check its accuracy and standard, to ensure adequate training of recruits, and to make necessary advance contacts with the owners and agents of estates. Each supervisor was allotted a regional charge in which survey proceeded county by county.

The work of the two Census Officers, in addition to local administration, was directed towards the maintenance, so far as varying local conditions permitted, of a uniform standard of classification among the different field parties; for this purpose, it was necessary, from time to time, to make transfers of staff.

Each surveyor and field officer carried a letter of authority issued by the Forestry Commissioners, under the provisions of the Forestry Acts, 1919 to 1945, to enable entry to be made on private land for the purpose of the survey; but in practice the interest and co-operation of owners was such that there was no case in which this authority had to be used. In the earlier stages, notification of visits was given entirely by the supervisors on such information of ownership as was available by local enquiry; but as soon as the matter could be organised, the Census was announced in the local press of every county due for survey, and circular letters were issued through the Forestry Commission's Private Woodlands Officers to all estates the owners of which were known. Contact with the remainder of the owners was, however, necessarily dependent on day to day enquiry as the survey proceeded.

The monthly rate of survey showed some seasonal fluctuation, reflecting the better weather conditions and longer daylight of the summer months; it was usually possible also to increase the staff during the summer by employing men from the universities. The dates of survey of individual counties are given in Appendix VI, Table A, page 192.

In England, work was first concentrated in the neighbourhood of Alice Holt, until a nucleus of trained staff had been built up. The bulk of the surveyors were then transferred to Wales, for which early information was required, and the remainder started in the north-western and northern counties of England, and worked southwards. This arrangement sought to take advantage of summer conditions in the more hilly parts of the country, and to avoid the more diverse and intricate broadleaved and coppice areas of the south-eastern counties until the staff were more experienced. On the completion of work in Wales, the survey was continued from the west and north towards the east and south of England until the various parties joined up, when a detachment

was moved into the south-western counties. Part of the staff was then transferred to the Volume Sampling Survey, and the remainder sent to complete south-east England; opportunity was taken at the same time to revise the surveys of Hampshire and Surrey, counties which had been used as training areas.

Starting in January, 1947, the survey of England continued until the middle of June, 1949, and occupied about 3,400 man-weeks. The work involved the issue of 10,272 six-inch Ordnance Survey quarter-sheets, and the completion of 140,455 Stand Data Forms. 7 per cent. of the maps published covered more than 500 acres of woodland apiece and another 69 per cent. more than five acres; maps of areas without surveyable woodland, which were, nevertheless, examined in the field, accounted for a further 19 per cent. 5 per cent. of the maps were not issued to field surveyors, as it was obvious that the areas concerned carried no surveyable woodland.

Scotland, with larger and more clearly defined Stands involving fewer types and species, offered a simpler proposition. The Border counties were used for initial training of staff, and work was then divided between the Lowland and north-eastern counties during winter, and the northern, central and western Highlands during the summer months. Survey started in February, 1947, and was completed by the end of September, 1948, occupying in all about 1,200 man-weeks, and involving the issue of 5,493 six-inch Ordnance Survey quarter-sheets, and the filling in of 70,046 stand data forms. 9 per cent. of the maps published covered over 500 acres of woodland apiece, and a further 50 per cent. had more than 5 acres; maps of areas examined in the field, although the maps themselves showed no woodland, comprised 26 per cent. of the total; and 15 per cent. of the maps were not issued to field surveyors, as they covered areas that were obviously unwooded.

In Wales the small, straggling and relatively inaccessible nature of many of the woods made for slow progress. Survey took from August, 1947, until May, 1948, and occupied about 600 man-weeks. 1,755 six-inch Ordnance Survey quarter-sheets were issued, and 22,133 Stand Data Forms completed. Only 3 per cent. of the maps published covered more than 500 acres of woodland apiece; another 71 per cent had more than 5 acres each; maps of areas examined in the field, though showing no woods on the printed map, accounted for a further 19 per cent. and maps not issued to surveyors, as the areas were obviously unwooded, for 7 per cent.

The survey of Private Woodlands thus occupied approximately 5,200 man-weeks, and involved the issue of 17,520 six-inch Ordnance Survey quarter-sheets, and the completion of 232,634 Stand Data Forms. The overall average rate of survey was about 550 acres per man-week, inclusive of supervision, training, holidays and lost time arising from weather and other contingencies, but the rate varied considerably in different parts of the country, often arising to well over 1,000 acres per man-week in Scotland and the north of England, and falling as low as 300 acres per man-week in Wales. The average size of Stand demarcated was about 12½ acres, varying from 12 acres in England to nearly 15 in Scotland and just over 10 in Wales.

In addition to the above, 75,415 Stand Data Forms were submitted in respect of State Forests, making a grand total of 308,049.

Office Procedure

The handling of this quantity of documents required a specialised office organisation, and most of the work was centralised at Alice Holt.

The various operations fell into distinct stages. As field work on Private Woodlands proceeded, the completed maps, and the corresponding Stand

Data Forms, were collected from surveyors by their supervisors, who checked them and re-inspected any doubtful work on the ground. As soon as a whole county had been finished, the original forms were submitted to the appropriate office, where they were again checked by one of the Census Officers, any queries being passed back to the supervisor concerned. The checked and completed Stand Data Forms were transferred at this stage to the central tabulating staff at Alice Holt. Similar arrangements were made in respect of the forms for State Forests, which were submitted by the Conservators of Forests for the various parts of the country.

At Alice Holt, punch operators were employed to transfer the data to cards on the Hollerith system. These operators were trained to make, at the same time, a further check of the forms for completeness and accuracy. These repeated paper checks were necessary, owing to the fact that faulty or deficient cards would either be rejected by the machines during sorting, or would give incorrect totals on tabulation. A specimen Hollerith card is shown in Appendix I, Fig. 3, page 167, and the Stand Data Form to which it refers is shown in Fig. 1, page 164.

Card punching started in November, 1947, and was completed for Private Woodlands by July, 1949, and for State Forests by September, 1949. An average of four operators was employed, but the flow of work was conditioned by progress in the field rather than by potential output in the office.

The sorting and tabulation of the Hollerith cards was carried out partly by inter-departmental arrangement with the War Department and partly by commercial contract. The form of the main lists and tabulations used is detailed in Appendix III, page 183, which also includes specimen sheets of two of the lists, in one of which the card shown in Fig. 3 appears under its appropriate classification. (Sample 2, pages 186-187, fourth entry down.)

After preliminary trials, tabulation started in February, 1948, and was completed for Private Woodlands by August, 1949, and for the State Forests by November, 1949.

Completed lists and tabulations for each county were cross-checked, and the totals of each classification were extracted. Grand totals for England, Scotland, Wales and Great Britain respectively, and for such other groupings as were required, were compiled from these summaries by hand. Final figures were available within about a week of completion of the tabulations.

The completed six-inch Ordnance Survey census maps were prepared for permanent record by going over the surveyor's pencilled stand boundaries and numbers with waterproof ink. The maps were then sent to the Air Ministry Photographic Reproduction Department to be copied on microfilm. From these films, prints of each map were enlarged to the same size as the Stand Data Form, and were then filed with the appropriate Stand Data Forms. Photocopying started in May, 1949, and was completed by January, 1950. Both maps and Stand Data Forms are kept in duplicate.

The average office staff employed at Alice Holt while the survey was in progress was eight, and at the Scottish office two. After completion of field work the number at Alice Holt was increased for some months to eighteen.

Volume Sampling Survey, 1947-1949

The methods adopted in the sampling survey of 1938-1939 were modified, in the light of experience then gained, to suit present requirements. Circular one-tenth acre sampling plots were used, selection being randomised on the

basis of Hollerith tabulations. In order to maintain a standard sampling fraction throughout, plots falling near the edges of stands were either moved on to the edge as two semi-circular half plots, or moved inwards.

Details of technique were tried out in different types of stand in the neighbourhood of Alice Holt; and in order to test the extent to which the survey instructions would eliminate personal bias, and also to obtain information as to rates of progress, 51 plots selected in the county of Roxburgh were measured independently by two separate field parties.

A specimen Plot Data Form is given in Appendix I (Figs. 4 to 8, pages 169 to 175) and a copy of the actual survey instructions in Appendix II, page 176. The latter give details of methods and procedure in the field.

The investigation was applied to Private Woodlands only, and sampling was confined to High Forest above ten years of age and to Coppice-with-Standards; other types recorded in the census survey, by definition, contain very little standing timber and were therefore excluded. The sampling fraction adopted was 1 in 2,000 (one 1/10th acre in every 200 acres), calculated to result in a total of 6,000 to 7,000 plots, which if suitably distributed could be expected to give reasonably precise overall estimates of volume for the above categories, and adequate estimates for any grouping, such as of species or age-class, represented by at least 100 plots.

The location of plots was predetermined in the office by reference to the Hollerith lists for the categories to be sampled, county by county. By starting from a randomly chosen number between 1 and 200, and taking those Stands in which every 200th acre fell, an effective random sample was obtained, which was stratified by County, Type, Sub-type, Age-Class, and Principal Species; the chances of a Stand being sampled were strictly proportional to its area, and no Stand of less than 200 acres could have more than one plot. The exact position of each plot was determined by placing over the six-inch Ordnance Survey map of the Stand chosen, a celluloid grid with randomly distributed pin holes, one of which was selected at random as the plot centre.

Field work started in Scotland in October, 1948, and was continued without interruption into England and Wales, where it was completed by the middle of October, 1949. Surveyors worked in pairs, and the average number employed was twelve; the sampling thus occupied about 600 man-weeks. 7,065 plots were measured, of which 4,806 were in England, 1,765 in Scotland and 494 in Wales. An average rate of 24 plots per pair per week was maintained throughout the survey.

Computation of the plot data proceeded concurrently with the field work, and was based on specially prepared volume tables, by species and assortments. An example of the method of working is given on the specimen Plot Data Form shown in Appendix I, pages 169-175.

Provision had been made in designing the Plot Data Form for coding the final information, to permit of mechanised sorting and tabulation; but it was found in practice that this was unnecessary. Final figures for Great Britain were prepared by the end of November, 1949; they show the volumes standing at 30th September, 1949.

Throughout this survey, the Census workers were assisted and advised by the Mensuration Officer and his staff.

The average office staff employed at Alice Holt while the volume sampling survey was in progress was eight, and at the Scottish office two. After completion of field work the number at Alice Holt was increased for some months to eighteen.

Increment Investigation, 1947-1949

There are, as yet, no British yield tables for oak or other broadleaved trees, and few other records of growth from which it is possible either to estimate average volume increment percentages, or to judge which, if any, foreign yield tables can reasonably be applied. It was therefore necessary to carry out a special investigation, to make possible an estimate of the volume increment of all species of growing trees. For the coniferous species, satisfactory British yield tables were already available.

This work was placed in charge of the Mensuration Officer at Alice Holt, and the necessary figures were obtained by analysing 852 stems of oak, 218 of ash, 152 of elm, 107 of beech and 180 of other broadleaved species combined. These stems were selected at random from timber yards and felling areas in all parts of the country, and, in order to make the sample as representative as possible, the time allocated for the analysis in each county was roughly proportioned to the area of broadleaved woodland in that county. A very simple method of analysis was employed which did not require the stems to be cut into lengths other than those needed for utilisation.

Although the sample may appear small, it was found that in all age-classes the volume increment percentages were closely similar for the four major species, oak, ash, beech and elm. Within each species, there were no appreciable differences between the average increment percentage values for each major region. Details are given in Chapter 16, page 147, and Appendix V, page 190.

Two officers were employed on this investigation between September, 1947, and May, 1948.

Apportionment of Effort

The Area Survey accounted for about 80 per cent. of the work done, the Volume Survey for about 15 per cent., and the Increment investigation for about 5 per cent.

The total man-power requirement, for the whole survey, including the compilation of all the records, was found to be about one man-year for every 17,500 acres of woodland. Taking the working year as 300 days, this means that the work was done at an average rate of about 58 acres per head per day. The cost per acre surveyed was in the region of 6d., which is a very moderate outlay for the stocktaking of such a valuable and widely-dispersed asset.

PART II

THE CENSUS BY AREA

SECTION A—ALL WOODLANDS

CHAPTER 3

SCOPE OF THE SURVEY—ALL WOODLANDS

Area Surveyed

The census covered the mainland of England, Scotland, and Wales, together with the larger or more well-wooded islands adjacent to those countries. In detail, these islands were: the Isle of Wight; Anglesey; Arran, Bute, Gigha, Great Cumbrae, Islay, Jura, Mull, Skye, Raasay, Scalpay.

Certain islands which are known to possess so little woodland that the expense of surveying would not be justified, were excluded. The principal omissions of this kind were: the Orkney and Shetland Islands, the Outer Hebrides, and those islands of the Inner Hebrides that are not detailed in the preceding paragraph. The areas of all islands are, nevertheless, included in the Total Land Area figures (Table 3) for their respective countries, and also in most county tables (Appendix VI, page 191).

Throughout the area survey, separate figures were always obtained for the three countries, England, Scotland and Wales: and the details for each country are set out in the main tables. The county of Monmouth was treated throughout as a part of Wales.

Separate figures were also obtained for the eighty-four counties, and, in a few instances, for geographical or administrative divisions thereof. Certain county figures are given in outline in Appendix VI, page 191.

County figures are to be published in greater detail in *Supplements* to this main *Report*.

The gross area surveyed was 3,519,551 acres. Details by countries are given in Table 2.

GROSS AREA SURVEYED, AREA DISAFFORESTED, AND TOTAL WOODLAND AREA

Table 2

Country	Gross Area Surveyed	Area Disafforested		Total Woodland Area, Net	
	Acres	Acres	%(1)	Acres	%(2)
England	1,918,587	53,541	2.8	1,865,046	54
Scotland	1,273,746	6,908	0.5	1,266,838	37
Wales	327,218	10,740	3.3	316,478	9
Great Britain	3,519,551	71,189	2.0	3,448,362	100

Notes. (1) Area disafforested is expressed as a percentage of gross area surveyed, for each country.

(2) Percentages of total woodland area show the proportion of the total for Great Britain, which lie in each country.

This total is made up of all areas of five acres or more in extent, and exceeding one chain (66 feet) in width, which were shown as woodland on the current edition of the six-inch Ordnance Survey maps. It also includes all land not so shown, which was found to be woodland at the date of survey. Such land includes both deliberate extensions of woodland by afforestation, and extensions arising from the natural spread of trees on to common lands and similar areas. To be included as woodland, these extensions had to be at least half-stocked with trees having reasonable prospects of survival. Osier beds, and agricultural land carrying widely planted poplars or willows, were not included.

Not all the land surveyed was found to be still classifiable as woodland. From the total of 3,519,551 acres, there had to be deducted 71,189 acres regarded as "Disafforested" or "Lost", through conversion to other uses, since the last revision of the Ordnance Survey maps used. This area amounts to two per cent. of the gross area surveyed, and details by countries are shown in Table 2. It is further discussed under "Disafforested Areas" on page 37.

Total Area of Woodland

After allowing for the Disafforested areas, the total area of woodland in Great Britain at the 30th September, 1947 was found to be 3,448,362 acres.

Details by countries are given in Table 2, which shows that: England, with 1,865,046 acres, has 54 per cent. of the whole; Scotland, with 1,266,838 acres, has 37 per cent; and Wales, with 316,478 acres, has 9 per cent. of the whole.

Of the total for Great Britain, 3,412,388 acres, or 99 per cent, are on the mainland, and 35,974 acres, or 1 per cent., are distributed over the various islands. Details of total woodland by counties are given in Appendix VI, Table B, page 194.

Inverness-shire is seen to be the county with the largest actual woodland area, having 212,616 acres. The counties with the most extensive woodland areas are, for each country:

	Acres
England	
Yorkshire (all three Ridings)	153,835
Hampshire (including Isle of Wight)	151,085
Sussex	143,674
Kent	102,532
Devon	101,574
Scotland	
Inverness (including Islands)	212,616
Perth	150,372
Aberdeen	147,313
Argyll (including Islands)	130,549
Wales	
Montgomery	39,320

Every county surveyed was found to contain some measurable woodland; even the Administrative County of London had 639 acres. But no woodland was recorded in the Parts of Holland, an administrative division of Lincolnshire ; while the Isle of Ely in Cambridgeshire had only 56 acres. The position is shown diagrammatically in Map 1, page 239.

Comparison with Total Land Area

The total area of woodland has next to be considered in relation to the total land area, and this comparison, with details by countries, is set out in Table 3. It will be seen that, since Great Britain has a total land area of 56,200,400 acres, the total woodland area of 3,448,362 acres amounts to 6.1 per cent. of the land surface. When the three countries are taken separately, the proportion is seen to be remarkably constant. England has 5.8 per cent. of its land surface under woodland, Scotland 6.6 per cent., and Wales 6.2 per cent.

TOTAL LAND AREAS, AGRICULTURAL AREAS AND WOODLAND AREAS

Table 3

Country	Total Land Area(1)	Agricultural Area (2)		Total Woodland Area	
	Acres	Acres	%(3)	Acres	%(3)
England	32,032,797	25,515,283	79.7	1,865,046	5.8
Scotland	19,068,725	15,356,776	80.5	1,266,838	6.6
Wales	5,098,878	4,416,574	86.6	316,478	6.2
Great Britain	56,200,400	45,288,633	80.6	3,448,362	6.1

Notes. (1) Total land area excluding water, as at December, 1948. Source: Director-General, Ordnance Survey.

(2) Total of crops, grass and rough grazing, as at June, 1948. Source: Ministry of Agriculture and Fisheries, and Department of Agriculture for Scotland.

(3) Expressed as a Percentage of Total Land Area, for each country.

Much greater differences are found when the figures for the individual counties, which are set out in Appendix VI, Table B, and shown diagrammatically in Map 1, page 239, are examined. It is possible to group together certain counties which make up two regions with particularly high densities of woodland.

The greatest density is found in the North and East of Scotland, where the ten following counties (cited in order of density) all have 8 per cent. or more of their land area under woodland:

	per cent.
Moray	21.6
Nairn....	19.1
Kincardine	13.4
Aberdeen	11.6
Inverness (excluding Islands)	10.7
Clackmannan	10.2
Banff....	10.0
Perth....	9.4
Fife	9.3
Angus	8.3

The second region of high density lies in the south-east of England, and comprises the following six areas:

	per cent.
Sussex	15.5
Surrey	15.0
Hampshire (excluding Isle of Wight)	14.9
Kent	10.5
Berkshire	9.2
Isle of Wight	8.0

Only one other English county, Hereford with 8.6 per cent., has more than 8 per cent. of its land under woodland.

In Wales, the only county with a remarkably high density is Monmouth, with 10.7 per cent. of its land area under woodland.

The majority of the counties outside the two groups listed above, carry less than the average density of woodland. The lowest figure recorded is that for Caithness, with 0.4 per cent., which is exceeded even by London, with 0.9 per cent.

In England, there is a group of eastern and midland counties with a density of woodland substantially below that for the country as a whole; the following list is arranged in order of increasing density:

	per cent.
London	0.9
Cambridge	1.0
Middlesex	1.9
Leicester	2.3
East Riding of Yorkshire	2.3
Huntingdon	2.5
Lincoln	2.6
Warwick	2.9
Essex	3.2
Chester	3.2
Rutland	3.4

All these counties are almost entirely lowland in character, with good agricultural soils. Three of them, Cambridge, Huntingdon, and Lincoln, include substantial areas in the well-farmed but almost treeless fens. It is evident that very little woodland is to be found in those parts of England that have the most fertile agricultural areas.

In Scotland, on the other hand, those counties or districts with the lowest density of woodland are the western and northern ones where exposure, combined with infertile soils, tends to restrict tree growth. The areas concerned are:

	per cent.
Caithness	0.4
Islands of Inverness-shire	0.8
Sutherland	2.4
Islands of Argyll	2.8
Wigtown	2.8
Selkirk	3.0
Bute	3.7
Ayr	3.8

A similar tendency for the western counties to be the least well-wooded is evident in Wales, where Anglesey, with 1.2 per cent, has the lowest density of woodland, followed by Pembroke, with 2.5 per cent.

The total land areas, for Great Britain, component countries and counties, which were used for these comparisons, are set out in Appendix VI, Table T, page 230.

Woodland per Head of Population

At the date of the Census, 1947, the total population of Great Britain was estimated by the Registrar-General to be 48,189,000 persons. There were thus only 71 acres of woodland to every one thousand people, or .073 of an acre per head.

Comparison with Other European Countries

Table 4 shows, for comparison, the position of certain neighbouring European countries in these respects.

WOODLAND AREA IN RELATION TO TOTAL LAND AREA AND POPULATION FOR TEN COUNTRIES OF WESTERN EUROPE

Table 4

Country	Total Woodland Millions of Acres	Percentage of Land Area	Acres per Head of Population
Great Britain	3.5	6.1	0.07
Republic of Ireland....	0.25	1.4	0.07
Norway	19.0	23.8	6.47
Denmark	1.0	9.3	0.25
Germany	31.25	26.8	0.44
Netherlands	0.5	6.1	0.05
Belgium	1.5	18.2	0.17
France	26.0	19.1	0.62
Spain....	12.0	9.7	0.46
Portugal	5.75	25.8	0.74
Europe as a whole	327.75	26.1	0.84

Source : Food and Agriculture Organisation : Forestry and Forest Products, 1946

It will be seen that Great Britain has one of the lowest percentages of woodland in relation to its land area, to be found in western Europe. Only Ireland, with only 1.4 per cent., has less; while Holland has the same proportion, 6.1 per cent., as Great Britain.

In relation to population, Great Britain is again seen to have a relatively low woodland area. Only Holland, with .05 of an acre per head, has less; while the Republic of Ireland, with .07 of an acre, has the same area per head as Britain.

Ownership of Woodlands

All woodlands were classified on the basis of ownership at the date of census, 30th September, 1947. This classification forms a basic division of this *Report*. Woodlands under private ownership are discussed in Section B, pages 69 to 110, while State Forests are discussed in Section C, pages 111 to 134.

For administrative reasons, it was found necessary to include with the woods under private ownership, certain woodland areas which are owned by

Government Departments and other public authorities. Consequently the woods which were separately surveyed, as being under state ownership, comprised only those directly controlled by the Forestry Commission; these are referred to throughout as "State Forests".

OWNERSHIP OF TOTAL WOODLAND AREA

Table 5

Country	Private Woodlands		State Forests		All Woodlands	
	Acres	%(1)	Acres	%(1)	Acres	%
England	1,577,115	84	287,931	16	1,865,046	100
Scotland	1,024,008	81	242,830	19	1,266,838	100
Wales	224,208	71	92,270	29	316,478	100
Great Britain	2,825,331	82	623,031	18	3,448,362	100

Note. (1) Percentage of Total Area of Woodland in each country.

The division on the basis of ownership is set out, with details by countries in Table 5. It will be seen that 2,825,331 acres, or 82 per cent. of the total woodland area, is privately owned. The balance of 623,031 acres, or 18 per cent., consists of State Forests administered by the Forestry Commission.

England, with 16 per cent. of its total woodland in State Forests, has rather less than the average for Great Britain as a whole; Scotland, with 19 per cent., has slightly more; Wales, with 29 per cent. of its woodland in State Forests, shows the largest proportion under state ownership.

Details by counties are given in Appendix VI, Table B, page 194. This table shows that, in September, 1947, most of the counties of Great Britain had some woodland under state ownership. The proportions are shown diagrammatically in Map 4, page 242. Exceptions were Cambridge, Essex, Hertford, Huntingdon, Leicester, London, Middlesex, Warwick and Westmorland; Bute, Caithness, Dunbarton, East Lothian, Lanark, Midlothian, Renfrew and West Lothian; Flint and Pembroke.

As discussed in Chapter 2, the same basic methods and criteria were applied when surveying both Private Woodlands and State Forests, so that all the figures obtained are strictly comparable.

Suitability for Economic Management

A separate classification was made of the total woodland area on the basis of suitability, or otherwise, for economic management, and the results are set out in Table 6. This table shows only those areas that could be definitely regarded as "Suitable" for economic management; any regarded either as "Doubtful" or as "Unsuitable" are excluded. Details by counties are given in Appendix VI, Table C, page 196.

State Forests were included in this classification mainly to secure complete and comparable statistics. It was found that, when the same criteria as were used for the Private Woodlands were applied to the State Forests, 4 per cent. of the latter could not be regarded, at that time, as "Suitable for Economic Management". The policy of the Forestry Commissioners has, of course, always been to acquire only such woodlands, or potential woodlands, as could be economically managed. Nevertheless, its extensive estates do in fact include

areas of remote and high-lying scrub, or woods on land subject to common rights, while many of the old woodland areas in the New Forest are subject to various types of restriction.

By far the greater part of the woodland that could not be regarded as Suitable for Economic Management was in private ownership, and is therefore dealt with in Chapter 7, page 69.

WOODLANDS SUITABLE FOR ECONOMIC MANAGEMENT

Table 6

Country	Private Woodlands		State Forests		All Woodlands	
	Acres	%(1)	Acres	%(1)	Acres	%(1)
England	1,269,651	81	275,441	96	1,545,092	83
Scotland	914,889	89	234,309	96	1,149,198	91
Wales	148,336	66	90,354	98	238,690	76
Great Britain	2,332,876	83	600,104	96	2,932,980	85

Note. (1) Percentages relate to the Total Woodland Area of the description specified.

As Table 6 shows, those areas regarded as Suitable for Economic Management amounted, for the woodlands of the country as a whole, to 2,932,980 acres, or 85 per cent. England, with 83 per cent. suitable, came close to the average for Great Britain. In Scotland, a higher proportion, 91 per cent., was regarded as suitable, largely because of the location of woodlands in fairly large and compact blocks. But in Wales, with only 76 per cent. suitable, the proportion was below the average; this is accounted for by the many small and straggling woods scattered along the valleys.

Productive and Unproductive Woodland

A further classification was made of the total woodland area on the basis of present productivity. For this purpose, the Classification by Type, which is discussed in Chapter 4 following, was taken as the basis.

The following types were regarded as "Productive Woodland":

High Forest,
Coppice-with-Standards,
Coppice.

The following types were regarded as "Unproductive Woodland":

Scrub,
Devastated woodland,
Felled areas.

UNPRODUCTIVE WOODLANDS

Table 7

Country	Private Woodlands		State Forests		All Woodlands	
	Acres	%(1)	Acres	%(1)	Acres	%(1)
England	477,349	30	28,080	10	505,429	27
Scotland	647,224	64	45,702	19	692,926	55
Wales	106,676	47	4,538	4	111,214	35
Great Britain	1,231,249	44	78,320	13	1,309,569	38

Note. (1) Expressed as a percentage of the Total Woodland under each class of ownership, as set out in Table 5 opposite.

Table 7 sets out the area of Unproductive Woodland, while details by counties are given in Appendix VI, Table D, page 198. The position is shown diagrammatically in Map 3, page 241.

It will be seen that, for the woodlands of Great Britain as a whole, no less than 1,309,569 acres, or 38 per cent., were classified as "Unproductive", at 30th September, 1947. This figure provides a measure of the great amount of rehabilitation or restocking that is required to bring all our woodlands into a productive condition.

Important differences are apparent between the three countries. In England, only 27 per cent. of all woodland, or 30 per cent. of that in private ownership, is Unproductive. In Wales, the percentages of 35 for all woodlands, and 47 for those in private ownership, resemble the average for Great Britain. But in Scotland, the proportions of Unproductive woodland rise to 55 per cent. for all woodlands, and 64 per cent. for woods in private ownership. In fact, over half the total Unproductive Woodland lies in Scotland. The main reasons for this disproportionate share are first, an exceptionally large area of felled woodlands, much of it remaining unplanted since the fellings of the 1914 to 1918 war; and second, an unduly high proportion of scrub, largely birch and oak in the Highlands.

In the State Forests, more than half the area described as "Unproductive" consists of felled woodlands, many of which had recently been acquired for replanting.

When the details for counties, in Appendix VI, Table D, page 198, are considered, wide local variations are apparent. In England, the range is from only 10 per cent. of woodland classified as Unproductive in Middlesex, and only 15 per cent. in Kent, to a maximum of 48 per cent. in Staffordshire. English counties with exceptionally large proportions of unproductive woodland are:

	per cent
Stafford	48
Durham	44
Leicester	44
Nottingham	42
Essex	42
Derby	41
Shropshire	39
Yorkshire, East Riding	39

Broadly speaking, the highest proportions of Unproductive Woodland are found in the North Midlands, and the lowest in the southern counties of England.

The proportions of Unproductive Woodland recorded for the Scottish counties are exceptionally high. Only one county, Roxburgh with 25 per cent., has a proportion below the average figure (27 per cent.) recorded for the whole of England. Areas with more than 60 per cent. of their woodland classified as unproductive are:

	per cent.
Sutherland	71
Islands of Argyllshire	69
Islands of Inverness-shire	68
Dunbartonshire	68
Inverness-shire (Mainland)	67

ALL WOODLANDS

	per cent.
Nairn	65
Caithness	64
Ross and Cromarty	64
Clackmannan	63
Angus	62
Bute	61
Banff	60

It will be seen that the counties with the highest proportions lie in the Highlands, and particularly in the northern portions thereof; the position in central and southern Scotland is more satisfactory.

The very high proportions of Unproductive Woodland in northern Scotland are accounted for by the factors already mentioned, that is: extensive felled areas, many dating back to 1918 or before, and large areas of scrub. For example, an examination of the figures for Private Woodlands in Ross and Cromarty shows that Felled and Devastated areas cover 32,831 acres and Scrub accounts for 20,276 acres, while Productive High Forest covers only 17,730 acres, out of a total of 70,837 acres of woodland of all Types. The high proportion of land that has, in the past, borne timber crops, and could do so again in the future, but is at present lying idle, is well shown by the census returns.

The figures for Wales present no remarkable feature. Pembroke, with 47 per cent., and Radnor, with 43 per cent., are seen to have the highest proportions of Unproductive Woodland. Caernarvon, with 23 per cent., has the lowest proportion.

Disafforested Areas

Woodland was recorded as Disafforested or "Lost" if, although shown as woodland on the most recent six-inch Ordnance Survey maps, it was found to be converted, or was obviously under conversion, to other uses. This classification was made irrespective of the stocking of any remaining crop. The conversion, however, had to be of a permanent nature; temporary developments or restrictions were disregarded.

The effective period during which this recorded process of disafforestation had proceeded, varied from one county to another. This was unavoidable, as the maps used for the various counties had been issued and revised at different dates; details are set out in Appendix VI, Table A, page 192.

In some instances, the disafforestation now recorded may date back to 1897; but most of it has taken place within the present century, and much since the 1914-1918 war.

The total area Disafforested is shown by countries in Table 2, page 29. Details by counties will be found in Appendix VI, Table S, page 228.

These figures have to be considered in relation to the dates of revision of the six-inch Ordnance Survey maps. Particulars of the principal Ordnance Survey edition used in each county, are given, in respect of the Private Woodlands, in Appendix VI, Table A, page 192. Similar details are not shown for the State Forests, but in that case the area Disafforested is small.

Without making an exhaustive analysis, it will be found that the rate of Disafforestation is often greatest in counties where the maps have most recently been revised, a paradox arising from the fact that it is continual development which makes revisions necessary. To obtain an exact picture of the total

wastage of woodland area in recent decades, it would therefore be necessary to compare the current editions of the six-inch Ordnance Survey maps with others that have preceded them.

Table 2 discloses a total area of 71,189 acres found to be disafforested over the whole of Great Britain. This is equivalent to 2 per cent., of the gross area surveyed, and is a reflection of the extensive developments that have been going on in the use of woodland and agricultural land for housing or industry; the proportion permanently lost to forestry is thus a small one.

The area lost lies largely in England, with 53,541 acres. This was to be expected, as it is in that country that the greatest amount of urban development has occurred. In relation to the gross area surveyed, it amounts to 2.8 per cent.

The area permanently disafforested in Scotland is very small, amounting to only 6,908 acres or 0.5 per cent. of the gross area surveyed. This may be explained by the fact that the bulk of the Scottish woods lie remote from extensions of urban or industrial land use.

Wales shows, rather surprisingly, the highest proportion of land lost to forestry. The total area is 10,740 acres, higher than that for Scotland, and the proportion of the gross area surveyed is 3.3 per cent. It would appear that the small and scattered woods characteristic of the Welsh valleys, have tended to be converted rather rapidly to other forms of land use, mainly grazing.

When the figures for counties in Appendix VI, Table S, page 228, are examined, it will be seen that, in England, the proportion of former woodland recently disafforested is naturally highest in those areas where industrial or residential development has proceeded most rapidly. The outstanding figures are:

	per cent. of gross area surveyed
London	13
Middlesex	9
Warwick	8
Surrey	6
Berkshire	5
Hertford	5
Kent	5
Isle of Wight	5

All these counties, except Warwick and the Isle of Wight, lie in or adjacent to London, and it is clear that the expansion of the metropolis into the neighbouring counties, has caused the highest proportionate loss of forest land. Kent, with 5,185 acres disafforested, has lost more than any other county.

Few Scottish counties have permanently lost any substantial area of woodland to other uses. The figures for Morayshire (1,123 acres, or 2 per cent.) are exceptional, and reflect developments for defence purposes. The highest proportions are found in two industrial counties, Fife and Lanark, each of which lost 3 per cent.

In Wales, the relatively high losses are fairly evenly distributed. There is no correlation between the spread of industry or housing estates and the conversion of forest land to other uses. The proportion is highest, at 5 per cent., in two purely agricultural counties, Cardigan and Montgomery.

The different causes of Disafforestation were not classified during the survey, but descriptions of each area were noted on the reverse of the relative Stand Data Forms, and revealed remarkable diversity. The following headings are recorded in order of importance:

(*a*) Housing development, gardens, etc.

(*b*) Clearance for agriculture or horticulture (including the use of felled woodlands for grazing).

(*c*) Mining and quarrying (including tips and spoil heaps, and large scale open-cast working, both for coal and iron ore).

(*d*) Industrial building development.

(*e*) Permanent military and other defence works, including aerodromes.

(*f*) Clearance for overhead power lines.

(*g*) Flooding for reservoirs, either for water undertakings or in connection with hydro-electric power schemes.

(*h*) Road widening.

It is apparent that modern machinery has considerably increased the risk of disafforestation, as well as the speed with which it can be carried out. During the survey, numerous instances were noted where developments, such as those listed above, had been made with little or no regard for the preservation of productive woodland, or the economic working of portions of woods that were left standing when adjacent areas had to be cleared.

Woods Under Five Acres

As has been seen, woodland areas less than five acres in extent had to be excluded from the main census, as their survey and classification would have involved an effort out of proportion to their value. But when the main census had been completed, it was decided to make an estimate of their total area, by means of a sampling survey. In this way, figures were secured for Great Britain as a whole, and for the three component countries, but not for individual counties.

The areas concerned, being fairly evenly distributed, lend themselves well to a sampling technique. As a check on accuracy, two independent samples were taken, and were found to give results in close agreement. Briefly, the method was to select, at random, two one-per-cent. samples of the maps used for the main survey, and to count and classify all areas of woodland, one acre in extent or over, that had not been surveyed in the main census. From this small sample, the area appropriate to the whole country concerned, was calculated.

Woods of less than one acre in extent were omitted from this survey. It was also confined to woodlands under private ownership.

During the course of the survey it was found that there was a very small area of woodlands of five acres or more in extent, which had escaped inclusion in the main survey. This was therefore included with the small woodlands, and is shown under the heading "Other Woods" in Table 8. The total area concerned, 4,500 acres, is equivalent to only .13 per cent. of the gross area surveyed, and suggests that the main survey was carried out with adequate accuracy.

CENSUS OF WOODLANDS, 1947-1949

PRIVATE WOODLANDS UNDER FIVE ACRES IN EXTENT

Table 8

Size of Block	England	Scotland	Wales	Great Britain
	Estimated Area	Estimated Area	Estimated Area	Estimated Area
	Acres	Acres	Acres	Acres
One to Two Acres	24,000	8,500	5,500	38,000
Two to Three Acres	36,000	10,000	8,000	54,000
Three to Four Acres	30,500	10,000	9,000	49,500
Four to Five Acres	26,500	8,500	6,000	41,000
Other (over five acres)	3,000	1,000	500	4,500
Total	120,000	38,000	29,000	187,000

Table 8 shows the area of the small woodlands, from one to five acres in extent, classified by size, for each country. The total for Great Britain, 187,000 acres, is equivalent to little more than 5 per cent. of the gross area surveyed in the main census. This shows that the exclusion of such small woods cannot have had any great effect on the principal findings of the survey. It will be seen, incidentally, that the area of small woodlands is fairly evenly distributed over the different size classifications.

England, with 120,000 acres, has the largest share of these small woodlands, which are very generally distributed in that country. In Scotland and Wales the small woods are mostly found in the lowland districts.

Most of these small woods consist of shelter belts, amenity woods, policies, and game covers, which are closely integrated with the husbandry of farms and estates. They cannot normally be considered as suitable, or available, for the sustained production of commercial timber.

It was further estimated that the area of small woods, one to five acres in extent, controlled directly by the Forestry Commission, and hence classifiable under State Forests, was about 750 acres. This consists partly of amenity woods on farms or residential properties, and partly of outlying patches of scrub or similar woodland not yet linked, by afforestation, to larger woods. The total area concerned is too small to have much bearing on the general position.

Woodlands in Northern Ireland

The following information, supplied by the Ministry of Agriculture, Government of Northern Ireland, is presented here to enable total figures for the United Kingdom to be calculated.

Northern Ireland has a total land area of 3,352,251 acres. At the 30th September, 1947, it is estimated that some 59,000 acres, or 1.4 per cent., were classifiable as woodland. Out of this 59,000 acres of woodland, approximately 22,000 acres were comprised in the State Forests, and 37,000 acres in Private Woodlands. 42,000 acres, comprising 22,000 acres of State Forests, and 20,000 acres of the Private Woodlands, carried productive crops, mainly High Forest. The remaining area of 17,000 acres, all of which was in the Private Woodlands, consisted of felled or devastated woodland which could not be regarded as productive.

Woodlands in the Isle of Man

The following information has been furnished by the Forestry, Mines, and Lands Board of the Isle of Man.

The Isle of Man has a total land area of 140,985 acres. In 1949 it was estimated that 4,091 acres, or 2.9 per cent., were under plantations. Of this 4,091 acres, State Forests covered 1,311 acres, and Private Woodlands accounted for 2,780 acres.

CHAPTER 4

CLASSIFICATION BY TYPE AND SUB-TYPE —ALL WOODLANDS

The main classification of the woodlands was made on the basis of their "Type" or character at the 30th September, 1947. The criteria by which each Stand was allocated to its appropriate Type are set out in Appendix II, page 176, Instructions for Survey, and illustrations of each Type appear in Plates I to V and IX to XI, following page 112. The characteristics of each Type are briefly described under their appropriate headings below. The general position is set out in Table 9.

AREAS OF WOODLANDS CLASSIFIED BY TYPES AND SUB-TYPES, IN EACH COUNTRY— ALL WOODLANDS

Table 9

Type	England		Scotland		Wales		Great Britain	
	Acres	% (1)	Acres	% (1)	Acres	% (1)	Acres	% (1)
HIGH FOREST								
Coniferous	331,275	18	439,084	34	97,438	31	867,797	25
Mixed	117,996	6	37,235	3	10,835	3	166,066	5
Broadleaved	580,286	31	97,017	8	77,633	25	754,936	22
Total, High Forest....	1,029,557	55	573,336	45	185,906	59	1,788,799	52
COPPICE								
With Standards	227,423	12	89	—	2,276	1	229,788	7
Coppice only	102,637	6	487	—	17,082	5	120,206	3
Total, Coppice	330,060	18	576	—	19,358	6	349,994	10
SCRUB	200,040	10	256,683	20	40,228	13	496,951	15
DEVASTATED	105,415	6	33,636	3	12,013	4	151,064	4
FELLED								
Before 9/39	33,492	2	233,433	18	21,578	7	288,503	8
Since 9/39	166,482	9	169,174	14	37,395	11	373,051	11
Total Felled	199,974	11	402,607	32	58,973	18	661,554	19
Total, All Types	1,865,046	100	1,266,838	100	316,478	100	3,448,362	100

Note. (1) Percentage of Total Woodland Area of each country.

In Great Britain as a whole, 52 per cent. of total woodland area was classified as High Forest, and 10 per cent. in the Coppice Type. Scrub accounted for 15 per cent., and Felled or Devastated areas for no less than 23 per cent.

The English woodlands are characterised by a high proportion of Coppice, amounting to 18 per cent., and have relatively small proportions of Scrub, 10 per cent., and Felled or Devastated areas, 17 per cent.

Scotland shows a high proportion of Scrub, 20 per cent., and of Felled and Devastated Areas, 35 per cent., while Coppice is virtually absent.

The proportions of each Type in Wales resembles those for Great Britain as a whole, but the proportion of High Forest, 59 per cent., is higher than the general average, while that of Coppice, 6 per cent., is somewhat lower.

High Forest

High Forest consists of stands of trees that are normally grown to maturity from planting, sowing, natural regeneration, or occasionally from coppice shoots. It comprises 1,788,799 acres, or 52 per cent. of the total woodland area of Great Britain. Economically, it is by far the most important of the five main Types, and therefore calls for the more detailed analysis that follows in Chapter 5, page 48.

Sub-Types of High Forest

High Forest is sub-divided into three sub-types, Coniferous, Mixed, and Broadleaved, and the areas of each, and their relationship to the total area of woodland, for each country, are set out in Table 9, page 41.

Proportions of Sub-types, within Countries

The proportion of the High Forest of each country, in each sub-type, is shown in Table 10, below.

PROPORTION OF SUB-TYPES OF HIGH FOREST, WITHIN COUNTRIES—ALL WOODLANDS

Table 10 — Per cent.

Sub-type	England	Scotland	Wales	Great Britain
Coniferous	32	77	52	49
Mixed	12	6	6	9
Broadleaved	56	17	42	42
Total	100	100	100	100

Note. See Table 9, page 41, for actual areas in acres.

Table 10 makes it clear that the High Forest area of Great Britain is fairly evenly divided between coniferous trees, with 49 per cent., and broadleaved trees with 42 per cent.

Considerable differences occur, however, between England and Scotland. The English woods are predominantly broadleaved, with 56 per cent. pure broadleaved and 12 per cent. mixed. The Scottish woods are mainly coniferous with 77 per cent. purely coniferous and 6 per cent. mixed. The woods of Wales are fairly evenly balanced between coniferous and broadleaved stands.

Share of each Country in each High Forest Sub-Type

Taking Coniferous High Forest first, it will be seen from Table 11 below that 51 per cent. of Great Britain's total lies in Scotland. On the other hand, 71 per cent. of the Mixed, and 77 per cent. of the Broadleaved High Forest are in England. In fact, England and Wales, taken together, have 78 per cent. of the Mixed High Forest, and no less than 87 per cent. of the Broadleaved High Forest.

SHARE OF EACH COUNTRY IN THE TOTAL AREA OF EACH SUB-TYPE OF HIGH FOREST—ALL WOODLANDS

Table 11 per cent.

Sub-type	England	Scotland	Wales	Great Britain
Coniferous	38	51	11	100
Mixed	71	22	7	100
Broadleaved	77	13	10	100
All High Forest	57	32	11	100

Note. See Table 9, page 41, for actual areas in acres.

High Forest Areas by Counties

Areas of High Forest for each county are given in Appendix VI, Tables E to J, pages 200 to 210. The total High Forest area is set out in Table E, and this is further classified in two ways: in Tables F and G there is a simple division into Mainly Coniferous and Mainly Broadleaved High Forest: in Tables H, I and J. the division is threefold—into Coniferous, Mixed, and Broadleaved High Forest.

Tables F and G include certain age group data as discussed in Chapter 5, page 48. Tables E, H, I and J show the proportions that their respective Types, or Sub-types, of woodland bear to the total woodland area of each county; they include a classification by ownership, as does Table E also.

Coppice

The woodlands classified as Coppice are those in which the crop is worked, or could be worked, on the Coppice system. They account for 349,994 acres, or 10 per cent. of the total woodland area.

There are 120,206 acres of simple Coppice, and 229,788 of Coppice-with-Standards. In this latter Sub-type, the actual Coppice forms an underwood and there is an overwood of "standard" trees of various ages, which are grown on to maturity to provide timber of larger dimensions.

Proportions of Sub-types within Countries

The relationship between the two Sub-types, Coppice-with-Standards and simple Coppice, is set out by countries in Table 12 overleaf.

Table 12 shows that Coppice-with-Standard is the more important sub-type, accounting for 66 per cent. of all coppice woods, or roughly twice as much as

simple Coppice. This is especially so in England, the principal coppice country: but the trend is reversed in Wales, which has substantially more simple Coppice. The Scottish figures relate to very small areas.

PROPORTION OF SUB-TYPES OF COPPICE, WITHIN COUNTRIES—ALL WOODLANDS

Table 12 per cent.

Sub-type	England	Scotland	Wales	Great Britain
Coppice-with-Standards	69	15	12	66
Simple Coppice	31	85	88	34
Total	100	100	100	100

Note. See Table 9, page 41, for actual areas in acres.

Share of each Country in each Sub-type of Coppice

The shares of each of the three countries, in the total coppice area of Great Britain, is set out, by sub-types, in Table 13, below.

SHARE OF EACH COUNTRY IN THE TOTAL AREA OF EACH SUB-TYPE OF COPPICE—ALL WOODLANDS

Table 13 per cent.

Sub-type	England	Scotland	Wales	Great Britain
Coppice-with-Standards	99	—	1	100
Simple Coppice	86	—	14	100
All Coppice	94	—	6	100

Note. See Table 9, page 41, for actual areas in acres.

Table 13 shows that England holds 94 per cent. of all coppice woodlands, with 6 per cent. in Wales, and a negligible area in Scotland; Wales, however, has 14 per cent. of the simple coppice.

Coppice is discussed in detail in Chapter 10, page 98, with special reference to its composition by species.

Coppice Areas by Counties

County figures for the areas of all Coppice, Coppice-with-Standards, and simple Coppice, are given in Appendix VI, Tables K, L and M, pages 212 to 216. These tables also show the proportions that the coppice areas bear to the total woodland area of each county, and broadly classify the ownership.

It will be seen that Coppice is much more important in the southern counties, both of England and Wales, than in the northern counties. The areas and proportions in Scotland are very small; in fact, the majority of Scottish counties have no coppice.

Scrub

Scrub consists of inferior growth unlikely to develop into a utilizable crop of coppice, poles, or timber. It accounts for 496,951 acres, or 15 per cent. of all woodlands in Great Britain. Details by countries are given in Table 9,

page 41; and an analysis of the total area shows the following distribution of the Scrub over the respective countries:

	Scrub
England	40%
Scotland	52%
Wales	8%
Great Britain	100%

England has rather a small share of Scrub, relative to total area, while Scotland's share is relatively large. Scrub is discussed in detail in Chapter 10, page 104.

County figures for Scrub are given in Appendix VI, Table N, page 218.

Devastated Areas

Stands from which the best timber had been removed, leaving a scattered or patchy remnant of the original crop, not capable of satisfactory development, were classed as Devastated, but Coppice-with-Standards areas from which the standards had been removed, were not so classified provided the coppice remained workable. Devastated areas cover 151,064 acres, or 4 per cent. of the total woodland area. Details by countries are shown in Table 9, page 41; and an analysis of the share of each country is as follows:

	Devastated Areas
England	70%
Scotland	22%
Wales	8%
Great Britain	100%

The comparatively large proportion found in England is probably due to the practice of selective felling which is often followed by timber merchants in broadleaved or mixed woods, owing to the varying demands for timber of different species or sizes. The Scottish woods, being mainly coniferous, tend to be clear felled rather than devastated.

Devastated woods are described in detail in Chapter 10, page 107. County figures are given in Appendix VI, Table O, page 220.

Felled Areas

Areas classified as Felled included all High Forest Stands which had been more or less completely clear-felled, and which had not been restocked by either natural or artificial regeneration; coppice areas being worked as such were excluded. Felled areas account for 661,554 acres, or 19 per cent. of all woodland. This is an alarmingly high figure, particularly when it is borne in mind that a considerable proportion of these felled areas were cut before the outbreak of war in 1939.

The analysis of felled areas into sub-types suggests that an undue share of woodland had long been permitted to lie idle after felling.

Sub-Types of Felled Areas

The first sub-type includes woods felled before September, 1939, *i.e.*, the "pre-war" fellings. Some of these areas are believed to have remained unstocked since the heavy fellings of the previous world war between 1914 and 1918.

The second sub-type includes fellings made during or since September, 1939, and comprises the war-time and immediate post-war fellings of the 1939 to 1945 world war.

Proportions of Sub-Types of Felled Areas, within Countries

Details are shown in Table 14, below.

PROPORTIONS OF SUB-TYPES OF FELLED AREAS, WITHIN COUNTRIES—ALL WOODLANDS

Table 14 per cent.

Sub-type	England	Scotland	Wales	Great Britain
Felled before September, 1939	17	58	37	44
Felled since September, 1939	83	42	63	56
Total	100	100	100	100

Note. See Table 9, page 41, for actual areas in acres.

Table 14 shows that, as one would expect, the greatest proportion, 56 per cent., of the felled area, comprised woodlands that had been clear-felled since the outbreak of war in 1939. This relationship is also true for England and Wales, but in Scotland 58 per cent. of all felled woodlands had remained unstocked since some date prior to September, 1939.

Share of each Country in each Sub-Type of Felled Area

The next analysis, in Table 15, shows the share of each country in the total area of felled woodland, by sub-types.

SHARE OF EACH COUNTRY IN THE TOTAL OF EACH SUB-TYPE OF FELLED AREA—ALL WOODLANDS

Table 15 per cent.

Sub-type	England	Scotland	Wales	Great Britain
Felled before September, 1939	12	81	7	100
Felled since September, 1939	44	46	10	100
All Felled Woodland	30	61	9	100

Note. See Table 9, page 41, for actual areas in acres.

Taking the Felled areas as whole, it will be seen that 61 per cent. lie in Scotland, as against only 30 per cent. in England, despite the fact that England has the larger share of the woodlands as a whole.

The disproportion is even more evident when woods Felled before September, 1939 are considered, as Scotland is seen to have 81 per cent., against England's 12 per cent. share.

The figures for areas Felled since September, 1939, are less abnormal, all countries having a share more or less proportionate to their total woodland area. This shows that war-time fellings were fairly evenly spread over the three countries.

When considering the high figures for Scottish woodlands Felled before 1939, it must be remembered that coniferous woods, if clear-cut and left unplanted, remain unstocked indefinitely. Whereas the broadleaved and mixed woods found in the south or midlands of England tend to revert, if left unplanted, to coppice, scrub or uneven-aged High Forest. Nevertheless, the Scottish figures are exceptionally high, and reveal that a large area of woodland had remained idle and unproductive for at least eight years, and portions of it for much longer.

Felled woodlands are further discussed in Chapter 10, page 109. County figures are given in Appendix VI, Tables P, Q and R, pages 222 to 226.

Ownership in Relation to Type

The area and proportion of each type and sub-type of woodland, in Great Britain as a whole, are classified according to their ownership in Table 16, below. The Private Woodlands are further discussed in Chapters 7 to 10, and the State Forests are dealt with in Chapters 11 to 14.

WOODLAND AREAS CLASSIFIED BY TYPE AND OWNERSHIP—GREAT BRITAIN
Table 16

Type	All Woodlands: Great Britain			
	Private Woodlands		State Forests	
	Acres	%(1)	Acres	%(1)
HIGH FOREST				
Coniferous	412,464	48	455,333	52
Mixed	142,650	86	23,416	14
Broadleaved	699,194	93	55,742	7
Total, High Forest	1,254,308	70	534,491	30
COPPICE				
With Standards	227,711	99	2,077	1
Coppice only	112,063	92	8,143	8
Total, Coppice	339,774	97	10,220	3
SCRUB	472,255	95	24,696	5
DEVASTATED	139,455	92	11,609	8
FELLED				
Before 9/39	275,104	95	13,399	5
Since 9/39	344,435	92	28,616	8
Total, Felled	619,539	94	42,015	6
TOTAL, All Types	2,825.331	82	623,031	18

Note. (1) Percentages relate to the total area of each Type or Sub-type. These total areas appear in Table 9, page 41.

Table 16 shows that 18 per cent. of all woodlands are in State Ownership. The State Forests include a substantial share, 30 per cent., of all High Forest, but only a small proportion—never more than 8 per cent.—of any other type.

These figures reflect the Forestry Commission's practice of concentrating on the establishment and maintenance of High Forest crops on its estates. It should be noted that more than half (52 per cent.) of the country's coniferous High Forest is in State Ownership.

CHAPTER 5

HIGH FOREST—ALL WOODLANDS

The area of High Forest in all the woodlands of the country was analysed on four main lines:

(i) Its composition by age-classes. (See below.)
(ii) Its composition by tree species. (Page 55.)
(iii) Principal species in relation to ownership. (Page 64.)
(iv) Principal species in relation to age-class. (Page 65.)

These four analyses require separate discussion.

A detailed assessment of the Condition of the High Forest, in terms of Stocking and Tree Form, was not made in respect of All Woodlands as a whole, but information is given separately for Private Woodlands in Chapter 9, page 81, and for State Forests in Chapter 13, page 117.

County figures for High Forest are given in Appendix VI, Tables E to J, pages 200 to 210.

The average size of stand, or portion of High Forest uniform enough to justify a common description, was 9 acres.

(i) Composition of High Forest by Age-Classes

Whenever possible, the allocation of High Forest Stands to age-classes was based on records of planting. Such records were nearly always available for State Forests, and for many of the Private Woodlands they were kindly supplied by owners, agents, and foresters. Where no reliable planting records were available, assessments of age were based on an examination of the stumps of recently felled trees, on counts of growth whorls in coniferous crops, on comparisons of height and girth with Stands of ascertained age in the same locality, and to some extent on the circumstantial evidence provided by the six-inch Ordnance Survey maps. In doubtful cases, there was a tendency for surveyors to over-estimate the age of conifers growing on good sites, and to under-estimate the age of broadleaved trees growing on poor sites; but this was almost entirely compensated by the progressive increase in the age-ranges adopted for successive age-classes above forty years.

As a general rule, Stands were recorded as "uneven-aged" if the larger trees in the crop were of a different age-class to the remainder, and occupied at least a tenth, but not more than nine-tenths, of the upper canopy. Variations of age within a single age-class were not recorded as uneven-aged.

Table 17 gives details of the classification of the total area of High Forest by age-classes, within sub-types, and within countries. These figures are presented in full, for reference, but certain aspects of them will be better appreciated from the simpler form of summary given later in Table 18 for Great Britain as a whole, and in Table 19 for individual countries.

Table 17

AGE-CLASSES OF HIGH FOREST, BY SUB-TYPES AND COUNTRIES—ALL WOODLANDS

Country	Type	Age-Class in Years									Total All Ages
		1 to 10	11 to 20	21 to 30	31 to 40	41 to 60	61 to 80	81 to 120	Over 120	Uneven	
		Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres
England	Coniferous	90,503	101,919	70,722	15,527	16,161	8,965	3,443	72	23,963	331,275
	Mixed	12,817	13,673	10,830	7,313	11,907	8,100	5,661	867	46,828	117,996
	Broadleaved	10,607	15,569	17,362	17,399	34,025	58,762	95,738	36,619	294,205	580,286
	Total	113,927	131,161	98,914	40,239	62,093	75,827	104,842	37,558	364,996	1,029,557
Scotland	Coniferous	97,016	115,099	71,237	32,934	39,202	33,309	18,835	12,722	18,730	439,084
	Mixed	793	982	841	1,230	2,620	4,025	8,074	3,258	15,412	37,235
	Broadleaved	758	728	1,216	2,233	3,673	9,419	34,984	25,094	18,912	97,017
	Total	98,567	116,809	73,294	36,397	45,495	46,753	61,893	41,074	53,054	573,336
Wales	Coniferous	35,547	41,647	14,843	2,500	1,449	467	158	8	819	97,438
	Mixed	773	1,101	2,032	728	1,141	901	704	44	3,411	10,835
	Broadleaved	1,213	1,611	2,958	4,945	6,068	8,153	11,264	2,740	38,681	77,633
	Total	37,533	44,359	19,833	8,173	8,658	9,521	12,126	2,792	42,911	185,906
Great Britain	Coniferous	223,066	258,665	156,802	50,961	56,812	42,741	22,436	12,802	43,512	867,797
	Mixed	14,383	15,756	13,703	9,271	15,668	13,026	14,439	4,169	65,651	166,066
	Broadleaved	12,578	17,908	21,536	24,577	43,766	76,334	141,986	64,453	351,798	754,936
	Total	250,027	292,329	192,041	84,809	116,246	132,101	178,861	81,424	460,961	1,788,799

Table 17, however, gives particulars of the areas occupied by Mixed High Forest, that is, of High Forest crops in which both conifers and broadleaved trees occur in mixture. These amount, in total, to 166,066 acres, or 9.3 per cent. of the High Forest area of the country. These mixed woods have originated in various ways; many of them, including most of the younger crops classified as mixed, have been established with the object of raising crops of broadleaved trees with the aid of conifer nurses, and will, in due course, become classifiable as broadleaved, when the conifers have served their purpose. It follows, therefore, that this sub-type, though of value for immediate description, is subject to change as a result of silvicultural operations, and that the general consideration of the High Forest crops of the country would be better made on the data given in Tables 18 and 19, which have been prepared by re-classifying the three Types, Coniferous, Mixed, and Broadleaved High Forest, into two categories, Mainly Coniferous High Forest, comprising all Stands in which the principal species recorded is coniferous, and Mainly Broadleaved High Forest, comprising all Stands with a broadleaved principal species. The distribution of these two categories, by counties, is shown in Map 5, page 243.

Table 18 shows that there is slightly more coniferous forest in Great Britain as a whole (53%) than there is broadleaved (47%) but that there are considerable differences in the three countries. In England (Table 19) for example, only 38 per cent. of the High Forest is coniferous, whereas in Scotland the corresponding percentage is 79, and in Wales, 56. The High Forest of England is thus predominantly broadleaved, and that of Scotland, coniferous; Wales, on the other hand, has only slightly more coniferous than broadleaved High Forest and thus is nearer the average for Great Britain as a whole.

Coniferous High Forest in Great Britain is mainly even-aged, only 7 per cent. (67,747 acres) being classified as uneven-aged, but its distribution over the various age-classes is highly peculiar. Only 5 per cent. of the mainly coniferous crops are over 80 years of age, only 12 per cent. between 41 and 80 years, 24 per cent. between 21 and 40 years, but no less than 52 per cent. are twenty years of age or under. For this unbalanced distribution, there are two principal reasons. The first is that war-time fellings, and heavy cutting in the inter-war period, have eaten heavily into the stocks of coniferous timber, mature or approaching maturity. The second is, that the large programmes of planting and replanting, carried out mainly by the State during the last 30 years, have greatly increased the areas of coniferous woodland in the younger age-classes.

How heavily the wartime and other fellings have borne on the mature coniferous High Forest crops, may be seen in Table 19 which shows that in England only 5,623 acres of conifers over 80 years of age existed when the Census was taken. In Wales the situation was even worse, since only 1,164 acres were found above the age of 60.

On the other hand, there are still relatively large areas of mature and maturing conifers in Scotland.

The broadleaved High Forest in Great Britain is interesting because only 53 per cent. of it is even-aged; 393,214 acres, or 47 per cent. of the whole, was classified as uneven-aged, and this relatively high proportion of uneven-aged woodland is a feature of our broadleaved crops, particularly in the southern half of the country. It will be noted, in this connection, that while both in England and in Wales, 50 per cent. of the broadleaved high forest is uneven-aged, only 24 per cent. has been so classified in Scotland.

AGE-CLASSES OF HIGH FOREST, CLASSIFIED AS MAINLY CONIFEROUS AND MAINLY BROADLEAVED—
ALL WOODLANDS, GREAT BRITAIN

Table 18

Category	Age-Class in Years									Total All Ages
	1 to 10	11 to 20	21 to 30	31 to 40	41 to 60	61 to 80	81 to 120	Over 120	Uneven	
	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres
Mainly Coniferous	231,224	268,519	166,359	56,463	65,296	48,615	26,927	13,797	67,747	944,947
Per cent. of Total(1)	92	92	87	66	56	37	15	17	15	53
Mainly Broadleaved	18,803	23,810	25,682	28,346	50,950	83,486	151,934	67,627	393,214	843,852
Per cent. of Total(1)	8	8	13	34	44	63	85	83	85	47
Total	250,027	292,329	192,041	84,809	116,246	132,101	178,861	81,424	460,961	1,788,799

Note. (1) Percentage of the total for each age-class, found in each description of woodland.

HIGH FOREST AREAS BY AGE-CLASSES AND COMPOSITION, WITH DETAILS FOR COUNTRIES—ALL WOODLANDS

Table 19

Country	Composition	AGE-CLASS																Total	
		1—10		11—20		21—30		31—40		41—60		61—80		81—120		Over 120		Uneven-aged			
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
England	Mainly Coniferous	97,830	25	110,290	29	77,883	20	19,586	5	22,311	6	12,324	3	5,351	1	272	—	41,153	11	387,000	100
	Mainly Broadleaved	16,097	3	20,871	3	21,031	3	20,653	3	39,782	6	63,503	10	99,491	16	37,286	6	323,843	50	642,557	100
	Total	113,927	11	131,161	13	98,914	10	40,239	4	62,093	7	75,827	7	104,842	9	37,558	4	364,996	35	1,029,557	100
Scotland	Mainly Coniferous	97,351	21	115,779	25	71,869	16	33,923	8	41,007	9	35,497	8	21,229	5	13,502	3	24,564	5	454,721	100
	Mainly Broadleaved	1,216	1	1,030	1	1,425	1	2,474	2	4,488	4	11,256	10	40,664	34	27,572	23	28,490	24	118,615	100
	Total	98,567	17	116,809	20	73,294	13	36,397	7	45,495	8	46,753	8	61,893	11	41,074	7	53,054	9	573,336	100
Wales	Mainly Coniferous	36,043	35	42,450	41	16,607	16	2,954	3	1,978	2	794	1	347	—	23	—	2,030	2	103,226	100
	Mainly Broadleaved	1,490	2	1,909	2	3,226	4	5,219	6	6,680	8	8,727	11	11,779	14	2,769	3	40,881	50	82,680	100
	Total	37,533	20	44,359	24	19,833	11	8,173	4	8,658	5	9,521	5	12,126	7	2,792	1	42,911	23	185,906	100
Great Britain	Mainly Coniferous	231,224	24	268,519	28	166,359	18	56,463	6	65,296	7	48,615	5	26,927	3	13,797	2	67,747	7	944,947	100
	Mainly Broadleaved	18,803	2	23,810	3	25,682	3	28,346	3	50,950	6	83,486	10	151,934	18	67,627	8	393,214	47	843,852	100
	Total	250,027	14	292,329	16	192,041	10	84,809	5	116,246	7	132,101	8	178,861	9	81,424	5	460,961	26	1,788,799	100

Note. Percentages relate to the total area of each description of woodland (*i.e.* Mainly Coniferous or Mainly Broadleaved), in each country.

Broadleaved High Forest, when compared with the coniferous, is seen to have a completely different distribution of age-classes. In the conifers, there was, as we have seen, a marked preponderance of the youngest age-classes; in the broadleaved High Forest, the opposite is the case. Thus only 5 per cent. of broadleaved High Forest is under 20 years of age, and only 6 per cent. between 21 and 40. On the other hand, 26 per cent. is over 80 years old.

In Scotland, where the broadleaved High Forest is not so important, this trend is even more strongly marked, only 2 per cent. of the crops are 20 years old or under, only 3 per cent. between 21 and 40 years old, while 57 per cent. are more than 80 years of age.

Taking the crops as a whole (Table 18), it will be seen that 92 per cent. of the High Forest up to 20 years old is coniferous, and only 8 per cent. broadleaved. Between 21 and 30 years of age, the corresponding figures are 87 and 13 per cent. These figures are largely influenced by the extensive plantations of softwood which have been made since 1919, mainly by the State but to some extent by private owners.

Between 31 and 40 years of age, and between 41 and 60, the percentages of coniferous High Forest were 66 and 56 respectively, but in crops over 60 years of age conifers play a small part.

Both coniferous and broadleaved High Forest have highly abnormal distributions of age-classes, taking the country as a whole; any approach to what is called normality can only be made during the course of many years.

Distribution of Age-Classes by Counties

It is desirable to give a detailed picture of the distribution of age-classes by counties, so as to enable an assessment to be made of each county's ability to sustain local markets for forest produce. This is effected by Tables F and G of Appendix VI, pages 202 to 204. In Table F, for Mainly Coniferous High Forest, it is assumed that a normal rotation is 80 years, and consequently that Stands aged 40 years or below may be regarded as being "under middle age". Similarly, in Table G, for Mainly Broadleaved High Forest, it is assumed that a normal rotation is 120 years, and that Stands aged 60 years or below are "under middle age". Map 6 on page 244, shows the position diagrammatically; it has been compiled by adding the areas "under middle age", for Mainly Coniferous and for Mainly Broadleaved High Forest together; areas "over middle-age", and uneven-aged areas, have been treated in a like fashion.

Several important features are brought out by this presentation. Counties such as Argyll, Northumberland and Norfolk, which contain relatively large proportions of the newly formed coniferous plantations in State Forests, are seen to have a large share of their total woodland area classified as "under middle age". In Wales, the great scarcity of the older age-classes becomes apparent. In the southern counties of England, the importance of the uneven-aged areas, which are, as we have seen, largely broadleaved, is at once evident. Certain counties show a fairly even balance between stands under and over middle age; examples are Inverness, Nairn, Lanark, Wigtown, Lancashire, the West Riding of Yorkshire, Buckingham, Oxford, Surrey, Sussex, Hampshire and Somerset. In other counties, Stands "over middle-age" predominate over the younger ones; this is so in Dunbarton, Renfrew, the Lothians and Berwickshire in Scotland, and in Westmorland, Cheshire, Leicester, Hertford, Essex and Middlesex in England. Few of these counties include any new State Forests. In these Scottish Counties much of this predominance of the older age-classes arises from the preservation of shelter-belts; while in the English

areas it is probable that amenity considerations had saved many of the older Stands from war-time fellings. It may be noted that the counties with a preponderance of the older age-classes include those which, on the whole, are not well-wooded; conversely, those counties with a large proportion of woodland, or with their woods in large and convenient groupings, had lost a high proportion of their older age-classes during the war.

Ownership in Relation to Age-Classes

A point of some interest is the relative shares of the various age-classes found in Private Woodlands and State Forests respectively. As the systematic large-scale planting of State Forests only began in 1919, their share of the older age-classes is naturally a small one. The age-classes up to 40 years have been analysed separately for Mainly Coniferous and Mainly Broadleaved High Forest, with the results shown below:

RELATIVE SHARE OF PRIVATE WOODLANDS AND STATE FORESTS, IN MAINLY CONIFEROUS HIGH FOREST, FOR AGE CLASSES UP TO 40 YEARS

Table 20

Ownership	1 to 10 yrs.		11 to 20 yrs.		21 to 30 yrs.		31 to 40 yrs.		Total 1 to 40 yrs.	
	Acres	% (1)	Acres	% (1)	Acres	% (1)	Acres	% (1)	Acres	% (1)
Private	59,422	26	74,754	28	90,815	55	52,264	93	277,255	38
State	171,802	74	193,765	72	75,544	45	4,199	7	445,310	62
Total	231,224	100	268,519	100	166,359	100	56,463	100	722,565	100

Note. (1) Percentage of each age-class.

Table 20 shows that the combined areas of Mainly Coniferous High Forest established (nearly all by planting) during the four ten-year periods over the past forty years show a remarkable increase from 56,463 acres to 268,519 acres, followed by a small decline to 231,224 acres during the last decade, caused by the war. The increase in State planting has been very much greater than that for Private planting, and as a result, the relative share of the State forests has increased from only 7 per cent. in the oldest, 31 to 40 year, age-class, to 74 per cent. in the youngest, 1 to 10 year, age-class. Since 1927, nearly three-quarters of the new Coniferous High Forest has been established by State action.

RELATIVE SHARE OF PRIVATE WOODLANDS AND STATE FORESTS, IN MAINLY BROADLEAVED HIGH FOREST FOR AGE-CLASSES UP TO 40 YEARS

Table 21 At 30th September, 1947

Ownership	1 to 10 yrs.		11 to 20 yrs.		21 to 30 yrs.		31 to 40 yrs.		Total 1 to 40 yrs.	
	Acres	% (1)	Acres	% (1)	Acres	% (1)	Acres	% (1)	Acres	% (1)
Private	7,549	40	11,304	47	22,085	86	27,069	95	68,007	70
State	11,254	60	12,506	53	3,597	14	1,277	5	28,634	30
Total	18,803	100	23,810	100	25,682	100	28,346	100	96,641	100

Note. (1) Percentage of each age-class.

Table 21 shows that the combined areas of Mainly Broadleaved High Forest established during ten-year periods over the past forty years show a steady decline from 28,346 to 18,803 acres. This decline is mainly due to a falling off of Private planting, from 27,069 to 7,549 acres. Planting in State Forests, on the other hand, has increased from 1,277 acres to a maximum of 12,506 acres, followed by a decline to 11,254 acres during the last decade, due to the war. As a result, the proportion in State ownership rose steadily from 5 per cent. in the 31 to 40 year age-class, to 60 per cent. in the 1 to 10 year age-class.

The Forestry Commission has thus contributed substantially to new plantings of broadleaved trees, though the areas which it has planted with conifers are much greater.

(ii) Composition of High Forest by Principal Species

The term "principal species" was defined in the Instructions for Survey as the most abundant species in each Stand; where this comprised nine-tenths or more of the crop the Stand was regarded as pure. In mixtures in which the principal species formed less than nine-tenths of the crop, the next most abundant species was also recorded under the description of "subsidiary". Principal and subsidiary species which had not been allotted a place in the tables were classified as either "Other Conifers" or "Other Broadleaved".

The application of such a system introduces the possibility of three anomalies which have to be kept in mind when figures are being quoted.

First, in mixtures containing many different species the principal one may represent only a small proportion of the crop (in extreme cases as little as one-fifth). Second, the description refers only to the actual state of the mixture at the date of survey, and takes no account of possible objects or intentions of management; reference has already been made to the possibility of broadleaved crops raised with conifer nurses being classified with a conifer as the principal species and so being included under Mainly Coniferous High Forest.

The third point is that no distinction is made between intimate mixtures and mixture by groups; since Stands less than one acre in extent were not normally separated in the survey, small pure patches of different species had frequently to be combined for purposes of description, and the "principal species" taken as the one which had the larger area in each case. Finally, and arising to some extent from this latter point, a classification by principal species alone tends to obscure the relative abundance of any species which is usually grown mainly in mixtures or in small patches.

The general position is shown in Table 22 overleaf, which shows, both for Great Britain and the three individual countries, the areas occupied by the fourteen tree species that make up, between them, 98 per cent. of the total High Forest. (Details of fifteen minor species follow in Tables 23 to 26.) Table 22 also shows the percentage of the total High Forest area occupied by each species, as well as its percentage share in the area of Mainly Coniferous or Mainly Broadleaved High Forest, as the case may be.

The first point to be remembered is that the coniferous species, with 944,947 acres, or 53 per cent. of the total High Forest, occupy a slightly larger area than the broadleaved species, which have 843,852 acres, or 47 per cent.

Table 22 also shows that in Great Britain as a whole the most important species in High Forest is oak, with 431,495 acres, or 24 per cent. of the total High Forest area, followed by Scots pine with an area of 364,152 acres, or 20 per cent. There is a considerable gap between the latter and the third and

HIGH FOREST AREAS UNDER MAJOR TREE SPECIES, WITH DETAILS FOR COUNTRIES. PURE AND MIXED STANDS COMBINED

Table 22

SPECIES	ENGLAND			SCOTLAND			WALES			GREAT BRITAIN		
	Area Acres	Percentages (a) of Conifers	Percentages (b) of all species	Area Acres	Percentages (a) of Conifers	Percentages (b) of all species	Area Acres	Percentages (a) of Conifers	Percentages (b) of all species	Area Acres	Percentages (a) of Conifers	Percentages (b) of all species
Scots Pine	148,361	38	14	208,930	46	36	6,861	7	4	364,152	39	20
Corsican Pine	31,543	8	3	3,494	1	1	3,466	3	2	38,503	4	2
European Larch	73,158	19	7	48,069	10	9	11,676	11	6	132,903	14	8
Japanese Larch....	21,269	5	2	18,034	4	3	15,755	15	8	55,058	6	3
Norway Spruce....	41,557	11	4	70,785	16	12	20,811	20	11	133,153	14	8
Sitka Spruce	48,188	13	5	85,182	19	15	33,669	33	18	167,039	17	9
Douglas Fir	17,716	5	2	11,194	2	2	8,918	9	5	37,828	4	2
Other Conifers	5,208	1	—	9,033	2	1	2,070	2	1	16,311	2	1
Total: All Conifers	387,000	100	37	454,721	100	79	103,226	100	55	944,947	100	53
	Area Acres	Percentages (a) of Broad-leaved	Percentages (b) of all species	Area Acres	Percentages (a) of Broad-leaved	Percentages (b) of all species	Area Acres	Percentages (a) of Broad-leaved	Percentages (b) of all species	Area Acres	Percentages (a) of Broad-leaved	Percentages (b) of all species
Oak	337,088	52	33	45,103	38	8	49,304	60	26	431,495	50	24
Ash	69,575	11	7	4,947	4	1	10,244	12	6	84,766	10	5
Beech	108,219	17	11	47,043	40	9	6,503	8	4	161,765	20	9
Birch	51,352	8	5	6,578	6	1	9,216	11	5	67,146	8	3
Spanish Chestnut	9,930	2	1	27	—	—	107	—	—	10,064	1	1
Sycamore	43,687	7	4	7,668	6	1	4,798	6	3	56,153	7	3
Elm	13,256	2	1	6,064	5	1	813	1	—	20,133	2	1
Other Broadleaved Trees	9,450	1	1	1,185	1	—	1,695	2	1	12,330	2	1
Total: All Broadleaved Trees	642,557	100	63	118,615	100	21	82,680	100	45	843,852	100	47
Grand Total: All Species	1,029,557	—	100	573,336	—	100	185,906	—	100	1,788,799	—	100

fourth most common species, *i.e.* Sitka spruce with 167,039 acres (9 per cent.) and beech with 161,765 acres (also 9 per cent.). The only other species covering more than 100,000 acres are Norway spruce and European larch with 133,153 and 132,903 acres respectively, each equivalent to about 8 per cent. of the total High Forest area.

In England, broadleaved species occupy 63 per cent. of the High Forest, oak accounting for 33 per cent., beech for 11 per cent., ash for 7 per cent., birch for 5 per cent., and sycamore for 4 per cent. In the coniferous woods, which make up 37 per cent. of the total, Scots pine accounts for 14 per cent., the two larches for 9 per cent., and the two spruces for 9 per cent. also.

In Scotland, coniferous species predominate, with 79 per cent. of the total High Forest area, including 36 per cent. under Scots pine, 27 per cent. under the two spruces, and 12 per cent. under the two larches. The broadleaved species account for 21 per cent; only beech, with 9 per cent., and oak, with 8 per cent., are individually important.

In Wales, the conifers, with 55 per cent, again predominate, though by a smaller margin; their species composition is, however, markedly different from that found elsewhere. The two spruces take the lead with 29 per cent., followed by the two larches with 14 per cent., Douglas fir with 5 per cent., and Scots pine (so important elsewhere) with only 4 per cent. The Broadleaved High Forest, amounting to 45 per cent. in all, consists mainly of oak, with 26 per cent.; but there are substantial areas of ash, 6 per cent.; birch, 5 per cent.; beech, 4 per cent.; and sycamore, 3 per cent.

Species Distribution by Countries

Mainly Coniferous High Forest

The distribution of the principal coniferous species over the three countries is shown in Table 23 below.

DISTRIBUTION OF THE PRINCIPAL CONIFEROUS SPECIES, BY COUNTRIES— ALL WOODLANDS

Table 23

Principal Species	England		Scotland		Wales	
	Acres	%(1)	Acres	%(1)	Acres	%(1)
Scots pine	148,361	41	208,930	57	6,861	2
Corsican pine	31,543	82	3,494	9	3,466	9
Lodgepole pine	828	25	1,949	60	483	15
European larch	73,158	55	48,069	36	11,676	9
Japanese larch	21,269	39	18,034	33	15,755	28
Hybrid larch	1,602	26	4,362	71	162	3
Norway spruce	41,557	31	70,785	53	20,811	16
Sitka spruce	48,188	29	85,182	51	33,669	20
Douglas fir	17,716	47	11,194	29	8,918	24
Tsuga	198	18	548	51	330	31
Lawson cypress	335	42	132	17	328	41
Grand fir	93	15	294	47	241	38
Silver fir	216	45	224	47	39	8
Noble fir	53	10	466	83	38	7
Thuya	359	51	164	24	173	25
Other conifers	1,524	57	894	33	276	10
Total	387,000	41	454,721	48	103,226	11

Note. (1) The basis (100 per cent.) for these percentages is the total area for Great Britain occupied by the species concerned. *See* Table 25.

All the coniferous species considered are represented in all the three countries, but there are some striking differences in their relative representation, which is often out of proportion to the land area of the countries concerned.

Scotland has the largest individual share of the Coniferous High Forest as a whole, and also of the following individual species: Scots and lodgepole pines; hybrid larch; Norway and Sitka spruces; tsuga; grand, silver, and noble firs.

England and Wales, taken together, have most of the Corsican pine, the European and Japanese larches, the Douglas fir, and the thuya. It should be noted that the combined area of Mainly Coniferous High Forest in England and Wales amounts to 52 per cent. of the total, and thus slightly exceeds the 48 per cent. held by Scotland.

Mainly Broadleaved High Forest

The distribution of the principal broadleaved species over the three countries is shown in Table 24 below:

DISTRIBUTION OF THE PRINCIPAL BROADLEAVED SPECIES, BY COUNTRIES—ALL WOODLANDS

Table 24

Principal Species	England		Scotland		Wales	
	Acres	%(1)	Acres	%(1)	Acres	%(1)
Oak	337,088	78	45,103	10	49,304	12
Ash	69,575	82	4,947	6	10,244	12
Beech	108,219	67	47,043	29	6,503	4
Birch	51,352	76	6,578	10	9,216	14
Spanish chestnut	9,930	99	27	—	107	1
Sycamore	43,687	78	7,668	14	4,798	8
Common alder	3,030	60	545	11	1,495	29
Hornbeam	978	98	12	1	5	1
Poplar	3,048	93	124	4	115	3
Lime	625	61	386	37	23	2
Elm	13,256	66	6,064	30	813	4
Willow	658	96	16	2	14	2
Norway maple	202	92	10	4	8	4
Cherry	103	90	4	4	7	6
Other broadleaves....	806	87	88	10	28	3
Total	642,557	76	118,615	14	82,680	10

Note. (1) The basis (100 per cent.) for these percentages is the total area for Great Britain occupied by the species concerned. *See* Table 26.

All the broadleaved species considered are represented in all the three countries, but without exception the bulk of every species is in England. England has 76 per cent. of all the Mainly Broadleaved High Forest, and from 60 to 99 per cent. of each of the individual species.

Scotland's share is only important in three species, beech, lime and elm. One of the unanticipated findings of the Census is that Scotland holds 29 per cent. of the country's beech, and 37 per cent. of the lime; both are introduced species in that country, and are planted mainly in policies or amenity woods. Scotland's share of the elm, 30 per cent., consists mainly of the Scots or wych elm, which is native. Birch does not figure very largely in the Scottish High

Forest, for, although it is common and widespread, most of the Stands are so poor that they were classified as Scrub.

Wales has a rather large share, 29 per cent., of the alder, but otherwise the proportion of the commoner broadleaved species presents few unusual features.

Spanish chestnut, hornbeam, willow, Norway maple, and cherry, which occupy considerable areas in England, are represented in Scotland and Wales by Stands of only a few acres each.

Distribution of the Principal Species of High Forest, by Counties

Details of the areas under each of the principal species, in each county, will be published later in *Supplements* to this *Report*, but certain of the more outstanding results reached by the county analyses are set out below. The distribution of the most important species, namely certain pines and spruces, oak, and beech, is also shown diagrammatically in Maps 16 to 19, pages 254 to 257.

Conifers

Map 16, page 254, which represents the distribution of pines, brings out the predominance of Scots pine in the north-eastern and northern counties of Scotland. Some well-known but much depleted relics of the native Caledonian pine forest survive in the central Highlands, and smaller outlier extend along the glens towards the west coasts of Inverness and Ross-shire. Widespread planting of Scots pine has taken place, mainly on the heather moorlands of the eastern watersheds. In southern Scotland the Scots pine is also extensively planted, but the tendency towards an easterly distribution is again noticeable, and to the south of the Border it becomes pronounced. Apart from this northern hill country, the main distribution of Scots pine as a forest crop in England is on areas of poor light soil in East Anglia, Lincoln, Stafford, Nottingham and Bedford, and on the heaths of the southern counties on which it now spreads naturally and vigorously. Over much of Wales and many midland counties it is rarely seen as a forest crop.

Corsican pine which accounts for the bulk of the area described as "Corsican and Lodgepole pines" on Map 16, is an important conifer in Nottingham and Stafford, in both of which counties it is suited to the poor Bunter sandstone; it is preferred there to Scots pine, partly because of its better resistance to industrial smoke and fumes. It has been extensively planted in Norfolk and Suffolk, and is well represented in the North Riding of Yorkshire, Lincoln, Hampshire, Dorset, Somerset and Devon. In Scotland, it is virtually confined to coastal sand dunes in Moray and Fife; it has been used for the fixation of similar areas in Carmarthen, Glamorgan, Lancashire and Norfolk. The closely related Austrian or black pine, planted in shelter belts in many parts of the country, was classified for the purpose of the Census under "Other Conifers" and is not represented on the map. Lodgepole pine has been used mainly in the afforestation of difficult moorland sites in Scotland, the north of England and North Wales, and only on a small scale.

The larches show a more general distribution than the pines, but nowhere make up a large proportion of the total area of high forest. European larch is widely planted in small patches for general estate and farm use. In Scotland it is most prominent in Perthshire, but it is well represented throughout the Highlands. To the south it has been frequently planted in Peebles, and it occurs in fair proportion in the north of England. The main distribution shifts to the western half of the country, in North Wales, Shropshire, Hereford,

Monmouth, Gloucester, Somerset and Devon. Other counties with a good deal of European larch are Northampton, Lincoln, Wiltshire, Hampshire and Sussex.

Japanese larch has been used on poorer sites in practically all counties listed above, but tends to be more generally planted in the higher rainfall areas in the west of the country, such as Wales, Devon, south-west Scotland and Argyll. Hybrid larch is most common in Perthshire (where it originated) and occurs elsewhere only in occasional small Stands, or in mixtures.

Map 17 shows that the distribution of spruces is remarkably clear cut and restricted. In contrast to the pines it shows a pronounced westerly trend. Large areas occur in Argyll, the central Highlands and Stirling, the Border counties, Wales and Devon. Aberdeen, Kincardine, Northumberland and the North Riding of Yorkshire are apparent exceptions to this westerly distribution, but in most cases the principal areas lie well up the watersheds and so also come under westerly influences of climate. Sitka spruce is the commoner species in all the principal counties of these regions except Inverness, Perth and Aberdeen, and has been used extensively in the afforestation of poorer and higher lying types of wet grass moors with shallow or medium peat. Norway spruce has been widely planted in the same areas, but is more usually confined to lower elevations and to flushes of a less infertile or acid character. Towards the eastern half of the country both species occur frequently in mixtures with pine, but only occasional small patches, mainly of Norway spruce, are found in the lowland districts of England, usually on wet clay soils, or established primarily as game covers.

The distribution of Douglas fir, with large areas in Inverness, Perth, Argyll, Kirkcudbright, Caernarvon, Merioneth, Montgomery, Radnor, Somerset and Devon, is in accordance with its frequent use for the conversion, by underplanting, of mixed but mainly oak scrub to high forest. "Undifferentiated conifers" reach significant amounts in two counties only; in Argyll the total is made up of plantations of a large variety of west North American species which are well suited to the moist and equable climatic conditions, and in Dorset it consists mainly of maritime pine, which is there naturalised on many of the coastal heaths.

Broadleaved Trees

Turning to the broadleaved trees, details of principal species by countries are given in Table 24 and as would be anticipated from the distribution of this category as a whole, the largest areas of all species are found in England. Chestnut, hornbeam, poplar, willow, Norway maple and cherry are in fact practically confined to England. Relative to their respective total areas, however, Scotland contains a high proportion of beech, lime, and elm, and Wales a high proportion of alder.

Map 18 represents the distribution of oak, which is seen to occur to some extent in all but a few of the more northern counties, and to be by far the commonest High Forest tree in many of the southern ones. This predominance is most noticeable in a belt stretching across the heavier soils of the south Midlands, and including Radnor, Hereford, Worcester, Warwick, Leicester, Rutland, Northampton, Huntingdon, Bedford, Hertford, Middlesex and Essex. In the south-east, Kent, in the south-west, Cornwall, and in the north-west, Cheshire and Westmorland, also contain relatively high proportions of oak. In Scotland oak is scarce in the north-east and the distribution tends to be south-westerly and local. The species is well represented in Perth, Stirling and

Dunbarton, and good native Stands occur in the Cowal district of Argyll and along the Great Glen in Inverness-shire, while in the south appreciable areas occur in Selkirk, Dumfries and Kirkcudbright.

Observations made in the course of the Census survey confirmed the generally western distribution of sessile oak, which, however, was found to extend eastwards on most of the lighter and more acid soils. Planted oak proved to be almost entirely of pedunculate or of hybrid origin.

The distribution of beech is represented in Map 19 and falls distinctly into two zones: a southern one, to which it is indigenous and in which conspicuous examples are the well known Chiltern beech woods of Buckingham and Oxford, and a northern one in the midland valley and eastern counties of Scotland, to which it has been introduced and in which it has been established in policy woods and shelter belts. In the north of England, beech tends, as in Scotland, towards an easterly distribution.

Sycamore is important in Lancashire, the West Riding of Yorkshire and Derby, and fairly prominent throughout the northern counties of England and in North Wales; it is also common in the Scottish counties of Fife, Midlothian, Lanark and Ayr. Its distribution may be related to its ability to withstand a combination of industrial fumes and exposure.

Ash is more generally distributed, but (with the exception of Lincolnshire, where it has been extensively planted) tends to become prominent as a principal species only in the western and south-western counties of England. In Scotland, Wigtown and Kirkcudbright are the only counties which contain any appreciable area of ash.

Birch is a widespread species, but Stands good enough to be classed as High Forest are abundant in comparatively few counties, the chief of these being: Perth, Cumberland, Yorkshire, Shropshire, Norfolk; and the south-eastern counties of Berkshire, Hampshire, Surrey, Sussex and Kent.

Broadleaved species other than the foregoing are important in comparatively few counties. The Scots or wych elm occupies considerable areas of High Forest in Fife, West Lothian, Lanark and Yorkshire. The sweet or Spanish chestnut figures to a considerable degree in Notts., Norfolk, Gloucester; and the south-eastern counties of Hampshire, Surrey, Sussex and Kent. Alder is frequent in Glamorgan, and hornbeam in Essex.

Pure and Elite Stands of High Forest

Tables 25 and 26 overleaf, where they deal with pure Stands, throw some interesting light on silvicultural practice. To prevent confusion, it is necessary to point out at this stage that pure crops are defined as having at least 90 per cent. of a single species in their composition; thus, all the mixed High Forest, referred to in Table 17, page 49, is excluded as well as all coniferous and broadleaved Stands in which individual species are mixed in such a way that no species makes up as much as 90 per cent. of the crop.

So far as coniferous High Forest (Table 25) is concerned, 563,018 acres or 60 per cent. of the whole, occur in pure Stands; with broadleaved High Forest (Table 26), on the other hand, only 32 per cent. of the Stands are pure (271,060 acres).

Of the principal coniferous species, Scots pine, corsican pine, Japanese larch and Sitka spruce all have more than 60 per cent. of their areas as pure crops; Norway spruce is slightly lower at 56 per cent. while European larch is well below the average at 42 per cent.

SPECIES COMPOSITION OF MAINLY CONIFEROUS HIGH FOREST, WITH DETAILS OF PURE AND ELITE STANDS—ALL WOODLANDS, GREAT BRITAIN

Table 25

Principal Species	Total Area	In Pure Stands		
		Total Area		Elite
	Acres	Acres	%(1)	Acres
Scots pine	364,152	230,976	63	2,292
Corsican pine	38,503	25,481	66	95
Lodgepole pine	3,260	1,699	52	—
European larch	132,903	55,216	42	403
Japanese larch	55,058	35,353	64	100
Hybrid larch	6,126	4,432	73	50
Norway spruce	133,153	75,018	56	112
Sitka spruce	167,039	109,780	66	72
Douglas fir	37,828	21,966	58	60
Tsuga	1,076	543	50	—
Lawson cypress	795	479	60	—
Grand fir	628	412	66	—
Silver fir	479	91	19	1
Noble fir	557	183	33	—
Thuya	696	252	36	4
Other conifers	2,694	1,137	42	—
Total	944,947	563,018	60	3,189

Note. (1) Percentage of area for each individual tree species or category.

SPECIES COMPOSITION OF MAINLY BROADLEAVED HIGH FOREST, WITH DETAILS OF PURE AND ELITE STANDS—ALL WOODLANDS, GREAT BRITAIN

Table 26

Principal Species	Total Area	In Pure Stands		
		Total Area		Elite
	Acres	Acres	%(1)	Acres
Oak	431,495	171,507	40	1,403
Ash	84,766	14,567	17	141
Beech	161,765	49,947	31	1,754
Birch	67,146	22,368	33	—
Spanish chestnut	10,064	1,793	18	45
Sycamore	56,153	5,776	10	15
Common alder	5,070	1,045	21	—
Hornbeam	995	73	7	—
Poplar	3,287	1,604	49	—
Lime	1,034	97	9	—
Elm	20,133	1,717	9	8
Willow	688	328	48	—
Norway maple	220	25	11	2
Cherry	114	22	19	—
Other broadleaves	922	191	21	—
Total	843,852	271,060	32	3,368

Note. (1) Percentage of area for each individual species or category.

Table 26 brings out very clearly the mixed character of our broadleaved woodlands. Almost half the Stands of poplar and willow are pure but these are exceptional. Oak with 40 per cent. is above the average.

Elite Stands

Stands composed of elite trees, that is, trees of outstanding quality as regards straightness of bole and crown development, were classified as "elite" and are recorded for the different species in Tables 25 and 26.

These extend in area to 3,189 acres for coniferous, and 3,368 acres for broadleaved species, and examples were found in most of the principal species. Scots pine has the largest area—2,292 acres, followed by beech, 1,754 acres and oak 1,403 acres. The only two common trees for which no elite Stands were recorded, are birch and alder.

Minor Tree Species

Out of the twenty-nine species of trees that were classified individually during the Census survey, it was found that fourteen accounted for 98 per cent. of the total High Forest area. These major species were: Scots pine, Corsican pine, European larch, Japanese larch, Norway spruce, Sitka spruce and Douglas fir among the conifers; and oak, ash, beech, birch, sweet or Spanish chestnut, sycamore and elm among the broadleaved trees. All other species, which together account for only 2 per cent of the total High Forest area, must be regarded as being of minor importance; details are given in Tables 23 to 26.

Lodgepole pine occupies 3,260 acres, of which 1,949 acres are in Scotland, where this species is often planted on unfertile soils and in exposed situations in the State Forests. Hybrid larch, with 6,126 acres, is to be found over substantial areas in both Private Woodlands and State Forests, and again the largest area, 4,362 acres, is in Scotland. The only other minor conifer with an area exceeding one thousand acres is tsuga or hemlock, with 1,076 acres, mostly in Scotland and Wales. The bulk of the total area of Lawson cypress, with 335 acres, and of the thuya, with 359 acres, is in England. Of the three firs of the *Abies* genus, the European silver fir, which was formerly commonly planted on private estates, occupies 479 acres and is well distributed over all three countries but over four-fifths of it is in mixed Stands. The two North American species, the grand fir (with 628 acres) and the noble fir (with 557 acres) which have largely superseded the European silver fir in more recent plantings, are to be found mainly in Scotland and Wales.

The "other conifers", which are not differentiated in these Census returns, included Austrian pine, maritime pine (which is naturalised locally in Dorset), deodar, Californian redwood and yew. Taken together, they are fairly evenly spread over the three countries, and occupy, in all, 2,694 acres.

Although England has a rather small share in the minor coniferous species, (Table 23), it holds by far the largest share of all the minor broadleaved species (Table 24). Alder, with 5,070 acres, is almost entirely of natural origin, forming groves along moist valleys and on partially waterlogged soils; 3,030 acres are in England and 1,495 acres, or 29 per cent., a surprisingly high proportion, are in Wales. Hornbeam, with 995 acres, is practically confined to the south-east of England, mainly Kent and Essex, where most High Forest Stands have probably arisen from the hornbeam coppices that were formerly commonly planted and tended. The poplar Stands, totalling 3,287 acres, are virtually all artificially planted, and the same is true of most of the willow, with 688 acres;

both these trees are widely used for roadside and streamside planting, but, by definition, such areas were excluded from the Census survey.

Nearly all of the lime, with 1,034 acres, is in planted Stands, and a rather large proportion, 386 acres or 37 per cent. is in Scotland, to which country the lime is not native. Norway maple, an introduced species and therefore virtually all planted, covers 220 acres, nearly all of which is in England. Finally we have the cherry, which is a native tree that is rarely planted under forest conditions, covering 114 acres, of which 103 are in England. The "other" or undifferentiated broadleaved species, such as the plane, amounted in all to only 922 acres.

Reference to Table 26 shows that pure Stands of the minor broadleaved species are not of great extent. With the exception of the poplar and the willow, nearly half of which are found in pure Stands, the greater proportions of them occur in mixture with other tree species.

(iii) Species Composition of High Forest by Ownership

Mainly Coniferous High Forest

SPECIES COMPOSITION OF MAINLY CONIFEROUS HIGH FOREST, IN RELATION TO OWNERSHIP—ALL WOODLANDS, GREAT BRITAIN

Table 27

Principal Species	Private Woodlands		State Forests	
	Acres	%(1)	Acres	%(1)
Scots pine	247,691	68	116,461	32
Corsican pine	6,499	17	32,004	83
Lodgepole pine	177	5	3,083	95
European larch	101,758	77	31,145	23
Japanese larch	26,174	47	28,884	53
Hybrid larch	4,606	75	1,520	25
Norway spruce	47,611	36	85,542	64
Sitka spruce	25,131	16	141,908	84
Douglas fir	14,520	38	23,308	62
Tsuga	170	16	906	84
Lawson cypress	217	27	578	73
Grand fir	140	23	488	77
Silver fir	456	95	23	5
Noble fir	383	69	174	31
Thuya	403	58	293	42
Other conifers	1,005	37	1,689	63
Total	476,941	50	468,006	50

Note. (1) Percentage of total area under each species, as set out in Table 22.

Table 27 analyses the ownership of the principal species found in Coniferous High Forest and shows that Private Woodlands hold the larger share of Scots pine, European and hybrid larches, silver and noble firs and thuya. The State Forests hold the greater part of all the other conifers, and in the case of Corsican and lodgepole pines, Sitka spruce and tsuga, their share amounts to more than four-fifths of the total. Generally speaking, the Private Woodlands, which have been built up slowly over a long period of years, have the greater share of those coniferous species that have been favoured for planting since an early date. The State Forests, having been built up more rapidly over a shorter period, naturally include the larger proportion of those species that have come into favour more recently. Taking all species together, the State and Private Woodlands are seen to have equal shares.

Mainly Broadleaved High Forest

SPECIES COMPOSITION OF MAINLY BROADLEAVED HIGH FOREST IN RELATION TO OWNERSHIP—ALL WOODLANDS, GREAT BRITAIN

Table 28

Principal Species	Private Woodlands		State Forests	
	Acres	%(1)	Acres	%(1)
Oak	393,344	91	38,151	9
Ash	80,160	94	4,606	6
Beech	144,698	89	17,067	11
Birch	64,112	95	3,034	5
Spanish chestnut	9,374	93	690	7
Sycamore	55,085	98	1,068	2
Common alder	4,737	93	333	7
Hornbeam	992	100	3	—
Poplar	2,097	64	1,190	36
Lime	997	96	37	4
Elm	20,026	100	107	—
Willow	670	97	18	3
Norway maple	174	79	46	21
Cherry	100	88	14	12
Other broadleaves	801	87	121	13
Total	777,367	92	66,485	8

Note. (1) Percentage of total area under each species, as set out in Table 23.

Table 28 analyses the ownership of the principal species found in Broadleaved High Forest, and shows that, without exception, the larger share of every species is in the Private Woodlands. The State Forests, however, include 36 per cent. of the country's poplar, and 11 per cent. of the beech. Taking all species together 92 per cent. are in Private Woodlands, and only 8 per cent. in State Forests

(iv) Principal Species in Relation to Age-Classes

Mainly Coniferous High Forest

PRINCIPAL SPECIES IN MAINLY CONIFEROUS HIGH FOREST, IN RELATION TO ALL AGE-CLASSES—ALL WOODLANDS, GREAT BRITAIN

Table 29

Principal Species	Age-Class in Years			
	1 to 40	41 to 80	Over 80	Uneven
	Acres	Acres	Acres	Acres
Scots pine	214,638	69,042	35,574	44,898
Corsican pine	35,381	1,936	55	1,131
Lodgepole pine	3,122	—	—	138
European larch	95,940	26,817	2,837	7,309
Japanese larch	53,275	766	1	1,016
Hybrid larch	6,033	62	—	31
Norway spruce	112,407	11,839	1,433	7,474
Sitka spruce	163,342	822	10	2,865
Douglas fir	33,601	2,126	388	1,713
Tsuga	785	24	—	267
Lawson cypress	643	37	2	113
Grand fir	559	16	1	52
Silver fir	98	67	129	185
Noble fir	326	117	60	54
Thuya	525	55	9	107
Other conifers	1,890	185	225	394
Total	722,565	113,911	40,724	67,747

Table 29, which is an analysis of principal species by age-classes, shows that in Mainly Coniferous High Forest only Scots pine, European larch and Norway spruce are well represented in the stands over eighty years of age; in the 41 to 80 year age group they are still the most important species but are supplemented by Corsican pine and Douglas fir, while in Stands in the 1 to 40 year age group the relative importance of Scots pine and European larch declines and that of Sitka spruce and Japanese larch increases. In uneven-aged Stands all species are represented, but Scots pine predominates.

Table 30, which analyses the age-classes from 1 to 40 years, brings out the fact that these trends have been generally intensified in each successively younger age-class until in the 1 to 10 year age-class Sitka spruce is predominant and Japanese larch has reached an area almost equal to that of European larch. Norway spruce has shown an increase similar to, but less rapid than, that of Sitka spruce, while Corsican pine and Douglas fir, after reaching a maximum, each show a marked decline in the last decade, or youngest age-class.

PRINCIPAL SPECIES IN MAINLY CONIFEROUS HIGH FOREST, IN RELATION TO AGE-CLASSES UP TO FORTY YEARS—ALL WOODLANDS, GREAT BRITAIN

Table 30

Principal Species	Age-Class in Years			
	1 to 10	11 to 20	21 to 30	31 to 40
	Acres	Acres	Acres	Acres
Scots pine	51,395	71,572	67,068	24,603
Corsican pine	9,415	16,537	8,224	1,205
Lodgepole pine	939	2,014	165	4
European larch	19,116	36,276	25,511	15,037
Japanese larch	18,898	21,325	10,764	2,288
Hybrid larch	1,806	2,019	1,671	537
Norway spruce	46,206	38,419	19,925	7,857
Sitka spruce	78,127	66,461	16,940	1,814
Douglas fir....	3,530	12,467	14,947	2,657
Tsuga	482	210	79	14
Lawson cypress	497	79	13	54
Grand fir	244	240	47	28
Silver fir	22	11	22	43
Noble fir	43	104	99	80
Thuya	137	124	135	129
Other conifers	367	661	749	113
Total	231,224	268,519	166,359	56,463

Mainly Broadleaved High Forest

Similar details for Mainly Broadleaved High Forest are given in Tables 31 and 32. The former shows that only oak, beech and elm are well represented in the stands over 120 years of age. In the 61 to 120 year age group these species are still dominant but are supplemented by sycamore and ash, and by small amounts of chestnut and birch, while in the 1 to 60 year age group ash and birch predominate over all species except oak, while poplar and alder also become important. Oak again predominates in the uneven-aged Stands but beech, ash, birch and sycamore are relatively important, and all other species are well represented, often to the same extent as in even-aged Stands.

PRINCIPAL SPECIES IN MAINLY BROADLEAVED HIGH FOREST, IN RELATION TO ALL AGE-CLASSES—ALL WOODLANDS, GREAT BRITAIN

Table 31

Principal Species	Age-Class in Years			
	1 to 60	61 to 120	Over 120	Uneven
	Acres	Acres	Acres	Acres
Oak	44,000	152,028	36,385	199,082
Ash	29,604	11,552	551	43,059
Beech	18,095	41,849	27,588	74,233
Birch	28,962	1,609	27	36,548
Spanish chestnut	2,023	1,999	427	5,615
Sycamore	15,861	17,851	808	21,633
Common alder	2,042	534	26	2,468
Hornbeam	162	58	6	769
Poplar	2,827	98	5	357
Lime	98	299	173	464
Elm	2,935	7,322	1,602	8,274
Willow	506	31	—	151
Norway maple	95	20	2	103
Cherry	49	20	—	45
Other broadleaves	332	150	27	413
Total	147,591	235,420	67,627	393,214

PRINCIPAL SPECIES IN MAINLY BROADLEAVED HIGH FOREST, IN RELATION TO AGE-CLASSES UP TO FORTY YEARS—ALL WOODLANDS, GREAT BRITAIN

Table 32

Principal Species	Age-Class in Years			
	1 to 10	11 to 20	21 to 30	31 to 40
	Acres	Acres	Acres	Acres
Oak	7,324	6,893	3,778	6,886
Ash	1,982	4,338	6,761	6,511
Beech	5,212	3,734	1,769	2,368
Birch	2,344	5,500	9,033	6,941
Spanish chestnut	238	463	324	388
Sycamore	982	1,510	2,249	3,358
Common alder	102	122	380	576
Hornbeam	5	30	39	29
Poplar	428	884	866	372
Lime	7	11	19	21
Elm	14	70	323	707
Willow	57	127	100	133
Norway maple	12	21	13	11
Cherry	10	5	2	25
Other broadleaves	86	102	26	20
Total	18,803	23,810	25,682	28,346

Table 32 shows that the apparent decline of oak and beech has been arrested and reversed during the last thirty years, and it is believed that this is very largely the result of re-afforestation under State ownership. By way of contrast, ash and birch both reach their maximum in the 21 to 30 year age-class

and have declined since, while sycamore and elm have declined progressively since the 31 to 40 year age-class.

As, however, many broadleaved species arise largely by natural regeneration, which may be recorded temporarily as uneven-aged or even not classified as High Forest in the earlier stages, it would be unwise to draw definite conclusions from such trends. While several of the minor species show a similar progression, the area of poplar, which is nearly always planted, dropped by half in the last decade, due, no doubt, to war-time conditions. Spanish chestnut is almost alone in showing an even gradation of areas over the various age-classes.

CHAPTER 6

COPPICE, SCRUB, DEVASTATED AND FELLED AREAS—ALL WOODLANDS

As by far the greater proportions of these four main Types of woodland are under Private Ownership, the detailed consideration of each Type has been deferred to Chapter 10, page 98, entitled "Coppice, Scrub, Devastated and Felled Areas in Private Woodlands".

A further reason for this treatment is that the State ownership of woodlands of these types is, for the most part, a temporary and incidental phase. The bulk of such areas held by the State has been recently acquired from private ownership, for conversion to productive use. Brief notes on the areas of each Type owned by the Forestry Commission at the date of survey, are given in Chapter 14, page 131, entitled "Coppice, Scrub, Devastated and Felled Areas in State Forests".

But to complete the review of all the woodlands of the country, it is necessary to consider here the total area of each type in relation to its ownership.

Coppice

Of the total area of 349,994 acres of Coppice (of the two sub-types) 339,774 acres or 97 per cent., were in Private Woodlands, and only 10,220 acres or 3 per cent., in State Forests. The figures for the Coppice-with-Standards sub-type are: All Woodlands, 229,788 acres; comprising 227,711 acres, or 99 per cent., in Private Woodlands, and 2,077 acres, or 1 per cent., in State Forests. The corresponding figures for the Simple Coppice sub-type are; All Woodlands, 120,206 acres; comprising 112,063 acres, or 93 per cent., in Private Woodlands; and 8,143 acres, or 7 per cent., in State Forests.

Most of the Coppice under State ownership has been acquired for conversion to High Forest, but exceptions to this general rule include certain areas of productive chestnut Coppice in the South of England which is still worked as Coppice; and some smaller areas actually established by the Commission where local conditions are particularly suitable for Coppice crops.

Scrub

Of the total area of 496,951 acres of scrub, 472,255 acres, or 95 per cent., are in Private ownership, and 24,696 acres, or 5 per cent., are in the State Forests. Most of the Scrub in State Forests has recently been acquired for conversion to High Forest; it includes, however, a few tracts of Scrub which, by reason of high elevation, poor soil, or extreme exposure, are likely to remain as such indefinitely.

Devastated Areas

Devastated areas total 151,064 acres, comprising 139,455 acres, or 92 per cent., in Private ownership, and 11,609 acres, or 8 per cent., in State Forests. The devastated areas owned by the Forestry Commission are either recent acquisitions awaiting replanting, or else have been recently devastated by fire.

Felled Areas

Of the total area of 661,554 acres of felled woodlands, 619,539 acres, or 94 per cent., are in Private ownership, and 42,015 acres, or 6 per cent., are in State Forests. At the time of the Census, an abnormally large proportion of the older State Forests, including parts of such former Crown Woodlands as the New Forest (Hampshire) and the Forest of Dean (Gloucestershire), had been cut over to meet war-time needs, and still awaited replanting. But much of the Felled area in the State Forests had recently been acquired in its present condition, from private owners.

Details by sub-types are: *Felled before September, 1939*: 288,503 acres; comprising 275,104 acres, or 95 per cent., in Private ownership; and 13,399 acres, or 5 per cent., in State Forests.

Felled since September, 1939: 373,051 acres; comprising 344,435 acres, or 92 per cent., in Private ownership; and 28,616 acres, or 8 per cent., in State Forests.

SECTION B — PRIVATE WOODLANDS

CHAPTER 7

SCOPE OF THE PRIVATE WOODLANDS SURVEY

The scope of the Census Survey as a whole has already been outlined in Chapter 3, page 29.

Certain aspects peculiar to the woodlands in private ownership require discussion here, before their main analysis, which follows in Chapters 8 to 10, can be appreciated.

The term Private Woodlands is taken to comprise all woods other than those directly administered by the Forestry Commission. In addition to those which are owned by individuals, it therefore includes areas under the control of limited companies, trusts and institutions, of corporations and local authorities,

and of Government departments other than the Forestry Commission. By consent of His late Majesty King George VI the survey also included the Royal estates and those Crown woods which had not been transferred to the Forestry Commission by Orders in Council made under the Transfer of Woods Act of 1923.

No record was made of such different types of ownership within the main classification.

The distinction between Private Woodlands and State Forests was taken as at the 30th September, 1947, and any areas acquired by the Forestry Commissioners after that date were recorded as if they had still remained in private ownership.

The gross area surveyed, in blocks five acres or more in extent and exceeding one chain in width, was 2,889,684 acres.

Details by counties, with the mean date of survey in each case, are given in Appendix VI, Table A, page 192.

Out of the total area of 2,889,684 acres, 64,353 acres were classed as Disafforested. Details by countries are given in Table 33 below. In relation to each country's "Gross area Surveyed", England had lost 3 per cent. by disafforestation, Scotland only 1 per cent., and Wales 4 per cent.

GROSS AREA SURVEYED, AREA DISAFFORESTED, TOTAL NET WOODLAND AREA, BY COUNTRIES—PRIVATE WOODLANDS

Table 33

Country	Gross Area Surveyed	Area Disafforested		Total Woodland Area, Net	
	Acres	Acres	%(1)	Acres	%(2)
England	1,625,149	48,034	2.9	1,577,115	56
Scotland	1,029,955	5,947	0.6	1,024,008	36
Wales	234,580	10,372	4.4	224,208	8
Great Britain	2,889,684	64,353	2.2	2,825,331	100

Notes. (1) Percentage of Gross Area Surveyed, within each country.
(2) Percentage of Net Woodland Area of Private Woodlands in Great Britain.

Total Area of Private Woodlands

After deducting the Disafforested area, the total extent of woodlands in Private ownership, which forms the basis for further analysis, was 2,825,331 acres. Details by countries are:

England	1,577,115 acres	56 per cent.
Scotland	1,024,008 acres	36 per cent.
Wales....	224,208 acres	8 per cent.

These proportions are very similar to those recorded for All Woodlands in Chapter 3, page 29.

Details by counties are given in Appendix VI, Table B, page 194.

Suitability for Economic Management

The first object in the survey of Private Woodlands was to determine the proportion of the total area which could be regarded as suitable for the sustained production of timber and other forest products on an economic basis.

This was a classification of the site and not of the existing crop, and followed the principles, laid down in the Instructions for Survey (Appendix II) page 176. Surveyors had to form their own judgments, though they were often guided by the views of the owners, agents and foresters with whom they came in contact. The resulting figures are not therefore to be taken, as in the other census classifications, as a plain enumeration of fact, but rather as expressing a general average of opinion.

The classification was made irrespective of individual ownerships, and in practice the logical approach was to regard any surveyable block of woodland as suitable for economic management unless inherent disabilities appeared to the contrary. The chief causes of disqualification were low site quality, difficult access, unsatisfactory boundaries, and restrictive secondary uses of the land.

Low site quality, arising through undue exposure, shallow or infertile soil or impeded drainage, applies only where the existing or probable Stand would be classified as Scrub.

Poor access and unsatisfactory boundaries had to be considered in relation to the size of the woodland involved, which if large, might allow for improvements at an economic cost. There are some areas of semi-natural woodland, and also shelter belts, which have no recognised access. Other areas have been "sterilised" by building development along their frontages, or by public works such as aerodromes. Another kind of inaccessibility occurs with certain small blocks of woodland, even if adjacent to roads, which are too remote to be managed economically, even in conjunction with some larger group.

Woods regarded as Unsuitable for economic management because of unsatisfactory boundaries include the semi-natural woods occurring on commons and public open spaces (which are not always legally enclosable), narrow woods with a great length of boundary relative to the area enclosed, and irregularly-shaped woods which would be unduly expensive to fence.

Secondary uses of land which restrict the economic management of woods are mainly covered by the headings of amenity, agriculture or sport. Examples include areas maintained primarily for public recreation, private parks or policies, other woods adjacent to houses and gardens, the majority of shelterbelts, woods essential for the wintering of hill cattle and sheep, and some specially preserved deer harbours and game covers. At the time of the census survey, moreover, military restrictions still figured prominently in many parts of the country; and various woods which had been specially adapted as training areas, and for the camouflage of hutments and the dispersal of stores and ammunition, were brought into the classification of Unsuitable for economic management, although it was realised that this condition might not always prove permanent.

The woods included under the description of Doubtfully suitable are mainly of three kinds. The first comprises areas of a straggling outline which, although otherwise classifiable under a single Stand description, contain some sections Suitable for economic management and some which are Unsuitable. The second comprises areas in which the possible restrictive effects of secondary uses of the land were genuinely hard to assess. The third comprises areas,

otherwise Suitable for economic management, which appeared to be under imminent threat of disafforestation by adjacent operations such as building, mining and quarrying, already in progress at the time of survey.

SUITABILITY FOR ECONOMIC MANAGEMENT, BY COUNTRIES—PRIVATE WOODLANDS
Table 34

Country	Suitable		Doubtful		Unsuitable	
	Acres	%(1)	Acres	%(1)	Acres	%(1)
England	1,269,651	81	100,717	6	206,747	13
Scotland	914,889	89	2,830	—	106,289	11
Wales	148,336	66	23,301	11	52,571	23
Great Britain	2,332,876	83	126,848	4	365,607	13

Note. (1) Percentage of net Woodland Area for each country, as given in Table 33.

Table 34 gives details by countries, and shows that 2,332,876 acres, or 83 per cent. of the total area of Private Woodlands, were classified as Suitable for economic management, while 13 per cent. was considered to be definitely Unsuitable. The average size of Stand in woods recorded as Suitable was 15 acres, but only 9 acres in those considered Doubtful, and only 7 acres in areas which were considered Unsuitable. The small size of individual stands, frequently detached from other woodlands, thus appears to be an important factor in causing them to be regarded as Unsuitable for economic management.

In England the proportion classed as Suitable is 81 per cent. of the total, and that recorded as Doubtful is 6 per cent.

In Scotland the proportion classed as Suitable was 89 per cent. and only a negligible area was recorded as Doubtful. This reflects the generally clear-cut distinction between the large compact areas of forest on the one hand, and the policies, shelter belts and small patches of natural Scrub which together comprise most of the Scottish woods.

By contrast, in Wales the proportion classed as Suitable is only 66 per cent. of the total area, and 11 per cent. was recorded as Doubtful. Here most of the woods are small and scattered, or straggle across rocky hillsides and along winding dingles, with irregular boundaries and varying greatly in accessibility. Grazing, mining and quarrying threaten many areas with disafforestation.

The factors influencing the classification show rather definite regional variations, and are brought out better in an analysis by counties. Details of the area of Private Woodlands classed as Suitable for economic management in each county are given in Appendix VI, Table C, page 196.

The high average of suitability in Scotland is accounted for by a consistently large proportion throughout the Highland counties, but the proportion falls off in the South, with a very marked drop in the more densely populated areas of Midlothian and Lanark. In Wales, the low average of suitability is more or less general, but there is a gradual fall from the north to the south of the country.

In England, the heavily wooded counties of Kent, Surrey and Sussex include considerable areas Unsuitable for economic management, owing to their high density of population, with many restrictive secondary uses of the land in amenity woods, commons and open spaces, and constantly expanding building development. In addition, Surrey, Hampshire, Berkshire and Wiltshire contain in the aggregate large areas of woodland which were under intensive military

occupation at the time of survey, and whose status was problematic. A second zone of rather low average suitability, extending up the east coast of England and including the main arable counties, was also affected at the time of survey by the use of numerous woods for war purposes, including dispersal areas for aerodromes. By contrast, Somerset, Dorset and Staffordshire stand out with a high proportion classed as Suitable for economic management, due in each case to a concentration of much of the total area into a few woods of relatively large size.

SUITABILITY FOR ECONOMIC MANAGEMENT, BY TYPES OF WOODLAND—GREAT BRITAIN, PRIVATE WOODLANDS

Table 35

Type	Suitable		Doubtful		Unsuitable	
	Acres	%(1)	Acres	%(1)	Acres	%(1)
HIGH FOREST						
Coniferous	372,214	90	8,307	2	31,943	8
Mixed	105,556	74	8,404	6	28,690	20
Broadleaved	524,487	75	47,949	7	126,758	18
Total, High Forest	1,002,257	80	64,660	5	187,391	15
COPPICE						
With Standards	198,621	87	10,487	5	18,603	8
Coppice only	90,696	81	6,284	6	15,083	13
Total, Coppice....	289,317	85	16,771	5	33,686	10
SCRUB	369,323	78	21,871	5	81,061	17
DEVASTATED	110,778	80	8,401	6	20,276	14
FELLED						
Before 9/39	251,817	91	4,447	2	18,840	7
Since 9/39	309,384	90	10,698	3	24,353	7
Total, Felled	561,201	91	15,145	2	43,193	7
TOTAL	2,332,876	83	126,848	4	365,607	13

Note. (1) Percentage of net Woodland Area of Great Britain, in Private Woodlands, *i.e.*, 2,825,331 acres, *vide* Table 33.

Turning to a classification of suitability by Type of Crop, Table 35 shows that Felled areas have the highest proportion recorded as Suitable for economic management, amounting to 91 per cent. of their total area, probably because, on the whole, the more accessible and more easily worked woods have been selected for fellings, particularly in wartime.

Coniferous High Forest, consisting generally of plantations laid out for the main purpose of timber production, and Coppice-with-Standards, comprising woods which have been worked systematically over many centuries, both stand above the average level of suitability; while simple Coppice, Devastated areas and, Scrub, stand only just below it. On the other hand, Mixed and Broadleaved High Forest have only about 75 per cent. of their total area classed as Suitable for economic management; these types include the majority of shelter-belts, policies and amenity woods.

A comparison with similar figures for State Forests appears in Chapter 11, page 112.

Productive and Unproductive Private Woodlands

The proportions of the Productive Types—High Forest and Coppice, together with those of the Unproductive Types—Scrub, Devastated, and Felled Areas, in Private Woodlands, are shown in Table 36, which follows on page 75. In brief, 56 per cent. of all Private Woodlands are classed as Productive, the proportions for the various countries being: England, 70 per cent., Scotland, 36 per cent., Wales, 53 per cent. The reasons for these variations have already been discussed in Chapter 3, page 36; and as most of the Unproductive area is in the Private Woodlands, the same conclusions apply. The Unproductive areas of Private Woodlands in each county are set out in Appendix VI, Table D, page 198.

Similar figures for State Forests appear in Chapter 11, page 111.

CHAPTER 8

CLASSIFICATION BY TYPE AND SUB-TYPE—PRIVATE WOODLANDS

The following major classification of the Private Woodlands on the basis of their "Type" or character at the 30th September, 1947, follows the same lines as the similar classification for All Woodlands, which are explained in fuller detail in Chapter 4, page 41.

These figures for Private Woodlands are presented in the same way as those for All Woodlands. Comments on the composition of State and Private Woodlands, relative to Type, are deferred to Chapter 12, Classification by Type—State Forests, which commences on page 113. The criteria by which Stands were classified are given in Appendix II, page 176, and examples of each Type are shown in Plates I to V and IX to XI (following page 112).

The general position in the Private Woodlands is set out in Table 36 opposite.

In Great Britain as a whole, 44 per cent of the Private Woodland area was classified as High Forest, and 12 per cent. in the Coppice Type. Scrub accounted for 17 per cent., and Felled or Devastated Areas for no less than 27 per cent. The Productive Area, made up of High Forest and Coppice, was thus 56 per cent. of the whole, and no less than 44 per cent. must be regarded as Unproductive.

The English Woodlands are characterised by a high proportion of Coppice, amounting to 20 per cent., and have relatively little Scrub, 12 per cent., and Felled or Devastated areas, 18 per cent. In England, moreover, the proportion of High Forest, 50 per cent., is higher than in any other country. On a basis of productivity, the English Private Woodlands, with 70 per cent. in Productive Types, are substantially better than those of either Scotland or Wales.

Scotland shows an exceptionally high proportion of Felled or Devastated areas, which account for 40 per cent. of the Private Woodlands. Scrub is likewise an important Type, with 24 per cent., while Coppice is virtually absent. High

AREAS OF WOODLANDS, CLASSIFIED BY TYPES AND SUB-TYPES, IN EACH COUNTRY—PRIVATE WOODLANDS

Table 36

Type	England		Scotland		Wales		Great Britain	
	Acres	% (1)	Acres	% (1)	Acres	% (1)	Acres	% (1)
HIGH FOREST								
Coniferous	147,441	9	247,453	24	17,570	8	412,464	14
Mixed	100,140	7	34,686	3	7,824	4	142,650	5
Broadleaved	531,032	34	94,108	9	74,054	33	699,194	25
Total, High Forest	778,613	50	376,247	36	99,448	45	1,254,308	44
COPPICE								
With Standards	225,429	14	89	—	2,193	1	227,711	8
Coppice only	95,724	6	448	—	15,891	7	112,063	4
Total, Coppice	321,153	20	537	—	18,084	8	339,774	12
SCRUB	190,458	12	243,701	24	38,096	17	472,255	17
DEVASTATED	100,306	6	27,401	3	11,748	5	139,455	5
FELLED								
Before 9/39	32,766	2	221,073	22	21,265	9	275,104	10
Since 9/39	153,819	10	155,049	15	35,567	16	344,435	12
Total, Felled	186,585	12	376,122	37	56,832	25	619,539	22
TOTAL	1,577,115	100	1,024,008	100	224,208	100	2,825,331	100

Note. (1) Percentage of total area of Private Woodlands for each country.

Forest occupies only 36 per cent. of the area. An outstanding conclusion is that, in Private Woodlands of Scotland, the area Felled or Devastated, and consequently lying idle, is greater than that actively producing timber under High Forest crops. Only 36 per cent. of Scotland's Private Woodlands are regarded as Productive, as compared with the 70 per cent. so classed in England.

The Private Woodlands of Wales occupy an intermediate position, with proportions of the various Types following those for Great Britain as a whole. High Forest accounts for 45 per cent., Coppice for 8 per cent., Scrub for 17 per cent., and Felled or Devastated areas for 30 per cent. The proportion classifiable as Productive is 53 per cent.

Comparison of these figures with those for All Woodlands in Chapter 4, page 41, shows that the Private Woodlands have, proportionately, a larger share of Broadleaved High Forest, Coppice, Scrub, Devastated, and Felled Woodlands than the general average, and a smaller share of Coniferous High Forest. These variations are explained by the composition of State Forests, discussed in Chapter 12, page 113.

High Forest in Private Woodlands

The High Forest area in Private Woodlands amounts to 1,254,308 acres. Economically, it is the most important Type, and therefore requires the more detailed analysis that follows in Chapter 9. Details of its three sub-types—Coniferous, Mixed, and Broadleaved, appear in Table 36 above; and their relative importance in the various countries is analysed below.

Proportions of Sub-types, within Countries

The proportion of the Private High Forest of each country, in each sub-type, is shown in Table 37 below.

PROPORTIONS OF SUB-TYPES OF HIGH FOREST WITHIN COUNTRIES—PRIVATE WOODLANDS

Table 37 — Per cent.

Sub-type	England	Scotland	Wales	Great Britain
Coniferous	18	66	18	33
Mixed	14	9	8	11
Broadleaved	68	25	74	56
Total, High Forest....	100	100	100	100

Note. See Table 36, page 75, for actual areas in acres.

Table 37 shows that, for Great Britain as a whole, the Privately-owned High Forest area is largely broadleaved, at 56 per cent., compared with 33 per cent. coniferous and 11 per cent. mixed.

Remarkable differences, however, occur between the three countries. The English Private Woodlands are predominantly broadleaved at 68 per cent. The Scottish Private Woodlands are mainly coniferous, at 66 per cent. Wales shows the highest proportion, 74 per cent., of purely broadleaved areas in Private Woodlands.

Share of each Country in Each High Forest Sub-Type

As a consequence of the varied composition of each country's Private High Forest, set out in Table 37, the proportion of each sub-type that lies in each country varies appreciably. Details are set out in Table 38 below.

SHARE OF EACH COUNTRY IN THE TOTAL AREA OF EACH SUB-TYPE OF HIGH FOREST—PRIVATE WOODLANDS

Table 38 — Per cent.

Sub-type	England	Scotland	Wales	Great Britain
Coniferous	36	60	4	100
Mixed	70	24	6	100
Broadleaved	76	13	11	100
All Private High Forest....	62	30	8	100

Note. See Table 36, page 75, for actual areas in acres.

Table 38 shows that 62 per cent. of all Privately-owned High Forest is in England, 30 per cent. in Scotland, and 8 per cent. in Wales. England and Wales, taken together, hold 87 per cent. of the broadleaved, and 76 per cent. of the mixed Private Woodlands. Scotland, on the other hand, contains 60 per cent. of the coniferous Private Woodlands.

High Forest Areas by Counties

Areas of High Forest in Private Woodlands are given for each county in Appendix VI, Tables E, H, I and J, pages 200 to 210. These tables deal respectively with total areas, and coniferous, mixed and broadleaved High Forest. Maps 8 and 9, pages 246 and 247, show the distribution of privately-owned, Mainly Broadleaved, and Mainly Coniferous High Forest on a county basis.

Considering the coniferous areas (Map 8) first, there is found to be a pronounced concentration in the north-eastern counties of Scotland, notably in the east of Sutherland, Ross and Inverness, and throughout Nairn, Moray, Banff, Aberdeen, Kincardine, Angus, Perth, and Fife. This eastern concentration continues at a lesser intensity through the Borders to the North of England, but south of the Humber, privately-owned coniferous High Forest is sparse and local. Small groupings may be noted in East Anglia; on the borders of Surrey, Berkshire, Hampshire and Sussex; in East Dorset; and in South Devon. Coniferous High Forest is sparse right down the west of Britain, from Sutherland to Cornwall; the only concentration in Wales, in Montgomery, represents the Liverpool Corporation water catchment area around Lake Vyrnwy. Broadly speaking, the privately-owned coniferous High Forest is concentrated on areas of low rainfall, and is associated with the lighter soils and the heath vegetations; as will be shown in the following chapter, it consists largely of Scots pine, a tree that thrives well under such conditions.

The distribution of broadleaved High Forest (Map 9) on the other hand, has a pronounced southern trend. All English and Welsh counties have a fair proportion, with a rather heavy concentration in the south-eastern counties of Kent, Surrey, Sussex, Hampshire, Berkshire, Oxfordshire, Bucks and Herts. North of the Border, broadleaved woods become sparse, but Scotland has considerable areas in the Central Lowlands, Perthshire, Argyll and Angus, with a sprinkling along the north-eastern seaboard counties of Kincardine, Aberdeen, Banff, Moray and Nairn.

Coppice in Private Woodlands

There are altogether 339,774 acres of the Coppice Type in private ownership, comprising 12 per cent. of all Private Woodlands. The proportions within the various countries are: England, 20 per cent.; Scotland, *nil;* Wales, 8 per cent.

A general discussion of the Coppice, Scrub, Devastated, and Felled Areas in the Private Woodlands, follows in Chapter 10. The analyses in this present chapter are confined to a consideration of their main Types and their sub-types, and their representation in the various countries, based on Table 36, page 75.

In the Private Woodlands as a whole, there are 112,063 acres of Simple Coppice, and 227,711 acres of Coppice-with-Standards.

Proportions of Sub-types, within Countries

The relationship between these two sub-types is set out, by countries, in Table 39 overleaf.

Table 39 shows that 67 per cent. of the Coppice Types in Private Woodlands in Great Britain take the form of Coppice-with-Standards. In England, which holds the bulk of all Coppice, 70 per cent. is Coppice-with-Standards. On the other hand, most of the Privately-owned Coppice in both Scotland and Wales, is Simple Coppice.

PROPORTIONS OF SUB-TYPES OF PRIVATELY-OWNED COPPICE, WITHIN COUNTRIES

Table 39 Per cent.

Sub-type	England	Scotland	Wales	Great Britain
Coppice-with-Standards	70	17	12	67
Simple Coppice	30	83	88	33
Total	100	100	100	100

Note. See Table 36, page 75, for actual areas in acres.

Share of Each Country in each Sub-type of Coppice

The shares of the three countries, in the Privately-owned Coppice area of Great Britain, is set out, by sub-types, in Table 40 below.

SHARE OF EACH COUNTRY IN THE TOTAL AREA OF EACH SUB-TYPE OF COPPICE—PRIVATE WOODLANDS

Table 40 Per cent.

Sub-type	England	Scotland	Wales	Great Britain
Coppice-with-Standards	99	—	1	100
Simple Coppice	86	—	14	100
All Private Coppice	95	—	5	100

Note. See Table 36, page 75, for actual areas.

Table 40 shows that England, with 95 per cent. of all Privately-owned coppice, holds 99 per cent. of the Coppice-with-Standards and 86 per cent. of the Simple Coppice. Wales has a substantial share, 14 per cent., of the Simple Coppice. Scotland's share of both sub-types is negligible.

Coppice Areas by Counties

County figures for areas of all Coppice, Coppice-with-Standards, and Simple Coppice, in Private Woodlands, are given in Appendix VI, Tables K, L and M, pages 212 to 216. Maps 10 and 11, pages 248 and 249, show the distribution of Privately-owned Coppice-with-Standards and Simple Coppice on a county basis.

Coppice-with-Standards is shown by Map 10 to be concentrated in the south-east of England, notably in Kent, Surrey, Sussex, Hampshire, Berkshire, Dorset and Wiltshire. It is sparsely spread over the southern Midlands, and there is a detached grouping in the Furness district of Lancashire and adjacent areas of Westmorland, and Cumberland. Otherwise Coppice-with-Standards is absent from the North of England. Except for a little in Monmouth and Brecknock, Wales also carries no Coppice-with-Standards; while Scotland shows none at all.

Simple Coppice is shown by Map 11 to have a pronounced southern distribution. It is most frequent in Kent and Sussex, where much of it is sweet chestnut. Elsewhere it is scattered sparsely over the southern Midlands and across South Wales. It is unusual in the North of England, virtually absent from North Wales, and hardly represented at all in Scotland.

Scrub in Private Woodlands

Scrub occupies 472,225 acres or 17 per cent. of all land classified in Private Woodlands; proportions for the individual countries are: England, 12 per cent.; Scotland, 24 per cent.; Wales 17 per cent. Actual areas appear in Table 36, page 75.

The following analysis shows how Great Britain's privately-owned Scrub area of 472,255 acres is distributed over the three countries.

	Scrub
England	40%
Scotland	52%
Wales....	8%
Great Britain	100%

More than half the privately-owned Scrub is in Scotland, and as much as two-fifths in England. County figures are given in Appendix VI, Table N, page 218, and the distribution of Scrub is well shown by Map 12, on page 250. Scrub is seen to be widespread throughout the Scottish Highlands, particularly in Ross, Inverness, Perth, and Argyll, where it consists largely of birch. Elsewhere its distribution is sparse and more or less proportionate to the woodland area of each county.

Devastated Areas in Private Woodlands

Devastated areas occupy 5 per cent. of Great Britain's Private Woodlands, being 6 per cent. in England, 3 per cent. in Scotland, and 5 per cent. in Wales. The total area (Table 36, page 75) is 139,455 acres. The following analysis shows its distribution by countries.

	Devastated Areas
England....	72%
Scotland	20%
Wales	8%
Great Britain....	100%

England is seen to hold 72 per cent. of all Great Britain's Devastated Private Woodland. County figures are given in Appendix VI, Table O, page 220, while Map 13, page 251, represents the position graphically. In England, Devastated Woodland is most frequent in Surrey, and portions of the adjoining counties of Sussex, Hampshire and Berkshire. In Scotland, the highest proportion of it is found in Inverness-shire. In both cases it is an outcome of hasty and perhaps ill-planned war-time fellings, which have left a scattering of poorer trees, too sparse to form a crop, on the ground.

Felled Areas in Private Woodlands

Felled areas in Private Woodlands total 619,539 acres, or 22 per cent. of the Private Woodland area of Great Britain. Proportions for the various counties are: England, 12 per cent.; Scotland, 37 per cent.; Wales, 25 per cent. These are all unduly high, and represent, as will be shown below, not only heavy war-time clearances, but also much long-standing failure to replant areas clear-felled well before the 1939 to 1945 war.

The two sub-types of Felled Areas in Private Woodlands, are those felled *before* and those felled *since* September, 1939.

Proportions of Sub-types of Felled Areas, within Countries

Details of their proportions within countries relative to the total Felled area of each country are set out in Table 41 below.

PROPORTIONS OF SUB-TYPES OF FELLED AREAS, WITHIN COUNTRIES—PRIVATE WOODLANDS

Table 41 — Per cent.

Sub-type	England	Scotland	Wales	Great Britain
Felled before September, 1939	18	59	36	44
Felled since September, 1939	82	41	64	56
Total Felled Area in Private Woodlands	100	100	100	100

Note. See Table 36, page 75, for actual areas in acres.

For Great Britain as a whole, 56 per cent. of the Felled area of Private Woodlands is the outcome of war-time fellings since September, 1939. In England and Wales also, most of the felled areas were of this fairly recent origin. In Scotland, however, 59 per cent. of the Felled Area dates from before the 1939-1945 war.

Share of Each Country in each Sub-type of Felled Area

The share of each country in Great Britain's total area of 619,539 acres of Felled Private Woodland is shown, by sub-types, in Table 42 below.

SHARE OF EACH COUNTRY IN THE TOTAL OF EACH SUB-TYPE OF FELLED AREA—PRIVATE WOODLANDS

Table 42 — Per cent.

Sub-type	England	Scotland	Wales	Great Britain
Felled before September, 1939	12	80	8	100
Felled since September, 1939	45	45	10	100
All Private Felled Woodland	30	61	9	100

Taking Felled areas in Private Woodlands as a whole, it is seen that Scotland's share, 61 per cent., is substantially larger than her share of Private Woodlands, 36 per cent., would suggest. While the figures for areas "Felled since September, 1939" are not badly out of proportion, it should be noted that with areas "Felled before September, 1939", Scotland has an altogether undue share, namely 80 per cent.

This disproportion is borne out by the county figures given in Appendix VI, Tables P, Q and R, on pages 222 to 226. The figures in the two latter tables, for areas "Felled before" and Areas "Felled since" September, 1939, respectively, are shown graphically in Maps 14 and 15, pages 252 and 253.

Map 14, for Areas Felled *before* 1st September, 1939, shows that such areas are concentrated in Scotland, and mainly in those easterly Highland counties that have the largest share of the Mainly Coniferous High Forest (see Map 8). There they often represent coniferous woods felled in the 1914-1918 war, and subsequently, and never since replanted. Further south, the incidence of long-standing unplanted felled areas becomes much less, though their representation in Wales should be noted. Their absence from the English Midlands is partly explained by the fact that any area left unplanted for eight years or more, in the southern or midland counties of England, tends to develop some form of High Forest, Coppice, or Scrub growth, and so ceases to be classifiable as "Felled".

Map 15, for Areas Felled *since* 1st September, 1939, is remarkable for the even distribution of such areas over the whole of Great Britain, with the exception of the sparsely forested areas of western Scotland, and the heavily-wooded districts of north-east Scotland. It affords evidence that Private Woodlands throughout the country contributed their due share of war-time fellings. The heaviest concentration is in the north-east of Scotland, where, as shown by Map 8, there is still, nevertheless, the highest remaining concentration of privately-owned coniferous High Forest.

CHAPTER 9

HIGH FOREST IN PRIVATE WOODLANDS

The privately-owned High Forest is here discussed under the following four main sub-headings:

(i) Composition by age-classes.
(ii) Composition by tree species.
(iii) Principal species in relation to age-classes.
(iv) Condition, according to stocking and tree form.

County figures for privately-owned High Forest are given in Appendix VI, Tables E, H, I and J, pages 200 to 210.

The average size of Stand, or area of High Forest to which a common description could be applied, was ten acres.

(i) Composition of High Forest by Age-Classes

Details of the classification of privately-owned High Forest by age-classes, within Types and sub-types, and within countries, are given in Table 43.

A simplified form of summary, re-classifying these figures for Great Britain as a whole under the two categories, Mainly Coniferous High Forest and Mainly Broadleaved High Forest, is given later in Table 44, while similar information by countries is shown in Table 45, pages 84 and 85.

AGE-CLASSES OF HIGH FOREST, BY SUB-TYPES AND COUNTRIES—PRIVATE WOODLANDS

Table 43.

Country	Type	Age-Class in Years									Total All Ages
		1 to 10	11 to 20	21 to 30	31 to 40	41 to 60	61 to 80	81 to 120	Over 120	Uneven	
		Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres
England	Coniferous	29,480	29,691	31,111	13,983	14,505	7,603	1,640	61	19,367	147,441
	Mixed	8,358	7,233	7,833	7,087	11,608	7,743	3,967	576	45,735	100,140
	Broadleaved	4,132	7,485	14,989	16,387	32,742	57,813	87,514	22,432	287,538	531,032
	Total	41,970	44,409	53,933	37,457	58,855	73,159	93,121	23,069	352,640	778,613
Scotland	Coniferous	22,087	35,073	46,645	30,678	37,428	31,908	18,124	12,571	12,939	247,453
	Mixed	225	419	826	1,215	2,602	3,888	7,955	3,240	14,316	34,686
	Broadleaved	203	301	1,167	2,185	3,431	9,308	34,578	25,066	17,869	94,108
	Total	22,515	35,793	48,638	34,078	43,461	45,104	60,657	40,877	45,124	376,247
Wales	Coniferous	1,864	4,165	6,859	2,289	1,308	418	151	8	508	17,570
	Mixed	262	539	643	693	1,135	836	701	44	2,971	7,824
	Broadleaved	360	1,152	2,827	4,816	5,794	7,356	11,003	2,665	38,081	74,054
	Total	2,486	5,856	10,329	7,798	8,237	8,610	11,855	2,717	41,560	99,448
Great Britain....	Coniferous	53,431	68,929	84,615	46,950	53,241	39,929	19,915	12,640	32,814	412,464
	Mixed	8,845	8,191	9,302	8,995	15,345	12,467	12,623	3,860	63,022	142,650
	Broadleaved	4,695	8,938	18,983	23,388	41,967	74,477	133,095	50,163	343,488	699,194
	Total	66,971	86,058	112,900	79,333	110,553	126,873	165,633	66,663	439,324	1,254,308

The main deduction to be made from these Tables is that coniferous species predominate in the privately-owned High Forest for all age-classes up to 60 years. At ages above this, and in the uneven-aged Stands, the broadleaved trees are the more important. In England and Wales, however, coniferous trees are the more important category only in the age-classes under 30 years. In Scotland, on the other hand, coniferous trees are the major element in woods up to 80 years of age.

In Table 43, in which the areas of the different sub-types of privately-owned High Forest are displayed in their appropriate age-classes, attention may be drawn to the mixed forest, containing mixtures of coniferous and broadleaved species. This amounts to 142,650 acres, or 11 per cent. of the High Forest, of which 63,022 acres are uneven-aged and 79,628 even-aged. Most of this is in England—where it is generally distributed among the age-classes; in Scotland, very small areas of mixed forest are found in the younger age-classes, and what is standing in that country is mainly middle-aged and old. In Wales, mixed High Forest does not occur in any quantity at any age.

Table 45 shows that the general trend revealed for all the woodlands in Table 19, page 52, is present also in Private Woodlands; that is, there is a preponderance of the *younger* age-classes in the conifers and of the *older* age-classes in the broadleaved trees. There are, however, certain changes of emphasis.

In the conifers, the preponderance of the two youngest age-classes is not nearly so strongly marked—29 per cent. in Private Woodlands as against 52 per cent. in All Woodlands—and this brings out one effect of the recent extensive planting by the State which contributes so large a share of the "All Woodlands" total.

In the broadleaved High Forest, the youngest age-classes, 1–30 years, form a smaller proportion of the whole (6 per cent.) than they form for All Woodlands (8 per cent.), while the uneven-aged High Forest, which is mainly in private ownership, occupies a higher proportion of the Private woods.

The private coniferous High Forest in Scotland, though deficient in the oldest age-classes, due, no doubt, to the recent war, has a uniform distribution of areas over the various age-classes. England and Wales, on the other hand, are seriously deficient in the oldest age-classes; but England, in relation to its total Privately-owned coniferous High Forest, has a very high percentage (55 per cent.) 30 years of age and under.

Table 44 presents the same data as in Table 43, for Great Britain as a whole, re-classified, according to the principal species in each Stand, into two categories, Mainly Coniferous and Mainly Broadleaved.

The approximate distribution of these two categories is shown respectively in Maps 8 and 9, pages 246-247, while details by counties are given in Appendix VI, Tables H, I* and J, pages 206 to 211. The principal areas of Mainly Coniferous High Forest (Map 8) are concentrated in the Highland counties of Scotland, with a high density in all the main straths of the eastern watershed. Another concentration appears in the South of England on the borders of Berkshire, Surrey, Hampshire and Sussex, and represents the area in which Scots pine has become most extensively naturalised. There is a very general distribution of conifers throughout the hill country of the south of Scotland and the north of England, but elsewhere in England, and in Wales, privately-owned Coniferous High Forest is scattered and local. Such concentrations as appear in these last-named zones generally occur on tracts of lighter soil or on water catchment areas.

* Areas shown in Table I, Mixed High Forest, are apportioned between Maps 8 and 9.

AGE-CLASSES OF HIGH FOREST, CLASSIFIED AS MAINLY CONIFEROUS AND MAINLY BROADLEAVED—
PRIVATE WOODLANDS, GREAT BRITAIN

Table 44

Category	Age-Class in Years									Total All Ages
	1 to 10	11 to 20	21 to 30	31 to 40	41 to 60	61 to 80	81 to 120	Over 120	Uneven	
	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres
Mainly coniferous	59,422	74,754	90,815	52,264	61,538	45,535	23,535	13,585	55,493	476,941
Per cent. of Total(1)	89	87	80	66	56	36	14	20	13	38
Mainly broadleaved	7,549	11,304	22,085	27,069	49,015	81,338	142,098	53,078	383,831	777,367
Per cent. of Total(1)	11	13	20	34	44	64	86	80	87	62
Total	66,971	86,058	112,900	79,333	110,553	126,873	165,633	66,663	439,324	1,254,308

Note. (1) Percentage of each age-class.

HIGH FOREST AREAS BY AGE-CLASSES AND COMPOSITION, WITH DETAILS FOR COUNTRIES—PRIVATE WOODLANDS

Table 45

COUNTRY	COMPOSITION	AGE-CLASS																	
		1—10		11—20		21—30		31—40		41—60		61—80		81—120		Over 120		Uneven-aged		Total	
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
ENGLAND	Mainly Coniferous	35,090	18	34,740	18	36,218	19	17,893	9	20,490	10	10,785	6	2,709	1	229	—	36,167	19	194,321	100
	Mainly Broadleaved	6,880	1	9,669	2	17,715	3	19,564	3	38,365	7	62,374	11	90,412	15	22,840	4	316,473	54	584,292	100
	Total	41,970	5	44,409	5	53,933	7	37,457	5	58,855	8	73,159	9	93,121	12	23,069	3	352,640	46	778,613	100
SCOTLAND	Mainly Coniferous	22,284	9	35,406	13	47,262	18	31,652	12	39,215	15	34,038	13	20,487	8	13,333	5	17,864	7	261,541	100
	Mainly Broadleaved	231	–	387	–	1,376	1	2,426	2	4,246	4	11,066	10	40,170	35	27,544	24	27,260	24	114,706	100
	Total	22,515	6	35,793	9	48,638	13	34,078	9	43,461	12	45,104	12	60,657	16	40,877	11	45,124	12	376,247	100
WALES	Mainly Coniferous	2,048	10	4,608	22	7,335	34	2,719	13	1,833	9	712	3	339	2	23	—	1,462	7	21,079	100
	Mainly Broadleaved	438	1	1,248	2	2,994	4	5,079	6	6,404	8	7,898	10	11,516	15	2,694	3	40,098	51	78,369	100
	Total	2,486	2	5,856	6	10,329	10	7,798	8	8,237	8	8,610	9	11,855	12	2,717	3	41,560	42	99,448	100
GREAT BRITAIN	Mainly Coniferous	59,422	13	74,754	16	90,815	19	52,264	11	61,538	13	45,535	9	23,535	5	13,585	3	55,493	11	476,941	100
	Mainly Broadleaved	7,549	1	11,304	2	22,085	3	27,069	3	49,015	6	81,338	11	142,098	18	53,078	7	383,831	49	777,367	100
	Total	66,971	6	86,058	7	112,900	9	79,333	6	110,553	9	126,873	10	165,633	13	66,663	5	439,324	35	1,254,308	100

Note. Percentages relate to the total area of each description of woodland (i.e. Mainly Coniferous or Mainly Broadleaved), in each country.

Map 9, page 247, shows the general distribution of Mainly Broadleaved High Forest in Private Woodlands. This attains its greatest concentration in England in the Chilterns (Bucks, Oxon, Herts., Beds.), parts of the North and South Downs (Kent, Surrey, Sussex), and in the Cotswolds (Glos., Oxon., Northants.), with areas of lesser density in the Weald (Kent, Surrey and Sussex), Hampshire, South Devon, Cornwall, the west and north Midlands, and the Furness district of Lancashire. In Scotland, Mainly Broadleaved High Forest occurs principally in the Central Lowlands or in lowland and coastal districts elsewhere.

The totals for the two categories given in Table 44 show that Mainly Broadleaved High Forest with 777,367 acres, accounts for 62 per cent. of the total area of High Forest.

Uneven-Aged High Forest

Ninety-five per cent. of all High Forest Stands recorded as Uneven-aged occur in Private Woodlands, and it is necessary to consider this age-class separately in detail. The Instructions for Survey, which are given in Appendix II, page 176, provided for a special record of areas which had been underplanted and of those which were in process of natural regeneration under mother trees, and these descriptions were applied only to definitely two-storied High Forest in which judicious removal of the overwood would be capable of releasing an adequately stocked young crop. These forms of uneven-aged High Forest, though by no means common, are of considerable silvicultural interest. Details of this classification by countries are given for Mainly Coniferous High Forest in Table 46, and for Mainly Broadleaved High Forest in Table 47.

UNEVEN-AGED MAINLY CONIFEROUS HIGH FOREST IN PRIVATE WOODLANDS, WITH DETAILS OF UNDERPLANTING AND NATURAL REGENERATION, BY COUNTRIES

Table 46

Country	Total Uneven-aged	Underplanting		Natural Regeneration		Total of Underplanting and Natural Regeneration	
	Acres	Acres	%(1)	Acres	%(1)	Acres	%(1)
England	36,167	1,270	4	5,294	14	6,564	18
Scotland	17,864	653	3	466	3	1,119	6
Wales	1,462	6	—	50	3	56	3
Great Britain	55,493	1,929	3	5,810	11	7,739	14

Note. (1) Percentage of total area of Uneven-aged Mainly Coniferous Woodland within each country.

It will be seen from Table 46 that by far the larger amount of both underplanting and natural regeneration in Mainly Coniferous High Forest occurs in England, where altogether it accounts for 18 per cent. of the area classed as Uneven-aged. Over the whole country, however, the combined total represents only 14 per cent. of the Uneven-aged class, and natural regeneration alone 11 per cent.

These proportions are seen to be even smaller in the case of Mainly Broadleaved High Forest (Table 47) where the combined total represents only 6 per

cent. of the area classed as Uneven-aged. England again has by far the larger area under natural regeneration, but, relatively, Scotland has the higher proportion recorded as underplanted.

UNEVEN-AGED MAINLY BROADLEAVED HIGH FOREST IN PRIVATE WOODLANDS, WITH DETAILS OF UNDERPLANTING AND NATURAL REGENERATION, BY COUNTRIES
Table 47

Country	Total Uneven-aged	Underplanting		Natural Regeneration		Total of Underplanting and Natural Regeneration	
	Acres	Acres	%(1)	Acres	%(1)	Acres	%(1)
England	316,473	3,104	1	18,665	6	21,769	7
Scotland	27,260	1,090	4	609	2	1,699	6
Wales	40,098	90	—	739	2	829	2
Great Britain	383,831	4,284	1	20,013	5	24,297	6

Note. (1) Percentage of total area of Uneven-aged Mainly Broadleaved Woodland within each country.

The main bulk of Uneven-aged High Forest is clearly untouched by this analysis and requires a different approach.

Information on the age-range of areas classed as Uneven-aged was recorded on the reverse of the Stand Data Forms, but was not classified; it was, however, examined in some detail when these forms were being checked. It is clear that only a minority of such areas contain an adequate representation of all age-classes. Over the whole country, there are probably rather more Uneven-aged Stands comprised mainly of older trees than there are comprised mainly of younger trees. There is much local and regional variation, but again over the whole, the older class shows a marked preponderance towards the north, and the younger class towards the south. These deductions are supported by the results of the Volume Sampling Survey which was carried out later.

Most of the Uneven-aged Mainly Coniferous High Forest is in England, where it consists very largely of recent natural invasions of Scots pine into the southern heaths and woodlands. All ages are present, but most trees are below middle age. In Scotland the same class is represented principally by remnants of the Caledonian pine forest. Burning and grazing prevent effective regeneration and few areas contain many trees below 100 years of age. Most Stands are now between 100 and 250 years old and several are dying out without replacement.

Much of the Uneven-aged Mainly Broadleaved High Forest is derived from Stands which were formerly worked as Coppice-with-Standards. The underwood has been abandoned, and has either died out, or it has helped, with some self-sown trees, to fill gaps in the originally open canopy of the overwood. Where the younger growing stock is mainly of such coppice origin it cannot be relied upon to supply satisfactory replacements for the older trees. A second large group comprises old established semi-natural Stands, and areas of steep or broken ground, policies and amenity woods, in which clear felling is either impracticable or undesirable. These tend to contain a proportion of very old trees, with one or more other age-classes well represented, but they are seldom "all-aged", and regeneration is spasmodic. A third group, merging with the

HIGH FOREST AREAS UNDER MAJOR TREE SPECIES WITH DETAILS FOR COUNTRIES, PURE AND MIXED STANDS COMBINED

Table 48

SPECIES	ENGLAND			SCOTLAND			WALES			GREAT BRITAIN		
	Area Acres	Percentages (a) of Conifers	(b) of all species	Area Acres	Percentages (a) of Conifers	(b) of all species	Area Acres	Percentages (a) of Conifers	(b) of all species	Area Acres	Percentages (a) of Conifers	(b) of all species
Scots Pine	82,625	42	11	162,819	62	43	2,247	11	2	247,691	52	20
Corsican Pine	5,318	3	—	284	—	—	897	4	1	6,499	1	—
European Larch	59,752	31	8	34,890	13	9	7,116	34	7	101,758	21	8
Japanese Larch	12,420	6	2	10,190	4	3	3,564	17	4	26,174	6	2
Norway Spruce	15,435	8	2	29,223	11	8	2,953	14	3	47,611	10	4
Sitka Spruce	8,866	5	1	14,128	6	4	2,137	10	2	25,131	5	2
Douglas Fir	7,211	4	1	5,460	2	2	1,849	9	2	14,520	3	1
Other Conifers	2,694	1	—	4,547	2	1	316	1	—	7,557	2	1
Total: All Conifers	194,321	100	25	261,541	100	70	21,079	100	21	476,941	100	38
	Area Acres	Percentages (a) of Broad-leaved	(b) of all species	Area Acres	Percentages (a) of Broad-leaved	(b) of all species	Area Acres	Percentages (a) of Broad-leaved	(b) of all species	Area Acres	Percentages (a) of Broad-leaved	(b) of all species
Oak	303,110	52	39	43,451	37	11	46,783	60	47	393,344	51	31
Ash	65,621	11	9	4,632	4	1	9,907	13	10	80,160	10	6
Beech	92,783	16	12	46,368	40	12	5,547	7	6	144,698	19	12
Birch	49,482	8	6	5,626	5	2	9,004	11	9	64,112	8	5
Spanish Chestnut	9,265	2	1	25	—	—	84	—	—	9,374	1	1
Sycamore	42,933	7	6	7,423	7	2	4,729	6	5	55,085	7	4
Elm	13,150	2	2	6,063	6	2	813	1	1	20,026	3	2
Other Broadleaved Trees	7,948	2	—	1,118	1	—	1,502	2	1	10,568	1	1
Total: All Broadleaved Trees	584,292	100	75	114,706	100	30	78,369	100	79	777,367	100	62
Grand Total: All Species	778,613	—	100	376,247	—	100	99,448	—	100	1,254,308	—	100

second, consists of natural regrowth of broadleaved species on areas which have been recently devastated or felled, and recent invasions of a similar nature on waste land. In this group most, and sometimes all, the trees are below middle age, and some Stands will probably level up sufficiently to be classed as "even-aged" at a later date. Finally there is a small group, represented principally by the Chiltern beechwoods, which are more or less "all-aged", and worked normally under a form of selection system.

(ii) Composition of High Forest by Principal Species

The general position is given in Table 48 opposite, which shows, both for Great Britain and the three individual countries, the areas occupied by the fourteen tree species that make up, between them, 98 per cent. of the privately-owned High Forest. (Details of two minor species, hybrid larch and alder, follow in Tables 49 to 52.) Table 48 also shows the percentage of the total privately-owned High Forest area occupied by each species, as well as its percentage share in the area of Mainly Coniferous, or Mainly Broadleaved High Forest, as the case may be.

The first point to be remembered is that, in the privately-owned woodlands, the broadleaved species, with 777,367 acres, or 62 per cent., cover a considerably larger area than do the conifers, which have 476,941 acres, or 38 per cent.

Taking the Private Woodlands of Great Britain as a whole, oak is seen to be much the most important species, with 393,344 acres or 31 per cent. of the area, followed by Scots pine with 247,691 acres or 20 per cent.; these two species therefore cover 51 per cent.—more than half—of the privately-owned High Forest. Next in order of importance come beech, with 144,698 acres or 12 per cent.; European larch with 101,758 acres or 8 per cent.; ash, with 80,160 acres or 6 per cent.; birch, with 64,112 acres, or 5 per cent.; sycamore, with 55,085 acres, or 4 per cent., and Norway spruce, with 47,611 acres, also 4 per cent. The foregoing eight species account for 90 per cent. of the privately-owned High Forest, and no other individual species has more than 2 per cent. of this total area.

If the figures for closely related conifers are considered together, it will be seen that the two pines occupy 20 per cent. (nearly all Scots pine), the two larches have 10 per cent., and the two spruces only 6 per cent., of the privately-owned High Forest.

In England, Broadleaved species occupy 75 per cent. of the privately-owned High Forest, oak accounting for 39 per cent., beech for 12 per cent., ash for 9 per cent., birch for 6 per cent., sycamore for 6 per cent., and elm for 2 per cent. In the coniferous woods, which make up 25 per cent. of the total, Scots pine accounts for 11 per cent., the two larches for 10 per cent., and the two spruces for 3 per cent.

In Scotland, coniferous species predominate, with 70 per cent. of the privately-owned High Forest area, including 43 per cent. under Scots pine, 12 per cent. under the two spruces, and 12 per cent. under the two larches. The broadleaved species account for 30 per cent.; only beech, with 12 per cent., and oak, with 11 per cent., are individually important.

In Wales, the broadleaved trees, with 79 per cent., predominate in the privately-owned woodlands, although they have the lesser share of the country's woodlands as a whole. Oak accounts for 47 per cent., followed by ash with 10 per cent., birch with 9 per cent., beech with 6 per cent., and sycamore with 5 per cent.; the relative importance of ash should be noted. The coniferous woodlands, comprising 21 per cent. of the total, include 11 per cent. under the

two larches, 5 per cent. under the two spruces, only 3 per cent. under the two pines, and 2 per cent. under Douglas fir. The relative importance of the larches, and the very small area under the pines, are noteworthy features of these Welsh coniferous woodlands.

Species Distribution by Countries

Mainly Coniferous High Forest

DISTRIBUTION OF THE PRINCIPAL CONIFEROUS SPECIES IN HIGH FOREST BY COUNTRIES —PRIVATE WOODLANDS

Table 49

Principal Species	England		Scotland		Wales	
	Acres	%(1)	Acres	%(1)	Acres	%(1)
Scots pine	82,625	33	162,819	66	2,247	1
Corsican pine	5,318	82	284	4	897	14
European larch	59,752	59	34,890	34	7,116	7
Japanese larch	12,420	47	10,190	39	3,564	14
Hybrid larch	1,224	26	3,258	71	124	3
Norway spruce	15,435	33	29,223	61	2,953	6
Sitka spruce	8,866	35	14,128	56	2,137	9
Douglas fir	7,211	50	5,460	37	1,849	13
Undifferentiated	1,470	50	1,289	44	192	6
Total	194,321	41	261,541	55	21,079	4

Notes. (1) Percentage of the total area of each species found in the country concerned.
(2) Total areas for each species for Great Britain are given in Table 51.

The distribution of the principal species by countries is given for this category in Table 49 from which it is seen that 66 per cent. of the Scots pine and 61 per cent. of the Norway spruce occur in Scotland, while 59 per cent. of the European larch occurs in England.

Mainly Broadleaved High Forest

DISTRIBUTION OF THE PRINCIPAL BROADLEAVED SPECIES BY COUNTRIES— PRIVATE WOODLANDS

Table 50

Principal Species	England		Scotland		Wales	
	Acres	%(1)	Acres	%(1)	Acres	%(1)
Oak	303,110	77	43,451	11	46,783	12
Ash	65,621	82	4,632	6	9,907	12
Beech	92,783	64	46,368	32	5,547	4
Birch	49,482	77	5,626	9	9,004	14
Spanish chestnut	9,265	99	25	—	84	1
Sycamore	42,933	78	7,423	13	4,729	9
Alder	2,803	59	525	11	1,409	30
Elm	13,150	66	6,063	30	813	4
Undifferentiated	5,145	88	593	10	93	2
Total	584,292	75	114,706	15	78,369	10

Notes. (1) Percentage of the total area of each species found in the country concerned.
(2) Total areas of each species for Great Britain are given in Table 52.

The distribution, within this Mainly Broadleaved category, of principal species by countries is shown in Table 50. The largest amount of each species is to be found in England; but Scotland's share of the beech, 32 per cent., is remarkably high.

The high percentage of elm—30—in Scotland, is made up of wych elm which is a common component of broadleaved woodlands in the Lowland districts.

A general account of the distribution of the more prominent principal species has already been given in the discussion on All Woodlands, Chapter 5, page 48. The areas occurring in Private Woodlands, and contributing the greater part of the total, naturally fit into the same pattern. Such differences as do occur, appear mainly in the relative proportions of the principal species in age-classes below 30 years, from which State Forests are here excluded.

Pure and Elite Stands of High Forest

The definition of "pure" Stands, as shown in Tables 51 and 52 below, has been discussed under All Woodlands on page 61; but, in brief, a pure Stand is one in which 90 per cent. or more of the crop consists of a single tree species.

SPECIES COMPOSITION OF MAINLY CONIFEROUS HIGH FOREST, WITH DETAILS OF PURE AND ELITE STANDS—PRIVATE WOODLANDS, GREAT BRITAIN

Table 51

Principal Species	Total Area			In Pure Stands		
				Total Area		Elite
	Acres	%(1)	%(2)	Acres	%(3)	Acres
Scots pine	247,691	52	20	152,784	62	2,237
Corsican pine	6,499	1	1	2,542	39	20
European larch	101,758	21	8	37,153	36	390
Japanese larch	26,174	6	2	12,575	48	74
Hybrid larch	4,606	1	—	3,294	72	40
Norway spruce	47,611	10	4	19,532	41	88
Sitka spruce	25,131	5	2	13,930	55	2
Douglas fir	14,520	3	1	6,399	44	48
Undifferentiated	2,951	1	—	887	30	5
Total	476,941	100	38	249,096	52	2,904

Notes. (1) Percentage of Mainly Coniferous High Forest.
(2) Percentage of All High Forest.
(3) Percentage of area for each individual tree species or category.

In the privately-owned coniferous High Forest, 249,096 acres, or 52 per cent., occur in pure Stands. Of the individual species, hybrid larch, with 72 per cent., shows the highest degree of purity; this is a tree which grows very rapidly in its first few years, and is therefore unsuited for mixing, under most circumstances, with other species.

In the broadleaved High Forest under private ownership, 237,789 acres, or only 31 per cent., occur as pure Stands. The bulk of all species is seen to be growing in mixture. Oak, with 38 per cent., has the highest proportion growing pure, followed by birch with 32, and beech with 31 per cent. No other major species has more than one fifth of its total area growing as pure Stands; 90 per

SPECIES COMPOSITION OF MAINLY BROADLEAVED HIGH FOREST, WITH DETAILS OF PURE AND ELITE STANDS—PRIVATE WOODLANDS, GREAT BRITAIN

Table 52

Principal Species	Total Area			In Pure Stands		
				Total Area		Elite
	Acres	%(1)	%(2)	Acres	%(3)	Acres
Oak	393,344	51	31	148,945	38	1,355
Ash	80,160	10	6	12,764	16	138
Beech	144,698	19	12	44,646	31	1,721
Birch	64,112	8	5	20,597	32	—
Spanish Chestnut	9,374	1	1	1,368	15	42
Sycamore	55,085	7	4	5,447	10	15
Alder	4,737	—	—	884	19	—
Elm	20,026	3	2	1,695	8	8
Undifferentiated	5,831	1	1	1,443	25	2
Total	777,367	100	62	237,789	31	3,281

Notes. (1) Percentage of Mainly Broadleaved High Forest.
(2) Percentage of All High Forest.
(3) Percentage of area for each individual species or category.

cent. of the sycamore, and 92 per cent. of the elm, is found in mixture with other trees. These figures serve to emphasise the very varied character of the privately-owned broadleaved High Forest, since the mixtures themselves are made up in very diverse ways.

Elite Stands

The areas of elite Stands, that is, Stands of outstanding quality as regards straightness of stem and crown development, are given in Tables 51 and 52. It is seen that there is a considerable area, 2,237 acres, of elite Scots pine, and 390 acres of elite European larch; all the other major conifers are represented, but only by small areas. Among the broadleaved trees, beech, with 1,721 acres, has the largest area of elite Stands, followed by oak, with 1,355 acres, and ash, which has 138 acres. There are small areas of elite Spanish chestnut, elm, and sycamore, but no elite Stands of birch or alder were recorded.

(iii) Principal Species in Relation to Age-classes

A simple form of analysis, presented in Table 53 will suffice to show which species are the most important in the various age-classes of privately-owned High Forest.

Scots pine, which is the only species represented in the table at all ages from 1 to "over 120", is seen to be the most important species in all age-classes under 60 years, while oak is the major species in all age-classes over 60.

European larch is the second most important species up to 60 years of age, and Scots pine in the 61 to 80 year age-class, while above that age beech takes second place.

PRINCIPAL SPECIES IN HIGH FOREST IN RELATION TO AGE-CLASSES—PRIVATE WOODLANDS, GREAT BRITAIN

Table 53

Age-Class in Years	Principal Species in Order of Area					
	First	%(1)	Second	%(1)	Third	%(1)
1 to 10	Scots pine	36	European larch	20	Norway spruce	10
11 to 20	Scots pine	32	European larch	23	Japanese larch	10
21 to 30	Scots pine	33	European larch	17	Norway spruce	9
31 to 40	Scots pine	29	European larch	18	Birch	9
41 to 60	Scots pine	29	European larch	16	Oak	16
61 to 80	Oak	36	Scots pine	25	Beech	10
81 to 120	Oak	59	Beech	17	Scots pine	12
Over 120	Oak	41	Beech	33	Scots pine	19
Uneven	Oak	44	Beech	16	Ash	10

Note. (1) Percentage of total High Forest area within the age-class concerned.

Among the species which occupy third place in the various age-classes, the occurrence of birch in the 31 to 40 year age-class calls for special comment. Birch is seldom planted, and the Stands that make up 9 per cent. of all privately-owned High Forest aged between 31 and 40 years are almost entirely the result of natural regeneration during the years between 1908 and 1917.

It is known from observation and from the unclassified information recorded on the Stand Data Forms, that in both even-aged and uneven-aged Mainly Broadleaved High Forest, ash, birch, and sycamore constitute a high proportion of the younger growing stock, and have arisen from natural seeding.

(iv) General Condition of the High Forest Crops

During the survey, records were made, both in Private Woodlands and in State Forests, of the condition of the crops based on assessments of their stocking and of the form of the trees which made up the Stands. These features were not discussed under "All Woodlands" and they are introduced here for the first time.

Details of the methods of assessment are given in Appendix II, page 179.

Stocking

The density of stocking was recorded in four classes. "Overstocked" comprised neglected Stands which were overdue for thinning; "Satisfactory" stocking comprised full crops, or Stands in which less than a fifth of the area was not covered by the tree canopy; "Poor" stocking, Stands in which more than one fifth, but less than half, the area was without a tree canopy; and "Bad" stocking, Stands in which more than half the ground had no canopy of trees. Very badly stocked Stands, which carried less than about a quarter of the possible full crop, were normally classified as "Devastated"; they therefore fell in another Type, discussed in other chapters, and were not regarded as being High Forest.

Details of stocking are given by types and countries in Table 54.

Taking Great Britain as a whole, the larger proportions are seen to be classed as either Satisfactory or Poor. 76 per cent. of Coniferous High Forest is Satisfactorily stocked, but this proportion falls to 68 per cent. in Mixed High Forest and to 58 per cent. in Broadleaved High Forest. These trends run through the classification by stocking in all three countries. 35 per cent. of Broadleaved High Forest is Poorly stocked, but only 15 per cent. of Coniferous

STOCKING OF HIGH FOREST IN PRIVATE WOODLANDS, BY SUB-TYPES AND COUNTRIES

Table 54

Type	Stocking	England		Scotland		Wales		Great Britain	
		Acres	Sub-type %	Acres	Sub-type %	Acres	Sub-type %	Acres	Sub-type %
Coniferous....	Overstocked	3,436	2	18,904	8	362	2	22,702	5
	Satisfactory	119,825	81	178,251	72	15,118	86	313,194	76
	Poor	20,190	14	38,607	15	1,720	10	60,517	15
	Bad	3,990	3	11,691	5	370	2	16,051	4
	Total	147,441	100	247,453	100	17,570	100	412,464	100
Mixed	Overstocked	2,035	2	836	2	100	1	2,971	2
	Satisfactory	67,759	68	23,973	69	5,593	72	97,325	68
	Poor	25,976	26	8,100	24	1,740	22	35,816	25
	Bad	4,370	4	1,777	5	391	5	6,538	5
	Total	100,140	100	34,686	100	7,824	100	142,650	100
Broadleaved	Overstocked	3,632	1	516	1	152	—	4,300	1
	Satisfactory	305,638	58	63,084	67	39,421	53	408,143	58
	Poor	187,384	35	25,777	27	27,611	38	240,772	35
	Bad	34,378	6	4,731	5	6,870	9	45,979	6
	Total	531,032	100	94,108	100	74,054	100	699,194	100

STOCKING OF HIGH FOREST IN PRIVATE WOODLANDS, IN RELATION TO AGE-CLASSES, BY SUB-TYPES—GREAT BRITAIN

Table 55

Type	Stocking	Age-Class in Years									
		1 to 10	11 to 20	21 to 30	31 to 40	41 to 60	61 to 80	81 to 120	Over 120	Un-even	All Age-Classes
		Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Coniferous	Overstocked	—	2	8	14	8	6	2	—	1	5
	Satisfactory	87	88	85	74	72	72	55	23	55	76
	Poor	10	8	6	10	16	18	34	51	36	15
	Bad	3	2	1	2	4	4	9	26	8	4
	Total	100	100	100	100	100	100	100	100	100	100
Mixed	Overstocked	—	9	8	4	2	—	—	—	1	2
	Satisfactory	80	75	81	81	77	72	66	66	60	68
	Poor	16	11	9	12	17	23	30	28	34	25
	Bad	4	5	2	3	4	5	4	6	5	5
	Total	100	100	100	100	100	100	100	100	100	100
Broadleaved	Overstocked	3	3	3	2	—	—	—	—	1	1
	Satisfactory	66	65	66	70	67	64	65	62	51	58
	Poor	27	28	26	22	27	28	29	31	41	35
	Bad	4	4	5	6	6	8	6	7	7	6
	Total	100	100	100	100	100	100	100	100	100	100

High Forest is in that condition. In Scotland, 8 per cent. of the Coniferous High Forest is overstocked.

Stocking in relation to Age-class

Variations in stocking are partly associated with differences of age-class. This is revealed by the analysis of stocking by age-classes, within sub-types, set out in Table 55. The total area in each age-class, to which these percentages refer, has been given in Table 43, page 82.

Taking Coniferous High Forest first, the proportion classed as Satisfactorily stocked is low in all in Stands over 80 years of age; and above 120 years only 23 per cent. are so described. Overstocking, probably due to neglect of thinning, shows significant proportions in age-classes between 20 and 80 years.

The proportion of Bad stocking, although relatively small, is higher for every succeeding age-class from 20 to 120 years; over that age, it is at its highest, comprising 26 per cent. Only 55 per cent. of the Uneven-aged Coniferous High Forest is Satisfactorily stocked. This is accounted for mainly by the open character of the old Caledonian forest. It is encouraging to note that 85 per cent. or more of all the even-aged age-classes under 30 years, is classed as Satisfactorily stocked.

In Mixed High Forest the decline of Satisfactory stocking with age is more gradual and less severe. Over-stocking is highest in the 11 to 20 year age-class, where it often represents a neglect of cleaning operations, either of birch and similar trees invading conifer plantations as weeds, or of conifer nurses left too long in plantations of broadleaved species.

The proportion of Satisfactory stocking in even-aged Broadleaved High Forest stands at a uniform but rather low level of about two-thirds in almost every age-class. A small proportion of Overstocking appears in every age-class below 40 years and often represents dense self-sown Stands of birch, ash, and sycamore which are in need of cleaning. In Uneven-aged Stands, accounting for half the total area of Broadleaved High Forest, the proportions of Satisfactory and Unsatisfactory stocking are about equal.

In the younger age-classes, the proportion of broadleaved High Forest adequately stocked is significantly lower than the corresponding proportion for coniferous High Forest. This reflects the general difficulty of establishing broadleaved tree crops.

Tree form

Turning to the second aspect of condition, the classification of tree form by quality, four classes were defined in the Instructions for Survey (Appendix II, page 179). Stands classed as "elite" were of outstanding form and vigour, and considered suitable as parent crops for purposes of seed production and tree breeding. Mixtures were not included under this head unless all the main components of the crop were able to qualify. "Satisfactory tree form" comprised Stands in which the majority of stems were reasonably straight and sound; "Poor tree form", Stands containing many crooked, stunted, coarsely branched or decayed stems, which were, however, still capable of improvement by judicious thinning; and "Bad tree form", Stands in which the majority of stems had these defects and in which the possibility of improvement was doubtful. Stands of "Bad tree form" which had no potential value as a crop came under the classification of Scrub.

TREE FORM OF HIGH FOREST IN PRIVATE WOODLANDS, BY SUB-TYPES AND COUNTRIES
Table 56

Sub-Type	Tree Form	England		Scotland		Wales		Great Britain	
		Area	%	Area	%	Area	%	Area	%
Coniferous	Elite	2,167	2	1,849	1	223	1	4,239	1
	Satisfactory	136,058	92	195,968	79	15,676	90	347,702	84
	Poor	8,347	6	41,881	17	1,472	8	51,700	13
	Bad	869	—	7,755	3	199	1	8,823	2
	TOTAL....	147,441	100	247,453	100	17,570	100	412,464	100
Mixed	Elite	293	—	152	—	69	1	514	—
	Satisfactory	79,959	80	18,546	54	5,705	73	104,210	73
	Poor	18,733	19	14,581	42	1,817	23	35,131	25
	Bad	1,155	1	1,407	4	233	3	2,795	2
	TOTAL....	100,140	100	34,686	100	7,824	100	142,650	100
Broadleaved	Elite	4,661	1	153	—	1,074	1	5,888	1
	Satisfactory	317,400	59	34,137	36	29,472	40	381,009	54
	Poor	188,724	36	50,189	54	33,256	45	272,169	39
	Bad	20,247	4	9,629	10	10,252	14	40,128	6
	TOTAL....	531,032	100	94,108	100	74,054	100	699,194	100
		778,613		376,247		99,448		1,254,308	

An analysis of tree form by types, separately for England, Scotland and Wales, is given in Table 56.

The larger proportions are classed as either Satisfactory or Poor. A lower average quality is apparent in the figures for Scotland, this may be due to the more northerly latitude and generally poorer conditions of growth.

In Coniferous High Forest, over 90 per cent. of the Stands in England and Wales, and 79 per cent. of those in Scotland, are of satisfactory tree form.

In the Broadleaved High Forest, only 60 per cent. in England, 41 per cent. in Wales, and 36 per cent. of the Stands in Scotland are good enough to be classed as Satisfactory or Elite. Wales has the largest proportion of Bad tree form, accounting for 14 per cent. of its total area of Broadleaved High Forest, and mainly representing Stands of semi-natural or formerly coppiced oak on shallow mountain soils.

Mixed High Forest is in each case of intermediate quality.

Tree Form in relation to Age-class

An analysis of tree form by age-classes, within types, is set out in Table 57, and is based on the total areas in each age-class which have been given in

TREE FORM OF HIGH FOREST IN PRIVATE WOODLANDS, IN RELATION TO AGE-CLASSES, BY SUB-TYPES—GREAT BRITAIN

Table 57

Type	Tree Form	Age-Class in Years									Total Area
		1 to 10	11 to 20	21 to 30	31 to 40	41 to 60	61 to 80	81 to 120	Over 120	Un-even	
		Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Coniferous	Elite	—	—	—	1	1	2	4	4	2	1
	Satisfactory	97	94	92	86	80	73	57	31	78	84
	Poor	3	5	7	12	16	22	31	51	17	13
	Bad	—	1	1	1	3	3	8	14	3	2
	Total	100	100	100	100	100	100	100	100	100	100
Mixed	Elite	—	—	—	—	—	—	1	1	—	—
	Satisfactory	99	89	87	85	82	67	56	61	68	73
	Poor ..	1	10	12	14	16	30	40	36	30	25
	Bad	—	1	1	1	2	3	3	2	2	2
	Total	100	100	100	100	100	100	100	100	100	100
Broadleaved	Elite	—	—	—	1	1	1	1	1	1	1
	Satisfactory	81	70	66	64	58	58	53	49	53	54
	Poor	19	28	31	30	33	35	40	42	41	39
	Bad	—	2	3	5	8	6	6	8	5	6
	Total	100	100	100	100	100	100	100	100	100	100

Table 43, page 82. In each sub-type the proportion of satisfactory tree form is higher in the younger age-classes than in the older ones.

In Coniferous High Forest, 97 per cent. of Stands in the 1 to 10 year age-class are recorded as Satisfactory, but only 73 per cent. are so recorded at 80 years. The still lower figure recorded above this age coincides with a reduction in stocking which has already been noted, but at the same time a noticeable proportion of the area appears as Elite. In the uneven-aged class the proportion of Satisfactory tree form is slightly below the general average.

In Mixed High Forest the tree form of each Stand as a whole is influenced by the conifer content of the Stands in the younger and Uneven-aged classes, and by the broadleaved content in the older classes.

In Broadleaved High Forest the overall classification by tree form is influenced by the condition of the Uneven-aged Stands, in which scarcely more than half the area is classed as Satisfactory. The Even-aged Stands are, however, also of a low average quality, and there is a high proportion of Poor tree form in every age-class.

This Census survey does not provide any general indication of the way in which the recorded defects in stocking and tree form have arisen. But it does indicate their extent.

Comparisons with the State Forests in these and other respects, will be found in Chapter 13, entitled *High Forest Areas in State Forests*, which appears on page 117.

CHAPTER 10

COPPICE, SCRUB, DEVASTATED AND FELLED AREAS IN PRIVATE WOODLANDS

Coppice

As mentioned in Chapter 6, the bulk of the area under the Coppice Types occurs in Private Woodlands.

The average size of Stand recorded was 15 acres, 18 acres in Coppice-with-Standards, and 12 acres in Simple Coppice. Such average areas are appreciably larger than in High Forest, and although the method of classification involved fewer causes for sub-division, they genuinely represent a greater uniformity in the areas surveyed. The area of Coppice of both sub-types, in each county is given in Appendix VI, Table K, page 212.

The definition of Coppice in the Instructions for Survey (Appendix II, page 176) included all coppice growths (other than osiers) which averaged more than two stems per stool, and which were either workable as coppice, or suitable for retention and conversion to High Forest. When the crop had not been cut recently, the tests of workability were first, an age within the normal rotation at which produce would be marketable, second, vigour and uniformity of growth, and third, satisfactory stocking. Suitability for conversion to High Forest depended on the species, and the age and soundness of the stools.

"Standards" were taken to include all single stems, normally of seedling origin, which had survived more than one rotation of the coppice; but areas with less than six standards to the acre were not normally classed as Coppice-with-Standards unless these trees were very large.

Principal Species of All Coppice

The first main classification is by the principal species of the coppice. In Coppice-with-Standards, only Spanish chestnut, hazel and oak were distinguished, and if the coppice was composed of less than about four-fifths of any of these, or if the quality or stocking was poor or the subsidiary species aggressive, the Stand was recorded under the sub-type of "Mixed and Other". In Simple Coppice, the same principal species, with the addition of hazel, were recorded as for Broadleaved High Forest (see page 21), and pure Stands were taken as those in which a single species comprised nine-tenths or more of the crop.

Although the two classifications are thus not strictly comparable, the relative distribution of the main coppice species between types is assessed on this basis in Table 58.

It is seen that while 90 per cent. of the area of mainly hazel coppice is grown with standards, this system applies to only 71 per cent. of the chestnut, 59 per cent. of "mixed and other" coppice, and only 11 per cent. of the oak coppice. In the last-named species, relatively large areas of oak which were known formerly to have been worked as Coppice-with-Standards were found to merit classification as either simple Coppice or as High Forest.

It was also ascertained that hornbeam coppice represented the fourth most important species group in Coppice-with-Standards, with a total area of 23,225 acres, almost equal to chestnut. Three quarters of this occurs in Kent

PRINCIPAL SPECIES OF COPPICE, BY SUB-TYPES, IN PRIVATE WOODLANDS—GREAT BRITAIN

Table 58

Sub-Type	Principal Species				Total Area
	Mainly Chestnut	Mainly Hazel	Mainly Oak	Mixed & Other	
	Acres	Acres	Acres	Acres	Acres
With Standards	24,483	87,654	1,622	113,952	227,711
Per Cent.(1)	71	90	11	59	67
Coppice only	9,890	9,413	14,151	78,609	112,063
Per Cent.(1)	29	10	89	41	33
Total	34,373	97,067	15,773	192,561	339,774

Note. (1) Percentage of total area of each species or description.

and East Sussex, with the balance, in order of magnitude, in Hertford, Essex, West Sussex, Middlesex, Suffolk, Surrey and Norfolk. Hornbeam coppice is included under "Mixed and Other" in Table 58.

Distribution of Coppice-with-Standards

The general distribution of Coppice-with-Standards is shown in Map 10. The highest density is seen to be reached in an area comprising Kent, Sussex and Hampshire, and parts of the adjoining counties of Surrey, Berkshire, Wiltshire and Dorset. Towards the north and west far less is found. Coppice-with-Standards is virtually absent from the North Midlands, but is frequent in a limited area in the Furness district of Lancashire and adjoining parts of Westmorland and Cumberland. With exceptions which relate mainly to chestnut coppice, this distribution shows a correlation with the incidence of the heavier soils.

Principal Species in Coppice-with-Standards

Table 59 is a classification of Coppice-with-Standards according to the principal species of the standards and to the species group of coppice. 113,952 acres, or 50 per cent. of the total area, consists of "mixed and other" coppice, while 38 per cent. consists of hazel, 11 per cent. of chestnut, and only one per cent. of oak coppice; hornbeam coppice, though included with the "mixed and other" coppice in this table, actually accounts for 10 per cent. of all coppice under standards. Taking Great Britain as a whole, 90 per cent. of all Coppice-with-Standards areas have oak standards. Ash standards, which stand on 7 per cent. of the area, appear mainly in areas of mixed and hazel coppice, and chestnut standards in areas of chestnut coppice. Birch standards dominate some areas of "mixed and other" coppice, but all other species are of minor importance.

Age-Classes of Standards

The age-classes of the standards were not recorded during the Census survey. An overall assessment of the position was made by classifying the standards recorded in the volume sampling survey by species and girth classes, and transposing the latter into three principal age groups by estimation. The resulting analysis is set out in Table 60, and refers to the total area of Coppice-with-Standards.

COPPICE-WITH-STANDARDS, CLASSIFIED BY PRINCIPAL SPECIES, BOTH OF COPPICE AND OF STANDARDS—PRIVATE WOODLANDS, GREAT BRITAIN

Table 59

Standards: Principal Species	Coppice: Principal Species				Total Area	
	Mainly Chestnut	Mainly Hazel	Mainly Oak	Mixed and other		
	Acres	Acres	Acres	Acres	Acres	%(1)
Scots pine	287	106	—	360	753	—
European larch	256	87	4	112	459	—
Norway spruce	44	109	—	154	307	—
Oak	21,471	79,359	1,587	100,073	202,490	90
Ash	152	6,293	—	8,974	15,419	7
Beech	118	831	24	961	1,934	1
Birch	252	521	—	1,631	2,404	1
Spanish chestnut	1,865	46	—	427	2,338	1
Sycamore	2	135	—	269	406	—
Hornbeam	—	—	—	87	87	—
Elm	2	80	—	566	648	—
Undifferentiated	34	87	7	338	466	—
Total	24,483	87,654	1,622	113,952	227,711	—
Percentage(2)	11	38	1	50	—	100

Notes. (1) Percentage of the total Coppice-with-Standards area under the stated species of *Standard* trees.

(2) Percentage of the total Coppice-with-Standards area under the stated species or description of *Coppice*.

AGE-CLASS DISTRIBUTION OF STANDARD TREES IN COPPICE-WITH-STANDARDS—PRIVATE WOODLANDS, GREAT BRITAIN

Table 60

Species	Under Middle Age 0-40 years(1)		Middle Aged 40-80 years(1)		Over Middle Age Over 80 years(1)		Total Number of Trees
	Percent. Species	Percent. Total	Percent. Species	Percent. Total	Percent. Species	Percent. Total	Percent.
Oak	43	22	41	22	16	8	52
Ash	84	13	10	2	6	1	16
Birch	77	11	17	2	6	1	14
Undifferentiated	72	14	19	3	9	1	18
All Species	60		29		11		100

Notes. (1) Estimated from girth classes in the Volume Sampling Survey.

(2) Figures throughout are percentages of numbers of trees, not of areas.

Condition of Standards

Stocking. Turning to the condition of the standards, the density of stocking in Coppice-with-Standards was necessarily assessed on a different basis to that which was applied to High Forest. The assumption was made that overwood and underwood were of equal importance, and, therefore, that for satisfactory stocking an equivalent of at least half the area should carry standards. This proportion might be increased up to the stage, varying with the species concerned, when more than half the coppice was being damaged by shade, after which

the standards were considered to be "overstocked". Beyond this, areas in which the standards occupied four-fifths or more of the total normally came under the definition of High Forest. "Poor" stocking was taken as the condition in which only half to a quarter of the area was occupied by standards, and "Bad" stocking as below a quarter and down to a minimum of about six standards per acre, after which the stand was normally classed as Simple Coppice.

Table 61 gives this classification by sub-type of Coppice. 55 per cent. of the total area of Coppice-with-Standards is seen to be satisfactorily stocked, 31 per cent. poorly stocked, 11 per cent. badly stocked, and 3 per cent. overstocked. "Mixed and other" coppice, comprising half the total, is rather below this average, with 34 per cent. poorly and 14 per cent. badly stocked, but hazel coppice is in appreciably better condition with 67 per cent. satisfactorily and only 25 per cent. poorly stocked. In the case of chestnut coppice this classification does not fit so well, because the coppice is generally of greater value than the standards, and most Stands are actually in process of conversion to Simple Coppice as the standards mature. Over-stocking of standards attains the highest proportion in oak coppice, where it reflects the general tendency to convert Stands of this description to High Forest.

STOCKING OF STANDARD TREES IN COPPICE-WITH-STANDARDS, BY PRINCIPAL SPECIES OF COPPICE—PRIVATE WOODLANDS, GREAT BRITAIN

Table 61

Standards : Stocking	Coppice: Principal Species								Total Area	
	Mainly Chestnut		Mainly Hazel		Mainly Oak		Mixed and Other			
	Acres	% (1)	Acres	% (1)	Acres	% (1)	Acres	% (1)	Acres	%
Overstocked	1,061	4	3,617	4	132	8	2,429	2	7,239	3
Satisfactory	9,707	40	58,689	67	918	57	56,343	50	125,657	55
Poor	8,853	36	21,448	25	462	28	39,214	34	69,977	31
Bad	4,862	20	3,900	4	110	7	15,966	14	24,838	11
Total	24,483	100	87,654	100	1,622	100	113,952	100	227,711	100

Note. (1) Percentage of total area of each species of Coppice.

Number of Standards per Acre. A different approach to the density of stocking in Coppice-with-Standards was afforded by the results of the Volume Sampling Survey. Over all the plots measured, the average stocking worked out at 52 standards to the acre, but this varied considerably in different regions. In the main area, in Kent and East Sussex, in Dorset, Wiltshire and Berkshire, in Hertford, Essex and Suffolk, and in the Furness district, all regions in which coppice is still fairly intensively worked, the average is only 40 standards to the acre. In Surrey and in the South Midlands, where normal working is rather spasmodic, the average is 50, and in west Sussex and in Hampshire, where although the coppice is still cut, large areas of overwood are being stored to form High Forest, it rises respectively to 65 and 70 standards to the acre. The latter average appears also in the North Midlands, where true Coppice-with-Standards is now almost obsolete and where in most areas it has already undergone conversion. Finally, in the West Midlands, the Welsh borders, and the South-west, the average density of stocking rises to 85 standards to the

acre, and represents areas, principally of oak overwood and underwood, where regular working has long been abandoned, but in which the underwood still retains a distinct coppice structure of several stems per stool.

Tree Form. In a classification by tree form, the average quality recorded for standards is, perhaps surprisingly, considerably better than in Broadleaved High Forest, with 66 per cent. considered satisfactory, 33 per cent. poor, and only one per cent. classed as bad. This result is not altogether explained by the fact that the larger area of Coppice-with-Standards occurs in the south of the country, where the general conditions of growth for broadleaved species are at their best. In fact, many Stands of this type are growing on heavy soils which may have a stunting effect. The relative and average superiority of tree form in Coppice-with-Standards appears to arise from selective processes which have operated over a long period. In each generation of standards only seedlings of exceptional growth can survive competition with the coppice, and crooked stems are often cut back when young.

A detailed examination of the second component of Coppice-with-Standards, the underwood, would cover many points which are more conveniently discussed in relation to the next type, simple Coppice. In fact, over a common area of distribution, the two types often merge from one into the other, and present only slightly modified aspects of a joint subject.

The distribution of Coppice-with-Standards is set out in Appendix VI, Table L, page 214, and is also shown diagrammatically in Map 10, page 248.

Simple Coppice

"Coppice" was taken to include growth of pole or even of timber size which still retained the coppice structure of two or more stems per stool; in one or two exceptional cases Stands formed from pollards came under this description. Provided the underwood was still capable of being worked, it also comprised areas of former Coppice-with-Standards on which, as a result of felling, less than six standards remained to the acre. Where considerable gaps were left,

PRINCIPAL SPECIES OF SIMPLE COPPICE, BY COUNTRIES—
PRIVATE WOODLANDS

Table 62

Principal Species	England	Scotland	Wales	Great Britain	
	Acres	Acres	Acres	Acres	%(1)
Oak	12,588	391	11,325	24,304	22
Ash	11,772	3	1,283	13,058	12
Beech	590	—	3	593	1
Birch	6,064	—	350	6,414	6
Spanish chestnut	21,421	—	49	21,470	19
Sycamore	2,067	40	625	2,732	2
Alder	3,161	9	1,276	4,446	4
Hazel	26,398	—	944	27,342	24
Hornbeam	9,394	—	—	9,394	8
Lime	741	—	—	741	1
Elm	930	—	14	944	1
Willow	268	5	16	289	—
Undifferentiated	330	—	6	336	—
Total	95,724	448	15,891	112,063	100

Note. (1) Percentage of total area of Simple Coppice.

or where the underwood had been badly damaged, such Stands were classed as "Devastated". Areas formerly worked as Coppice, which contained decayed and exhausted stools, areas which had filled up with weeds, or crops which had grown beyond a normal rotation and were no longer marketable or suitable for conversion to High Forest, were classed as "Scrub".

Table 62 gives the classification of Simple Coppice by principal species and countries. Hazel accounts for 24 per cent. of the total area, oak 22 per cent., and chestnut 19 per cent. Ash comprises 12 per cent., hornbeam 8 per cent., birch 6 per cent., and alder 4 per cent. All other species are of minor importance. The small area in Scotland is almost entirely oak coppice. Oak, with a small amount of ash and alder, makes up most of the Coppice in Wales. In England, hazel covers the largest areas, and chestnut comes second, followed by oak and ash.

The area of Simple Coppice in each county is given in Appendix VI, Table M, page 216, and the general distribution is shown in Map 11, page 249. It is distributed over the same general area as Coppice-with-Standards, though less abundant, but there are considerable areas in South and West Wales, and South-west England, where Coppice-with-Standards is less common. These western coppices consist mainly of oak.

Hazel coppice is characteristic of the chalk down areas of the counties south of the Thames, and occurs in most mixed crops elsewhere. Chestnut coppice grows mostly on the Greensand ridges and lighter soils of the Weald, and is concentrated in Sussex and Kent. Ash, occurring on both calcareous and clay soils, is, like hazel, very widely distributed. Hornbeam, the distribution of which has already been indicated, is the main coppice crop on the heavier soils of the Weald and the south-eastern counties. Similar soil formations in the Midlands often support very mixed coppices in which elm and lime attain local predominance. Birch and sycamore as invading trees on some lighter soils, and alder and willow on wet and swampy sites, complete a varied pattern of distribution.

PRINCIPAL SPECIES OF SIMPLE COPPICE, BY PURE AND MIXED STANDS—PRIVATE WOODLANDS, GREAT BRITAIN

Table 63

Principal Species	In Pure Stands			In Mixed Stands		
	Acres	%(1)	%(2)	Acres	%(1)	%(2)
Oak	14,151	58	32	10,153	42	15
Ash	3,283	25	8	9,775	75	14
Beech	106	18	—	487	82	1
Birch	1,762	27	4	4,652	73	7
Spanish chestnut	9,890	46	23	11,580	54	17
Sycamore	849	31	2	1,883	69	3
Alder	1,800	40	4	2,646	60	4
Hazel	9,413	35	22	17,929	65	26
Hornbeam	2,228	24	5	7,166	76	10
Lime	10	2	—	731	98	1
Elm	177	19	—	767	81	1
Willow	102	35	—	187	65	—
Undifferentiated	13	4	—	323	96	1
Total	43,784	39	100	68,279	61	100

Notes. (1) Percentage of the individual species found in Pure or Mixed Stands respectively.
(2) Percentage of all Pure or all Mixed Stands, respectively, under the species named.

In Table 63, the total area of Simple Coppice is divided by principal species into pure and mixed Stands (pure Stands contain only one species over nine-tenths or more of the crop). 68,279 acres, or three-fifths of the total, occur in mixed Stands. The proportion varies considerably between species, from 42 per cent. "mixed" in the case of oak coppice and 54 per cent. in chestnut, to 65 per cent. "mixed" in hazel coppice. With the exception of alder and willow, all the remaining species have even higher proportions recorded as occurring in mixed Stands. In pure Stands, oak coppice forms 32 per cent. of the total area, chestnut 23 per cent. and hazel 22 per cent., but no other species is of individual importance.

The high proportion of mixed coppice, both in this type and in Coppice-with-Standards, is worthy of note.

Stands recorded in the census as Coppice can all be taken as reasonably productive at the time of survey; but it is clear that a large number had only been brought back into rotational cutting as a result of abnormal demands for produce, including firewood, during and immediately following the 1939-45 war. It is generally known that before 1939 many coppices were going out of production, either by intentional or accidental conversion to "High Forest", or by thoroughgoing exploitation and consequent degradation to "Devastated" areas or to "Scrub". On the other hand, certain areas of pure chestnut coppice afford examples of intensively and profitably managed woods. Other such areas are being re-stocked, and new Stands are still being established.

Scrub

Private Woodlands contain a very large proportion of the total area classed as Scrub. The average size of Stand was 16 acres, varying from 11 acres in Wales and 13 in England, to 21 acres in Scotland; compared with High Forest, or even with Coppice, this represents the occurrence of larger units and not merely a less intensive basis of classification. Small patches of Scrub in otherwise productive Stands were usually not separated so long as adequate allowance could be made for them in assessments of tree form and stocking. If scrub patches were more prominent but not easily demarcated, they were allotted a proportion of the combined Stand areas by estimation, under the procedure laid down in the Instructions for Survey (Appendix II, page 176). Whole Stands occurred which consisted entirely of Scrub; these formed the majority under this description and comprised all the larger areas.

Scrub was defined for the purpose of the census as inferior growth which is unlikely to develop into a utilisable crop of coppice, poles, or timber. Thus, although they may originate in many different ways, all Stands coming under this description are fundamentally in an arrested or retrograde phase of development. The majority arise naturally and fail to develop to High Forest either because the species or site is unsuitable, or because they are repressed by such man-made influences as grazing and browsing, burning, or cutting and lopping. The minority are the remnants of artificially established crops that have failed to develop, exhausted and abandoned coppice, parts of plantations suffering from undue exposure or adverse soil conditions, and Stands of old decayed trees or pollards.

Many natural extensions of woodland on to waste land came under the former group, and the justification for their inclusion as woodland in the Census survey rests on their probable future development. The evidence is,

however, that owing to less intensive agricultural land use and better control of fires, many commons and open spaces which fifty years ago were quite bare, today carry Stands of timber. In nearly all such cases an initial stage in this process is the establishment of Scrub. Records of the existing status of such areas will thus form a sound basis for future assessments of what appears to be an important development.

Such extensions were not included if growth was still small, or if the ground was less than half stocked, and Stands in similar condition which were already shown as woodland on the six-inch Ordnance Survey maps were more usually recorded as "Devastated" or "Felled". Scrub, therefore, occupies an intermediate and transitional position in the Census classification, capable of merging both from woodland to non-woodland, and with every other Type. Its segregation and delimitation during survey were correspondingly difficult.

The general distribution of Scrub is shown in Map 12, and details of the area in each county are given in Appendix VI, Table N. The largest proportion of this Type is in Scotland, where it is widely distributed throughout the Highland counties. South of the Border, fairly dense zones of distribution occur in Yorkshire and the north Midlands, in the west Midlands and in South Wales. Some of these show the stunting effect of smoke and fumes upon tree growth in the main industrial regions. There is a fairly general dispersal of Scrub over the remainder of Wales, and local aggregations appear in some other districts of England. The third main zone of distribution is in the London basin and its adjacent counties, where it is associated both with a high degree of urbanisation, and with the occurrence of extensive tracts of commons and open spaces. Finally there is a small but rather general occurrence of Scrub in coastal districts, where exposure tends to limit satisfactory growth.

SPECIES COMPOSITION OF SCRUB, BY COUNTRIES—PRIVATE WOODLANDS

Table 64

Principal Species	England	Scotland	Wales	Great Britain	
	Acres	Acres	Acres	Acres	%(1)
Scots pine	594	11,941	15	12,550	2
Undifferentiated	2,221	506	27	2,754	1
Total Coniferous	2,815	12,447	42	15,304	3
Oak	21,366	27,144	12,940	61,450	13
Ash	7,113	2,564	1,824	11,501	2
Beech	2,855	2,574	167	5,596	1
Birch	77,504	185,520	11,423	274,447	59
Sycamore	6,329	2,561	453	9,343	2
Alder	3,255	6,380	4,038	13,673	3
Hazel	26,111	2,689	5,159	33,959	7
Hornbeam	4,337	—	—	4,337	1
Elm	2,364	521	25	2,910	1
Willow	3,891	482	642	5,015	1
Undifferentiated	32,518	819	1,383	34,720	7
Total Broadleaved	187,643	231,254	38,054	456,951	97
Grand Total	190,458	243,701	38,096	472,255	100

Note. (1) Percentage of total area of Scrub.

Major Species Occurring in Scrub

A classification of the 472,255 acres of Scrub by principal species and by countries is given in Table 64. Broadleaved species, which total 456,951 acres, cover a far larger area than do conifers. Birch covers 274,447 acres, or 59 per cent. of the total area. Oak scrub accounts for 13 per cent., but no other species except hazel, with 7 per cent., is individually prominent. "Undifferentiated" broadleaved Scrub, which accounts for another 7 per cent., consists very largely of hawthorn.

Most of the birch Scrub occurs in Scotland, where it consists, as in both England and Wales, of recent invasions of felled areas, and remnants or extensions of semi-natural woods which have been subjected to continuous degradation by grazing or burning.

Oak replaces birch (by a small margin) as the most important constituent of Scrub in Wales, where it represents exhausted coppice and semi-natural woods on poor mountain soils, both of which are often further degraded through grazing and browsing. Some recently-cut coppice of doubtful vigour was included in this type. Oak Scrub of similar origin occurs in the south-west Highlands and Galloway in Scotland, and throughout the West and South-west of England, corresponding with the formerly more extensive range of worked oak Coppice. In the remainder of England, however, oak often occurs as a "successor" species in birch and hawthorn Scrub, and many such areas may develop naturally into uneven-aged High Forest.

Hazel Scrub occurs principally in England, and consists largely of abandoned Coppice; but towards the north and west, and in Scotland and Wales, it represents degraded semi-natural woods.

Turning to the minor but often locally important constituents of broadleaved Scrub, hawthorn is characteristic of heavier soils, whereon, in the Midland counties of England, it invades open woods and rapidly overruns derelict agricultural land. In some hunting districts it has been established artificially to form fox covers. Rhododendron is probably the next most important undifferentiated species in broadleaved Scrub, and being naturalised on many lighter or more acid soils in most parts of the country, its rampant and smothering growth is now a menace to large areas of woodland. A third species to require mention is elderberry. Like rhododendron, it is almost immune to rabbit damage, often forming dense thickets in neglected plantations, and growing vigorously to take possession of the ground after these are felled.

Alder and willow Scrub is practically all contained in natural thickets along streamsides and rivers, and is most abundant in the higher rainfall areas of Scotland, Wales, and the West of England. Ash also appears widely as a principal species in such situations, but most ash Scrub in England is either abandoned coppice on clay soils invaded by thorn, or represents natural regrowth, on felled areas or on waste land, which has failed to develop, usually as a result of rabbit damage. Some sycamore Scrub has arisen in the same way, but most of it occurs in old shelter-belts and policy woods on exposed sites, or in regions affected by smoke pollution. Beech and elm Scrub are also found frequently in the same circumstances. Hornbeam Scrub is mainly abandoned coppice, but it occurs in some old amenity woods as pollards, like some of the beech.

Scots pine accounts for most of the coniferous Scrub, which is nearly all in Scotland and consists largely of checked or retarded areas of natural growth, growing on peat or moor-pan without adequate drainage. The undifferentiated

conifers occur principally in England, and contain a large proportion of yew, which is often the main constituent of mixed Scrub on chalk soils in the southern counties.

Suitability of Scrub for Economic Management

Scrub of certain tree species occupies, in the main, woodlands otherwise suitable for economic management, as shown in Table 65 below. Examples are Scots pine, with 89 per cent. of the Scrub area on such "suitable" land; birch, with 85 per cent.; oak, with 78 per cent.; hornbeam, with 73 per cent.; hazel, with 71 per cent.; and sycamore, with 68 per cent. On the other hand, Scrub of certain tree species tends to occur largely in woodland unsuitable for economic management. For example, 47 per cent. of the willow Scrub is on such "unsuitable" land, as is 44 per cent. of the elm, and 41 per cent. of the alder.

SUITABILITY OF SCRUB FOR ECONOMIC MANAGEMENT, BY SPECIES— PRIVATE WOODLANDS, GREAT BRITAIN

Table 65

Principal Species	Suitable		Doubtful		Unsuitable	
	Acres	%(1)	Acres	%(1)	Acres	%(1)
Scots pine	11,208	89	86	1	1,256	10
Undifferentiated	2,026	73	217	8	511	19
Total coniferous	13,234	86	303	2	1,767	12
Oak	48,207	78	3,070	5	10,173	17
Ash	7,507	65	862	8	3,132	27
Beech	2,525	45	1,776	32	1,295	23
Birch	233,408	85	6,018	2	35,021	13
Sycamore	6,333	68	655	7	2,355	25
Alder	7,125	52	947	7	5,601	41
Hazel	24,294	71	2,716	8	6,949	21
Hornbeam	3,148	73	774	18	415	9
Elm	1,472	51	150	5	1,288	44
Willow	1,799	36	840	17	2,376	47
Undifferentiated	20,271	58	3,760	11	10,689	31
Total broadleaved	356,089	78	21,568	5	79,294	17
Grand Total	369,323	78	21,871	5	81,061	17

Note. (1) Percentage of the total Scrub area of each species.

It appears probable that the main correlation between the principal species of Scrub and their relative suitability for economic management, is to be found in the generally unsatisfactory boundaries of the small and mixed semi-natural or amenity woods in which many Stands of certain species occur.

It should be realised that Scrub growth, produced despite adverse conditions is not always an indicator of infertility.

Devastated Areas

The average size of Stand was 13 acres. The average for England, where most of the Devastated areas occur, was 12 acres. In Scotland the average rose to 21 acres; in Wales it was only 10 acres per Stand.

As with Scrub, Devastated areas may originate in many different ways. Most result from exploitation fellings, made usually in Broadleaved High Forest, in which all the better trees are removed, and defective, immature, or undersized trees are left behind. This residue is usually more or less damaged during the operation, and some particularly bad examples were seen in which crawler tractors had been used to draw out timber. Other causes of devastation such as fire or wind-blow, may be accidental, and usually occur in coniferous High Forest. At the time of survey, recent military operations had caused some abnormal but rather widespread devastation, either from incidental damage to woods employed as camp sites and vehicle parks, from the use of live ammunition in battle training areas, or in occasional instances, from enemy bombing. Finally, Devastated areas may result from the disintegration of old and usually semi-natural Stands in which regeneration and replacement have been prevented over a long period by grazing or burning, or by unsuitable soil or weed conditions.

The general distribution of Devastated areas is shown in Map 13, and details of the area in each county are given in Appendix VI, Table O. The largest proportion of this type is in England, where it is very generally and evenly distributed. The only marked concentration appears on the borders of Surrey, Hampshire and Berkshire, and represents semi-natural Stands of Scots pine and birch devastated by heath fires, and areas of a similar character which have been damaged during military training. In Scotland, Devastated areas are practically confined to the central and north-western Highlands, and represent moribund remnants of the Caledonian pine forest, and some semi-natural birch woods, in which regeneration has been prevented by grazing and burning. In Wales the principal area of distribution comprises the northern and border counties.

A detailed classification of the 139,455 acres of Devastated Stands by principal species and by countries is given in Table 66.

SPECIES COMPOSITION OF DEVASTATED AREAS, BY COUNTRIES—
PRIVATE WOODLANDS

Table 66

Principal Species	England	Scotland	Wales	Great Britain	
	Acres	Acres	Acres	Acres	%(1)
Scots pine	11,647	7,567	403	19,617	14
European larch	2,113	795	346	3,254	3
Norway spruce	861	999	152	2,012	1
Undifferentiated conifers	904	91	108	1,103	1
Total coniferous	15,525	9,452	1,009	25,986	19
Oak	41,922	1,695	6,884	50,501	36
Ash	10,516	258	1,147	11,921	8
Beech	9,054	1,786	1,280	12,120	9
Birch	11,977	13,471	660	26,108	19
Spanish chestnut	1,892	—	4	1,896	1
Sycamore	6,232	256	448	6,936	5
Elm	1,747	290	128	2,165	2
Undifferentiated broadleaves	1,441	193	188	1,822	1
Total broadleaved	84,781	17,949	10,739	113,469	81
Grand Total	100,306	27,401	11,748	139,455	100

Note. (1) Percentage of total Devastated area.

81 per cent. of Devastated areas contain broadleaved principal species, and 19 per cent. coniferous principal species. Of the total, oak represents 36 per cent., birch 19 per cent., and Scots pine 14 per cent. Beech, ash and sycamore are individually less prominent, but between them they make up 22 per cent. The proportions vary between countries, and in Scotland birch and Scots pine account for most of the total.

The species remaining on a Devastated area may not always be representative of the original crop, or contribute equally to the parentage of its successor. Nevertheless, if conifers and birch are excluded, it would be a fair assumption that the remaining area of some 87,000 acres nearly all represents recent heavy exploitation fellings in either Broadleaved High Forest or Coppice-with-Standards.

Felled Areas

It will be recalled that Felled areas were divided into two sub-types, those felled *before* or *since* 1st September, 1939; both sub-types were bare of trees but still recognisable as woodland when surveyed. In practice the distinction was not always clear-cut, and where local enquiries failed to reveal the date of felling, surveyors were obliged to base their classification on circumstantial evidence, such as the degree of weathering and decay in the stumps, and the size and estimated age of any sprouts. In addition to Stands which had been cut, Felled areas also include a few Stands which had been completely destroyed by fire. Although the description normally applied only to former High Forest Stands, it was necessary to class as "Felled" certain areas, mainly of oak Coppice, in which the stools had been killed by out-of-season coppice cutting.

Table 67 gives details of the 619,539 acres Felled by sub-types and by countries. While 80 per cent. of the areas "Felled before 1st September, 1939" are in

FELLED AREAS BY SUB-TYPES AND COUNTRIES—PRIVATE WOODLANDS

Table 67

Sub-type	England			Scotland			Wales		
	Acres	%(1)	%(2)	Acres	%(1)	%(2)	Acres	%(1)	%(2)
Before Sept., 1939	32,766	18	12	221,073	59	80	21,265	36	8
Since Sept., 1939	153,819	82	45	155,049	41	45	35,567	64	10
Total	186,585	100	30	376,122	100	61	56,832	100	9

Notes. (1) Percentage of total Felled area of the country concerned.
(2) Percentage of the total area of the sub-type.

Scotland, the areas "Felled since 1st September, 1939" are all more nearly proportional to the respective total areas of Private Woodlands in each country. The general distribution of all felled areas is shown in Appendix VI, Table P, page 222. The distribution of pre-1939 fellings is shown in Map 14, and details of the area in each county are given in Appendix VI, Table Q; the distribution of the post-1939 fellings is shown in Map 15, and details by counties are given in Appendix VI, Table R.

Areas Felled Since 1st September, 1939

Although the Census classification is recorded in the reverse order, it will be more convenient to consider first the area of 344,435 acres "Felled since 1st September, 1939". The average size of Stand recorded in this sub-type was

16 acres; the average size in England and in Wales was 12 acres, and in Scotland 24 acres. This is greater than the average size of existing High Forest Stands in each country, and shows that the larger areas were selected for war fellings.

Map 15 shows a fairly even distribution over the whole country, but with a heavier concentration in the north-eastern Highlands of Scotland, and a lighter density in the equally well-wooded south-eastern counties of England. The latter contain a high proportion of Coppice types, which were not recorded as Felled, while in the former there is a predominance of Coniferous High Forest which is normally worked by clear felling. The evidence of symbols shown on the six-inch Ordnance Survey maps, and of stumps examined in the course of survey, shows that the larger proportion of all areas recorded in this sub-type formerly carried Mainly Coniferous High Forest. War fellings in Mainly Broadleaved High Forest either took the form of selection or devastation such as has been described, or else natural regrowth on the areas concerned had, in many cases, already resulted in their classification not as felled areas but as Scrub or High Forest.

In consequence of this regrowth in Broadleaved High Forest, and for other reasons, the total area of war fellings cannot be assessed directly from the Census classification. Allowance has to be made not only for factors of incomplete clearance and natural regrowth, but also for (1) the area already replanted and now appearing in the youngest age-class of High Forest; and (2) a continuance of abnormal felling which occurred between the end of the war in 1945 and the Census date at 30th September, 1947.

Areas Felled Before 1st September, 1939

Going back to the area of 275,104 acres recorded as "Felled before 1st September, 1939", it should be realised at the outset that many of the areas so classified were actually cut during the 1914-1918 war, while felling went on steadily all through the inter-war period. They have therefore remained unproductive for considerably longer than the minimum eight years 1939-47 suggested by the definitive date.

The average size of Stand (at 22 acres) was larger than in any other type, and the variation between countries was greater; the country averages were 12 acres per Stand in England, 14 in Wales, and 27 acres per Stand in Scotland. This high figure for Scotland is influenced, as is the corresponding average for areas "Felled since 1st September, 1939", by the general occurrence of much larger Stands in the Highland counties. These average about 50 acres, and correspond in size with the minimum economic unit for a portable sawmill, by which most had been exploited.

Map 14 brings out the significant position of the Highland counties in the distribution of areas "Felled before 1st September, 1939". Such areas are shown to be practically confined to the Highlands, the hill country of south Scotland, Wales, and a few counties in the north and the south-west of England.

The significance of this distribution must be considered in the light of three factors. First, the symbols on the six-inch Ordnance Survey maps and the evidence of stumps, show that such areas formerly carried almost entirely Coniferous High Forest. Second, natural re-stocking, such as occurs elsewhere, has been prevented by lack of seed trees, and grazing or burning. Finally, as far as the Census is concerned, such areas may have remained readily recognisable as woodland mainly because of a longer interval between revisions of the Ordnance Survey maps in the less populated parts of the country. (See Appendix VI, Table A, page 192, for details of dates of maps, by counties.)

SECTION C — STATE FORESTS

CHAPTER 11

SCOPE OF THE STATE FOREST SURVEY

For this present Census survey the term State Forests is taken to include all woods under the direct administration of the Forestry Commission as at the 30th September, 1947. It includes those woods which have been planted by the Forestry Commissioners since their constitution in 1919, together with woods which have been acquired from private ownership (whether for the purpose of re-stocking or otherwise), and certain former Crown woods, such as the Dean and New Forests which were placed in the Forestry Commissioners' charge in accordance with the Transfer of Woods Act of 1923.

At the time of survey the State Forests comprised 302 forest units, of which 108 were in England, 148 in Scotland, and 46 in Wales. The distribution of these units is shown in Map 7. Their woodland areas vary considerably in extent. In England, 31,933 acres were recorded in Thetford Chase (Norfolk and Suffolk), 27,295 acres in the New Forest (Hampshire), 20,392 acres in the Forest of Dean (Gloucester) and 19,226 acres in Kielder Forest (Northumberland). In Scotland, 8,165 acres were recorded in Loch Ard Forest (Perth and Stirling); and in Wales, 8,712 acres were found in Brechfa Forest (Carmarthen). On the other hand, a few recently constituted units had as yet no woodland areas, either acquired or established by the Forestry Commission. Appendix VII, page 232, gives further details.

The gross area surveyed, in blocks five acres or more in extent and exceeding one chain in width, was 629,867 acres.

Out of this total, 6,836 acres were classed as Disafforested. Details by countries are given in Table 68 below, from which it is seen that the area Disafforested occurs mainly in England. Most of it represents land taken over for defence purposes.

GROSS AREA SURVEYED, AREA DISAFFORESTED, AND NET WOODLAND AREA, BY COUNTRIES—STATE FORESTS

Table 68

Country	Gross Area Surveyed	Area Disafforested		State Forest Area, Net	
	Acres	Acres	%(1)	Acres	%(2)
England	293,438	5,507	1.9	287,931	46
Scotland	243,791	961	0.4	242,830	39
Wales	92,638	368	0.4	92,270	15
Great Britain	629,867	6,836	1.1	623,031	100

Notes. (1) Percentage of Gross Area Surveyed, within each country.
(2) Percentage of Net Woodland Area of State Forests in Great Britain.

Total Area of State Forests

After deducting the Disafforested area, the total extent of woodlands in State Forests, which forms the basis for further analysis, was 623,031 acres.

Details by countries are:

England	287,931 acres	46 per cent.
Scotland	242,830 acres	39 per cent.
Wales....	92,270 acres	15 per cent.

Details of the total woodland area of State Forests by counties are given in Appendix VI, Table B, page 194. Details by Forestry Commission Conservancies and individual forest units will be found in Appendix VII, page 232.

The area of plantations shown in the *Annual Report of the Forestry Commissioners for the Year ending 30th September, 1947**, was 534,094 acres. The difference between this and the total of 623,031 acres recorded in the Census, is due to the inclusion in the Census survey of woodland areas that were awaiting re-stocking. Similar differences occur in the areas of individual Forests.

Suitability for Economic Management

The reasons for classifying a small percentage of the State Forest Woodlands as Unsuitable, or Doubtfully Suitable, for economic management have been set out in Chapter 3, page 34. The total areas so classed are:

Unsuitable	16,839 acres	3 per cent.
Doubtfully Suitable	6,088 acres	1 per cent.

This leaves 600,104 acres, or 96 per cent. of all State Forest woodland, regarded as Suitable for economic management. Details of this area, by counties, are given in Appendix VI, Table C, page 196.

England has 11,286 acres regarded as Unsuitable and 1,204 acres considered Doubtful. Much of this is composed of the unenclosed woodlands in the New Forest.

Scotland has 4,902 acres considered Unsuitable and 3,619 acres regarded as Doubtfully Suitable for economic management. Most of these areas consist of Scrub at high elevations, acquired together with land more suitable for economic afforestation as an integral part of the estates concerned. The same consideration applies in Wales, which has 651 acres of State Forest considered Unsuitable, and 1,265 acres regarded as Doubtfully Suitable for economic management.

The proportion of State Forest land that was not considered to be definitely Suitable for economic management, *i.e.*, 4 per cent., is markedly lower than the comparable figure of 17 per cent. found in the Private Woodlands. (See Chapter 7, page 71.)

Productive and Unproductive Woodland in State Forests

The proportions of the Productive Types—High Forest and Coppice, together with those of the Unproductive Types, Scrub, Devastated and Felled Areas, in the State Forests, are shown in Table 69, which follows on page 113.

Briefly, 87 per cent. of all State Forest woodland is classed as Productive, the proportions for the various countries being: England, 90 per cent.; Scotland, 81 per cent.; and Wales, 96 per cent. But since nearly all the Unproductive areas in each country have only recently been acquired with the object, so far as is practicable, of making them Productive, these proportions are of no special significance, and are only set out here to complete the analysis and to make it comparable with that for Private Woodlands (Chapter 7, page 74).

Details of Unproductive areas in State Forests, by counties are given in Appendix VI, Table D, page 198.

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* H.M.S.O. 1s. 3d.

CHAPTER 12

CLASSIFICATION BY TYPE AND SUB-TYPE —STATE FORESTS

The following major classification of the State Forests on the basis of their "Type" or character at the 30th September, 1947, follows the same lines as the similar classification for All Woodlands, which is explained in fuller detail in Chapter 4, page 41. The figures here presented can be compared with those, and also with the figures for Private Woodlands, given in Chapter 8, page 74. The criteria by which Stands were classified are given in Appendix II, page 177; and examples of each Type are shown in Plates I to V and IX to XI (following page 112).

The general position in the State Forests is set out in Table 69 below.

TYPES AND SUB-TYPES OF STATE FORESTS, BY COUNTRIES

Table 69

Type	England		Scotland		Wales		Great Britain	
	Acres	%(1)	Acres	%(1)	Acres	%(1)	Acres	%(1)
HIGH FOREST								
Coniferous	183,834	64	191,631	79	79,868	88	455,333	73
Mixed	17,856	6	2,549	1	3,011	3	23,416	4
Broadleaved	49,254	17	2,909	1	3,579	4	55,742	9
Total, High Forest	250,944	87	197,089	81	86,458	95	534,491	86
COPPICE								
With Standards	1,994	1	—	—	83	—	2,077	—
Coppice only	6,913	2	39	—	1,191	1	8,143	1
Total, Coppice	8,907	3	39	—	1,274	1	10,220	1
SCRUB	9,582	3	12,982	5	2,132	2	24,696	4
DEVASTATED	5,109	2	6,235	3	265	—	11,609	2
FELLED								
Before 9/39	726	—	12,360	5	313	—	13,399	2
Since 9/39	12,663	5	14,125	6	1,828	2	28,616	5
Total, Felled....	13,389	5	26,485	11	2,141	2	42,015	7
TOTAL	287,931	100	242,830	100	92,270	100	623,031	100

Note. (1) Percentage of total *woodland* area of State Forests, within the country concerned. Non-woodland areas, whether awaiting afforestation, or devoted to other uses, are excluded.

In Great Britain as a whole, 86 per cent. of the State Forest area was classified as High Forest, and 1 per cent. as Coppice. Scrub accounted for 4 per cent., and Felled or Devastated Areas for 9 per cent. The Productive areas, High Forest and Coppice, therefore make up 87 per cent. of the whole, and the Unproductive areas 13 per cent. The reasons for the existence of substantial areas of Unproductive land in the State Forests are discussed in Chapter 6, page 68.

State Forests in England consist of 87 per cent. High Forest, 3 per cent. Coppice, 3 per cent. Scrub, and 7 per cent. Felled or Devastated.

In Scotland, the State Forests consist of 81 per cent. High Forest, with virtually no Coppice, 5 per cent. Scrub, and 14 per cent. Felled or Devastated.

In Wales, the proportions are 95 per cent. High Forest, 1 per cent. Coppice, 2 per cent. Scrub, and 2 per cent. Felled.

These variations between countries are not of great significance, because the areas under all Types except High Forest are influenced mainly by the recent acquisition of Coppice, Scrub, Devastated, or Felled areas for replanting. The proportion of each in any country at any time naturally varies, and is not a constant feature of their management.

For like reasons, comparisons with the proportions in Private Woodlands (Chapter 8, page 74) are not of great validity, though it will be seen that the State Forests have much higher proportions of High Forest, and much lower proportions of all other Types.

High Forest

The High Forest Type, which occupies 534,491 acres, or 86 per cent. of the total area of State Forests, is by far the most important Type, both by proportion and by reason of its high productivity. It is further discussed in Chapter 13, and the analysis in this present chapter is limited to the distribution of its three sub-types—Coniferous, Mixed, and Broadleaved, over the various countries.

Taking High Forest as a whole, the proportions within the three component countries are: England, 87 per cent. of State Forest land; Scotland, 81 per cent.; Wales, 95 per cent. Acreages are shown in Table 69, page 113.

Proportions of Sub-Types, within Countries

The proportion of State High Forest in each sub-type, within countries, is shown in Table 70 below.

PROPORTION OF SUB-TYPES OF HIGH FOREST, WITHIN COUNTRIES—STATE FORESTS

Table 70 — Per cent.

Sub-type	England	Scotland	Wales	Great Britain
Coniferous	73	98	92	85
Mixed	7	1	4	4
Broadleaved	20	1	4	11
Total	100	100	100	100

Note. See Table 69, page 113, for actual areas in acres.

Table 70 shows that, for Great Britain as a whole, the State Forest area is mainly coniferous, to the extent of 85 per cent., with only 11 per cent. broadleaved, and 4 per cent. mixed.

Rather marked differences occur between the individual countries though all are predominantly coniferous. The State Forests of England are 20 per cent. broadleaved, and 7 per cent. mixed; those of Scotland are only 1 per

cent. broadleaved and 1 per cent. mixed; Wales has 4 per cent. broadleaved and 4 per cent. mixed. Looking at it another way, the Scottish and Welsh State Forests are almost entirely coniferous, while England has a considerable area under broadleaved trees.

Share of each Country in each High Forest Sub-type—State Forests

The proportion of each sub-type lying in each country varies as may be seen from Table 71 below.

SHARE OF EACH COUNTRY IN THE TOTAL AREA OF EACH SUB-TYPE OF HIGH FOREST—STATE FORESTS

Table 71 — Per cent.

Sub-type	England	Scotland	Wales	Great Britain
Coniferous	40	42	18	100
Mixed	76	11	13	100
Broadleaved	89	5	6	100
All State High Forest	47	37	16	100

Note. See Table 69, page 113, for actual areas in acres.

Taking the Coniferous State High Forest first, it is seen that England and Scotland have almost equal shares, while Wales has a due but smaller proportion. Where Mixed High Forest is concerned, England and Wales have substantially the greater share, 89 per cent.; while no less than 95 per cent. of the Broadleaved High Forest in State ownership, is in England and Wales.

Comparison of these figures with the corresponding data for Private Woodlands, given in Chapter 8, page 76, shows that both State and Private woods follow the same general trends. As with the Private Woodlands, the bulk of the State-owned broadleaved areas are in England and Wales. But whereas England and Wales hold only 40 per cent. of the Privately-owned Coniferous High Forest, they have a larger share, 58 per cent., of the State's Coniferous High Forest.

High Forest Areas by Counties

Areas of State High Forest for each county are given in Appendix VI, Tables E, H, I and J, pages 200 to 210, with totals of the whole Type, and details for each sub-type, Coniferous, Mixed, and Broadleaved.

Coppice

The area of the Coppice Type in the State Forests is 10,220 acres, or 1 per cent. of all such land. Nearly all of it is in England and Wales. Coppice accounts for 3 per cent. of State Forest in England, 1 per cent. in Wales, and a negligible proportion in Scotland. Most of this Coppice has been acquired with a view to conversion to High Forest.

Coppice, Scrub, Devastated and Felled Areas in State Forests are discussed in greater detail in Chapter 14, page 131. The analyses in this present chapter are concerned mainly with the representation of these Types and their sub-types, by countries, and are based on Table 69, page 113.

Sub-Types of Coppice

The proportions of each sub-type of coppice in the State Forests arise largely as an incidental outcome of recent acquisitions of such land for conversion to High Forest, and not as a result of policy or planned management. Hence they do not merit detailed analysis or comparison.

But for the sake of completeness, it may be said that 20 per cent. of all State Coppice carries standards, proportions by countries being: England, 23 per cent.; Scotland, *nil*; Wales 6 per cent.

England has 95 per cent. of all State Coppice-with-Standards, leaving Wales with 5 per cent. England also has 86 per cent. of the Simple Coppice, and Wales 14 per cent. There is virtually no Coppice of either sub-type in the State Forests of Scotland.

County details appear in Appendix VI, Tables K, L and M, pages 212 to 216.

Scrub

For the same reasons as apply to Coppice above, the Scrub areas in State Forests, which total 24,696 acres, do not merit detailed analysis. For reference, 52 per cent. of all such Scrub was in Scotland, 39 per cent. in England, and 9 per cent. in Wales. County details appear in Appendix VI, Table N, page 218.

Devastated Areas

The share of each country in the Devastated area that happened to be under State ownership on 30th September, 1947, namely, 11,609 acres, was as follows: Scotland, 54 per cent.; England, 44 per cent.; Wales, 2 per cent. County details are given in Appendix VI, Table O, page 220.

Felled Areas

The Felled Areas in the State Forests amounted to 42,015 acres, or 7 per cent. of the total State Forest area. These include numerous felled areas recently acquired for replanting.

Proportions within countries were: England, 5 per cent.; Scotland, 11 per cent.; Wales, 2 per cent. Taking the Felled area as a whole, 62 per cent. lay in Scotland, 32 per cent. in England and 6 per cent. in Wales.

Sub-Types of Felled Areas

No particular significance attaches to the proportions, or the distribution, of the sub-types "Felled before September, 1939" and "Felled since September, 1939", of the Felled areas in State ownership at the date of the Census. Much of such land had only recently been acquired from private owners for replanting, and its earlier history had not been the concern of the State Forest administration. Details by counties appear in Appendix VI, Tables P, Q and R, pages 222 to 227.

CHAPTER 13

HIGH FOREST AREAS IN STATE FORESTS

The High Forest areas of the State Forests are here discussed on similar lines to those followed for the Private Woodlands (Chapter 9, page 81), namely by:

(i) Composition by age-classes.
(ii) Composition by tree species.
(iii) Principal species in relation to age-classes.
(iv) Condition, according to stocking and tree form.

County figures for State High Forest are given in Appendix VI, Tables E, H, I and J, pages 200 to 201 and 206 to 211.

The average size of Stand, or portion of woodland sufficiently uniform to justify a common description, in the State-owned High Forest, was 7½ acres. Having regard to the large areas planted up over the past thirty years, this appears a rather low figure. Moreover, the division of State Forests into compartments, with an average area of about 25 acres each, which is an integral feature of their management, suggests that a similar area might be found for individual Stands. But many of the compartments are far from uniform, various portions of them being planted with different species to accord with local peculiarities of soil and topography. Consequently large homogeneous Stands, though they do occur at some of the larger and more uniform forests, are infrequent over the State Forests as a whole.

(i) Composition of High Forest by Age-Classes

The classification of the total area of High Forest occurring in the State Forests by age-classes, within types, and within countries, is given in Table 72. The age-class structure is abnormal, as Stands under 31 years of age form 88 per cent. of the total. The older age-classes are found mainly in the former Crown woods, such as the New Forest, Forest of Dean, Alice Holt and Tintern; large parts of these woods have many characteristics in common with stands of similar age in Private Woodlands.

Attention may therefore be concentrated on the younger age-classes from 1 to 30 years of age, established for the most part by the Forestry Commissioners since they began operations in 1919. It is seen that the total area planted (and remaining in being at the time of the Census) rose from 79,141 acres in the first decade (1918 to 1927, represented by the 21 to 30 year age-class) to 206,271 acres in the second decade. There was then a slight fall, due to war-time difficulties, to 183,056 acres in the decade 1938 to 1947, represented by the youngest age-class. This trend is constant for all countries, and for all classes of planting, whether coniferous, mixed, or broadleaved.

The planting of Mixed and Broadleaved woods, taken together, has remained fairly constant at about 10 per cent. of the total for Great Britain. Nearly all of it takes place in England, where it accounts for about 15 per cent. of that country's planting.

Table 72.

AGE-CLASSES OF HIGH FOREST, BY SUB-TYPES AND COUNTRIES—STATE FORESTS

Country	Type	Age-Class in Years									Total All Ages
		1 to 10	11 to 20	21 to 30	31 to 40	41 to 60	61 to 80	81 to 120	Over 120	Uneven	
		Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres
ENGLAND	Coniferous	61,023	72,228	39,611	1,544	1,656	1,362	1,803	11	4,596	183,834
	Mixed	4,459	6,440	2,997	226	299	357	1,694	291	1,093	17,856
	Broadleaved	6,475	8,084	2,373	1,012	1,283	949	8,224	14,187	6,667	49,254
	Total	71,957	86,752	44,981	2,782	3,238	2,668	11,721	14,489	12,356	250,944
SCOTLAND	Coniferous	74,929	80,026	24,592	2,256	1,774	1,401	711	151	5,791	191,631
	Mixed	568	563	15	15	18	137	119	18	1,096	2,549
	Broadleaved	555	427	49	48	242	111	406	28	1,043	2,909
	Total	76,052	81,016	24,656	2,319	2,034	1,649	1,236	197	7,930	197,089
WALES	Coniferous	33,683	37,482	7,984	211	141	49	7	—	311	79,868
	Mixed	511	562	1,389	35	6	65	3	—	440	3,011
	Broadleaved	853	459	131	129	274	797	261	75	600	3,579
	Total	35,047	38,503	9,504	375	421	911	271	75	1,351	86,458
GREAT BRITAIN	Coniferous	169,635	189,736	72,187	4,011	3,571	2,812	2,521	162	10,698	455,333
	Mixed	5,538	7,565	4,401	276	323	559	1,816	309	2,629	23,416
	Broadleaved	7,883	8,970	2,553	1,189	1,799	1,857	8,891	14,290	8,310	55,742
	Total ...	183,056	206,271	79,141	5,476	5,693	5,228	13,228	14,761	21,637	534,491

During the first and second decades, England had the largest area planted, but during the third decade, represented by the youngest age-class, the area established in Scotland exceeded that formed in England.

AGE-CLASSES OF HIGH FOREST, CLASSIFIED AS MAINLY CONIFEROUS AND MAINLY BROADLEAVED—STATE FORESTS, GREAT BRITAIN

Table 73

Category	Age-Class and Period of Origin				
	Up to 30 years				Over 30 years and Uneven (Various)
	1 to 10 years (1947-1938)	11 to 20 years (1937-1928)	21 to 30 years (1927-1918)	Total (1947-1918)	
	Acres	Acres	Acres	Acres	Acres
Mainly Coniferous	171,802	193,765	75,544	441,111	26,895
Per cent. of Total(1)	94	94	95	94	41
Mainly Broadleaved	11,254	12,506	3,597	27,357	39,128
Per cent. of Total(1)	6	6	5	6	59
Total	183,056	206,271	79,141	468,468	66,023

Note. (1) Percentage of each age-class.

Table 73 is a simplified form of summary in which uneven-aged Stands, and all areas over 30 years of age, are grouped together, and the figures for Great Britain as a whole are re-classified under the two categories, Mainly Coniferous High Forest and Mainly Broadleaved High Forest. The Mainly Coniferous areas amount to 468,006 acres, comprising 88 per cent. of the total; records show that 357,175 acres, or about three-quarters of it, represent the afforestation of land which had not previously carried a tree crop. On the other hand only 14,301 acres, or just over a fifth of the total area of 66,485 acres of Mainly Broadleaved High Forest, are recorded as having been planted on new land; this lower proportion reflects the much better site qualities required for broadleaved crops.

A total of 468,468 acres is contained in the 1 to 30 year age group, and only 66,023 acres in Stands over 30 years or uneven-aged. Each age-class up to 30 years is found to contain a very even proportion of Mainly Broadleaved High Forest, amounting to 5 or 6 per cent. of the respective totals, while in the older and the uneven-aged Stands Broadleaved High Forest makes up 59 per cent. of the combined area. As seen in Table 73, this description amounts to 39,128 acres, and reference to Table 72 shows that most of it is over 80 years of age. It consists mainly of mature and semi-mature oak in the former Crown woods. Similarly, most of the Mainly Coniferous High Forest in the same group is found to be uneven-aged, and consists largely of Stands of Scots pine in various stages of natural regeneration, principally in the New Forest.

The data set out in Table 73 have been analysed by countries, and extended to cover all age-classes, and the results are set out overleaf in Table 74. In this latter table, percentages are calculated on a basis of *age-classes* within categories instead of by *categories* within individual age-classes. The "categories" concerned are "Mainly Coniferous" and "Mainly Broadleaved".

HIGH FOREST AREAS BY AGE-CLASSES AND COMPOSITION, WITH DETAILS BY COUNTRIES—STATE FORESTS

Table 74

COUNTRY	COMPOSITION	AGE-CLASS																	
		1-10		11-20		21-30		31-40		41-60		61-80		81-120		Over 120		Uneven-aged		Total	
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
ENGLAND	Mainly Coniferous ..	62,740	32	75,550	39	41,665	22	1,693	1	1,821	1	1,539	1	2,642	1	43	—	4,986	3	192,679	100
	Mainly Broadleaved	9,217	16	11,202	19	3,316	6	1,089	2	1,417	2	1,129	2	9,079	16	14,446	24	7,370	13	58,265	100
	Total	71,957	29	86,752	35	44,981	17	2,782	1	3,238	1	2,668	1	11,721	5	14,489	6	12,356	5	250,944	100
SCOTLAND	Mainly Coniferous...	75,067	39	80,373	42	24,607	13	2,271	1	1,792	1	1,459	1	742	—	169	—	6,700	3	193,180	100
	Mainly Broadleaved	985	25	643	16	49	1	48	1	242	6	190	5	494	13	28	1	1,230	32	3,909	100
	Total	76,052	39	81,016	41	24,656	12	2,319	1	2,034	1	1,649	1	1,236	1	197	—	7,930	4	197,089	100
WALES	Mainly Coniferous...	33,995	42	37,842	46	9,272	11	235	—	145	—	82	—	8	—	—	—	568	1	82,147	100
	Mainly Broadleaved	1,052	24	661	15	232	6	140	3	276	7	829	19	263	6	75	2	783	18	4,311	100
	Total	35,047	40	38,503	45	9,504	11	375	—	421	1	911	1	271	—	75	—	1,351	2	86,458	100
GREAT BRITAIN	Mainly Coniferous...	171,802	36	193,765	41	75,544	16	4,199	1	3,758	1	3,080	1	3,392	1	212	—	12,254	3	468,006	100
	Mainly Broadleaved	11,254	17	12,506	19	3,597	5	1,277	2	1,935	3	2,148	3	9,836	15	14,549	22	9,383	14	66,485	100
	Total	183,056	34	206,271	38	79,141	15	5,476	1	5,693	1	5,228	1	13,228	3	14,761	3	21,637	4	534,491	100

Note. Percentages are based on the total area of each category—Mainly Coniferous or Mainly Broadleaved—found in each country.

(ii) Composition of High Forest, by Principal Species

The general position is set out in Table 75 overleaf, which shows, both for Great Britain and the three individual countries, the areas occupied by the fourteen tree species that make up, between them, 99 per cent. of the High Forest area of the State Forests. (Details of three minor species follow in Tables 78 to 81.) Table 75 also shows the percentage of the total State High Forest area occupied by each species, as well as its percentage share in the area of Mainly Coniferous, or Mainly Broadleaved High Forest, as the case may be.

The first point to be remembered is that the coniferous species, with 468,006 acres, occupy 88 per cent. of the State High Forest, whereas the Broadleaved trees have only 66,485 acres, or 12 per cent.

Table 75 also brings out the fact that the most important species in the State High Forest is Sitka spruce, with 141,908 acres or 27 per cent., followed by Scots pine, with 116,461 acres or 22 per cent., and Norway spruce with 85,542 acres or 16 per cent.; these three species thus make up 65 per cent. of all the State High Forest. The fourth most important species is oak, with 38,151 acres, or 7 per cent., followed by Corsican pine with 32,004 acres (6 per cent.), European larch with 31,145 acres (also 6 per cent.), Japanese larch with 28,884 acres (5 per cent.) and Douglas fir with 23,308 acres (also 5 per cent.). Then comes beech with 17,067 acres or 3 per cent., followed by ash with 4,606 acres (1 per cent.) and birch with 3,034 acres (also 1 per cent.).

This brief analysis shows that 87 per cent. of the State High Forest is made up of seven coniferous species, while 12 per cent. consists of only four species of broadleaved trees. All other conifers only account for 8,754 acres, or 1 per cent.; and the combined area of broadleaved trees, other than the four named above, is only 3,627 acres. Sycamore, with 1,068 acres, and poplar with 1,190 acres (Table 81), are the principal "minor" broadleaved trees in the State High Forest.

If the figures for closely related species are combined, the two spruces are found to occupy 43 per cent. of the High Forest area, the two pines 28 per cent. and the two larches 11 per cent. It may be noted that the two leading groups, the pines and the spruces, are composed of those coniferous species that are most tolerant of poor soils; this reflects, in some degree, the generally infertile and exposed sites available to the Forestry Commission for new afforestation. Reference to Table 48, page 88, which gives similar figures for High Forest in Private Woodlands, shows that the latter include a higher proportion of the more exacting species, such as the larches. The difference is most striking with Sitka spruce, which makes up 27 per cent. of the State area, but only 2 per cent. of the Private area. This reflects the widespread use of this species in the first planting of peaty soils in new State Forests in the high rainfall areas of the northern and western uplands, where much of the new afforestation work is going on.

When the composition of the State High Forest within individual countries is examined, it is seen that in England the coniferous species cover 77 per cent. of the area, and the broadleaved species 23 per cent. In order of importance the six major tree species are: Scots pine with 26 per cent., Sitka spruce with 16 per cent., oak with 13 per cent., Corsican pine and Norway spruce with 11 per cent. each, and beech with 6 per cent. It is interesting to note that two broadleaved trees, oak and beech, hold the third and the sixth places, respectively.

HIGH FOREST AREAS UNDER MAJOR TREE SPECIES, WITH DETAILS BY COUNTRIES—PURE AND MIXED STANDS COMBINED—STATE FORESTS

Table 75

Species	England			Scotland			Wales			Great Britain		
	Area Acres	Percentages (a) of Conifers	(b) of all species	Area Acres	Percentages (a) of Conifers	(b) of all species	Area Acres	Percentages (a) of Conifers	(b) of all species	Area Acres	Percentages (a) of Conifers	(b) of all species
Scots pine	65,736	34	26	46,111	24	23	4,614	6	5	116,461	25	22
Corsican pine	26,225	14	11	3,210	2	2	2,569	3	3	32,004	7	6
European larch	13,406	7	5	13,179	7	7	4,560	6	5	31,145	7	6
Japanese larch	8,849	5	4	7,844	4	4	12,191	15	14	28,884	6	5
Norway spruce	26,122	13	11	41,562	21	21	17,858	21	21	85,542	18	16
Sitka spruce	39,322	20	16	71,054	37	36	31,532	38	36	141,908	30	27
Douglas fir	10,505	6	4	5,734	3	3	7,069	9	8	23,308	5	5
Other Conifers	2,514	1	—	4,486	2	2	1,754	2	3	8,754	2	1
Total: All Conifers	192,679	100	77	193,180	100	98	82,147	100	95	468,006	100	88
	Area Acres	Percentages (a) of Broad-leaved	(b) of all species	Area Acres	Percentages (a) of Broad-leaved	(b) of all species	Area Acres	Percentages (a) of Broad-leaved	(b) of all species	Area Acres	Percentages (a) of Broad-leaved	(b) of all species
Oak	33,978	58	13	1,652	42	1	2,521	58	3	38,151	57	7
Ash	3,954	7	2	315	8	—	337	8	1	4,606	7	1
Beech	15,436	27	6	675	18	—	956	21	1	17,067	25	3
Birch	1,870	3	1	952	24	1	212	5	—	3,034	5	1
Spanish chestnut	665	1	—	2	—	—	23	1	—	690	1	—
Sycamore	754	1	—	245	6	—	69	2	—	1,068	2	—
Elm	106	—	—	1	—	—	—	—	—	107	—	—
Other Broadleaved Trees	1,502	3	1	67	2	—	193	5	—	1,762	3	—
Total: All Broadleaved Trees	58,265	100	23	3,909	100	2	4,311	100	5	66,485	100	12
Grand Total: All Species	250,944	—	100	197,089	—	100	86,458	—	100	534,491	—	100

In Scotland, where the State High Forest is 98 per cent. coniferous, three species stand out as of major importance. These are Sitka spruce with 36 per cent; Scots pine with 23 per cent.; and Norway spruce with 21 per cent.

In Wales, with 95 per cent. of the State High Forest under conifers, Sitka spruce, with 36 per cent., is again the most important species, followed by Norway spruce with 21 per cent. Next in order come Japanese larch with 14 per cent., and Douglas fir with 8 per cent.; the proportions for both these species are substantially higher than those found in either England or Scotland. Scots pine, on the other hand, which is a major species in the other countries, occupies only 5 per cent. of the State High Forest of Wales.

When closely related coniferous species are grouped together, the English State High Forest is seen to consist of 37 per cent. pines, 27 per cent. spruces, and 9 per cent. larches. In Scotland, the spruces take the lead, with no less than 57 per cent., followed by the pines with 25 per cent., and the larches with 11 per cent. In Wales, where again the spruces cover 57 per cent., the larches, with 19 per cent., are the next most important group, and the pines occupy only 8 per cent. There are thus rather marked differences between the representation of the various species in the three countries.

Comparison with Private Woodlands—All Age-Classes

In any comparison of these figures with those for Private Woodlands, set out in Table 48 on page 88, it must be borne in mind that the State Forest figures relate, in the main, to the three youngest age-classes, from 1 to 30 years, whereas all age-classes are well represented in the figures for Private Woodlands.

But, taking the figures as they stand, the first comparison to be drawn is that the Private Woodlands contain substantially more ground under broadleaved trees, 62 per cent., than do the State Forests, with only 12 per cent. Consequently, the individual species of broadleaved trees that play an important part in the composition of privately-owned High Forest, are less well represented in the State Forests; while some individual species of conifers, which are important in the State Forests, do not comprise any substantial proportion of the Private Woodlands. These differences are best brought out by Table 76, which shows the fourteen most important species in Private and State High Forests, respectively, set out in order of magnitude.

Comparison with Private Woodlands—Age-Classes up to Thirty Years

Table 76 is a good general reflection of the situation as it existed when this Census was taken, but the comparison here between Private Woodlands and State Forests is not exact. As has already been mentioned, most of the planting in the State Forests has taken place within the last thirty years, whereas the bulk of the existing Private Woodlands dates from an earlier period. It is interesting, therefore, to restrict the comparison of species composition in Private Woodlands and in State Forests to the age-classes up to thirty years, as shown in Table 77 overleaf.

From Table 77 there emerges a striking resemblance; both in privately-owned woods and in State Forests the bulk of recent planting has been done with conifers.

The first seven conifers listed—namely Scots pine, Sitka spruce, Norway spruce, European larch, Japanese larch, Corsican pine, and Douglas fir—account for 90 per cent. of the age-classes under thirty years, in all the woodlands of Great Britain. These same seven conifers account for 82 per cent. of such

SPECIES OCCUPYING THE LARGEST HIGH FOREST AREAS IN PRIVATE WOODLANDS AND IN STATE FORESTS RESPECTIVELY—ALL AGE-CLASSES, GREAT BRITAIN

Table 76

Relative Order	Private Woodlands			State Forests		
	Species	Acres	*per cent.**	Species	Acres	*per cent.†*
1	Oak	393,344	*31*	Sitka spruce	141,908	*27*
2	Scots pine	247,691	*20*	Scots pine	116,461	*22*
3	Beech	144,698	*12*	Norway spruce	85,542	*16*
4	European larch	101,758	*8*	Oak	38,151	*7*
5	Ash	80,160	*6*	Corsican pine	32,004	*6*
6	Birch	64,112	*5*	European larch	31,145	*6*
7	Sycamore	55,085	*4*	Japanese larch	28,884	*5*
8	Norway spruce	47,611	*4*	Douglas fir	23,308	*5*
9	Japanese larch	26,174	*2*	Beech	17,067	*3*
10	Sitka spruce	25,131	*2*	Ash	4,606	*1*
11	Elm	20,026	*2*	Birch	3,034	*1*
12	Douglas fir	14,520	*1*	Sycamore	1,068	—
13	Spanish chestnut	9,374	*1*	Spanish chestnut	690	—
14	Corsican pine	6,499	—	Elm	107	—
—	—	1,236,183	*98*	—	523,975	*99*

Notes. * Percentage of all Privately-owned High Forest, *i.e.* 1,254,308 acres.
† Percentage of all State High Forest, *i.e.*, 534,491 acres.
All areas and percentages refer to the totals for pure and mixed stands, combined.

SPECIES OCCUPYING THE LARGEST HIGH FOREST AREAS IN ALL WOODLANDS, PRIVATE WOODLANDS, AND STATE FORESTS RESPECTIVELY. AGE-CLASSES UP TO THIRTY YEARS—GREAT BRITAIN

Table 77

Species	All Woodlands			Private Woodlands			State Forests		
	Order	Acres	*per cent.* (1)	**Order**	Acres	*per cent.* (2)	**Order**	Acres	*per cent.* (3)
Scots pine	**1**	190,035	*26*	**1**	88,779	*33*	**2**	101,256	*21*
Sitka spruce	**2**	161,528	*22*	**5**	21,453	*8*	**1**	140,075	*30*
Norway spruce	**3**	104,550	*14*	**3**	23,354	*9*	**3**	81,196	*17*
European larch	**4**	80,903	*12*	**2**	52,457	*19*	**5**	28,446	*6*
Japanese larch	**5**	50,987	*7*	**4**	22,555	*9*	**6**	28,432	*6*
Corsican pine	**6**	34,176	*5*	**12**	2,809	*1*	**4**	31,367	*7*
Douglas fir	**7**	30,944	*4*	**8**	8,713	*3*	**7**	22,231	*5*
Oak	**8**	17,995	*2*	**9**	5,047	*2*	**8**	12,948	*3*
Birch	**9**	16,877	*2*	**6**	15,390	*6*	**11**	1,487	—
Ash	**10**	13,081	*2*	**7**	9,886	*4*	**10**	3,195	*1*
Beech	**11**	10,715	*1*	**11**	3,667	*1*	**9**	7,048	*2*
Sycamore	**12**	4,741	*1*	**10**	3,862	*2*	**12**	879	—
Twelve species stated above	—	716,532	*98*	—	257,972	*97*	—	458,560	*98*
All other species....	—	17,865	*2*	—	7,957	*3*	—	9,908	*2*
Total all species	—	734,397	*100*	—	265,929	*100*	—	468,468	*100*

Notes. (1) Percentage of total area of High Forest up to 30 years of age, All Woodlands, *i.e.*, 734,397 acres.
(2) Percentage of total area of High Forest up to 30 years of age, Private Woodlands, *i.e.*, 265,929 acres.
(3) Percentage of total area of High Forest up to 30 years of age, State Forests, *i.e.*, 468,468 acres.

age-classes in Private Woodlands, and for 92 per cent. of the same age-classes in State Forests.

Another interesting comparison that emerges from this table is that, in the conifers, where the age-classes up to thirty years represent, with very few exceptions, the outcome of planting, the State Forests hold a larger area of every species except European larch. The Private Woodlands are seen to contain substantially more European larch, 52,457 acres, than do the State Forests, with 28,446 acres.

With the broadleaved trees, plantations in age-classes up to thirty years may be the outcome of planting, natural regeneration, or conversion from coppice. It will be seen that the State Forests hold the larger share of oak and beech, whereas the Private Woodlands have the greater proportion of the birch, the ash and the sycamore. The oak and the beech are known to have arisen mainly through planting, but nearly all the birch, and much of the ash and the sycamore, are the result of natural regeneration. If the birch be excluded, it will be seen that the combined areas of the other four major hardwoods—oak, ash, beech and sycamore—are very similar for both Private and State woodlands; the State Forest area of 24,070 acres slightly exceeds the Private Woodland total of 22,462 acres.

Species Distribution by Countries

Mainly Coniferous High Forest

DISTRIBUTION OF THE PRINCIPAL CONIFEROUS SPECIES, BY COUNTRIES—STATE FORESTS

Table 78

Principal Species	England		Scotland		Wales	
	Acres	%(1)	Acres	%(1)	Acres	%(1)
Scots pine	65,736	56	46,111	40	4,614	4
Corsican pine	26,225	82	3,210	10	2,569	8
Lodgepole pine	732	24	1,870	60	481	16
European larch	13,406	43	13,179	42	4,560	15
Japanese larch	8,849	31	7,844	27	12,191	42
Norway spruce	26,122	31	41,562	48	17,858	21
Sitka spruce	39,322	28	71,054	50	31,532	22
Douglas fir	10,505	45	5,734	25	7,069	30
Undifferentiated	1,782	32	2,616	46	1,273	22
Total	192,679	41	193,180	41	82,147	18

Notes. (1) Percentage of the total area of each species found in the country concerned
(2) Total areas for each species, for Great Britain, are given in Table 80.

Table 78 analyses the proportions of the total State High Forest area of coniferous species found in each country.

England has a larger share, 56 per cent., of the Scots pine than any other country, and also an exceptionally large share, 82 per cent., of the Corsican pine. These figures reflect the extensive planting of pines on heathland areas, especially in the eastern and southern districts; Thetford Chase (Norfolk and Suffolk), Clipstone (Derby and Notts.), Bramshill (Hants. and Berks.) and Ringwood (Hants. and Dorset), are examples of large State Forests in which the pines predominate. England's share of the spruces is a rather small one, relative to the total area of its State coniferous High Forest.

Scotland has a high proportion, 60 per cent., of the lodgepole pine, a species planted mainly on soils of low fertility on exposed sites in areas of high rainfall, particularly in the Highlands. The proportion of the Corsican pine, 10 per cent., found in Scotland, is remarkably low. Scotland has also rather small shares in the total area of Japanese larch (27 per cent.), and Douglas fir (25 per cent.). The relatively large Scottish share of Norway spruce (48 per cent.), and Sitka spruce (50 per cent.), should be noted.

Wales has, for its area, a remarkably high proportion, 42 per cent., of the State Forest Japanese larch, while the proportion of the Douglas fir, 30 per cent., is also high. On the other hand, Scots and Corsican pine are poorly represented.

Mainly Broadleaved High Forest

DISTRIBUTION OF THE PRINCIPAL BROADLEAVED SPECIES, BY COUNTRIES—STATE FORESTS

Table 79

Principal Species	England		Scotland		Wales	
	Acres	%(1)	Acres	%(1)	Acres	%(1)
Oak	33,978	89	1,652	4	2,521	7
Ash	3,954	86	315	7	337	7
Beech	15,436	91	675	4	956	5
Birch	1,870	62	952	31	212	7
Spanish chestnut	665	96	2	—	23	4
Sycamore	754	71	245	22	69	7
Alder	227	68	20	6	86	26
Poplar	1,105	93	10	1	75	6
Undifferentiated	276	80	38	11	32	9
Total	58,265	87	3,909	6	4,311	7

Notes. (1) Percentage of the total area of each species found in the country concerned.
(2) Total areas of each species, for Great Britain, are given in Table 81.

Table 79 is an analysis for the broadleaved species, and brings out the fact that the bulk of all such species is in England. England, in fact, holds 80 per cent. or more of all species except birch, sycamore and alder. Scotland has 31 per cent. of the birch, and 22 per cent. of the sycamore. Wales has 26 per cent. of the alder. Scotland's share of the broadleaved species is, in general, a very small one; this shows that few opportunities for the State planting of broadleaved trees have arisen there. Wales, despite its smaller forest area, actually holds slightly more broadleaved High Forest than does Scotland.

Pure and Elite Stands of High Forest

The definition of "pure" Stands, as represented in Tables 80 and 81 opposite, has already been discussed under All Woodlands on page 61; but briefly, a pure Stand is one in which 90 per cent. or more of the crop consists of a single tree species.

Where State Coniferous High Forest is concerned (Table 80), 313,922 acres, or 67 per cent. of the whole, occur in pure Stands; this is a rather higher proportion than that (52 per cent.) found in privately-owned Coniferous High Forest. (See Table 51, page 91.)

SPECIES COMPOSITION OF MAINLY CONIFEROUS HIGH FOREST, WITH DETAILS OF PURE AND ELITE STANDS—STATE FORESTS, GREAT BRITAIN

Table 80

Principal Species	Total Area			In Pure Stands		
				Total Area		Elite
	Acres	%(1)	%(2)	Acres	%(3)	Acres
Scots pine	116,461	25	22	78,192	67	55
Corsican pine	32,004	7	6	22,939	72	75
Lodgepole pine	3,083	1	1	1,603	52	—
European larch	31,145	7	6	18,063	58	13
Japanese larch	28,884	6	5	22,778	79	26
Norway spruce	85,542	18	16	55,486	65	24
Sitka spruce	141,908	30	27	95,850	68	70
Douglas fir	23,308	5	4	15,567	67	12
Undifferentiated	5,671	1	1	3,444	61	10
Total	468,006	100	88	313,922	67	285

Notes. (1) Percentage of Mainly Coniferous High Forest.
(2) Percentage of All High Forest.
(3) Percentage of area for each individual tree species or category.

SPECIES COMPOSITION OF MAINLY BROADLEAVED HIGH FOREST, WITH DETAILS OF PURE AND ELITE STANDS—STATE FORESTS, GREAT BRITAIN

Table 81

Principal Species	Total Area			In Pure Stands		
				Total Area		Elite
	Acres	%(1)	%(2)	Acres	%(3)	Acres
Oak	38,151	57	7	22,562	59	48
Ash	4,606	7	1	1,803	39	3
Beech	17,067	25	3	5,301	31	33
Birch	3,034	5	1	1,771	59	—
Spanish chestnut	690	1	—	425	62	3
Sycamore	1,068	2	—	329	31	—
Alder	333	—	—	161	48	—
Poplar	1,190	2	—	786	66	—
Undifferentiated	346	1	—	133	38	—
Total	66,485	100	12	33,271	50	87

Notes. (1) Percentage of Mainly Broadleaved High Forest.
(2) Percentage of All High Forest.
(3) Percentage of area for each individual species or category.

In the State Broadleaved High Forest (Table 81), 33,271 acres, or 50 per cent. of the whole, is in pure Stands. This proportion, again, is higher than that (31 per cent.) found in privately-owned broadleaved High Forest. (See Table 52, page 92.)

The existence of a greater proportion of pure crops in the State High Forest, than in corresponding privately-owned areas, is a constant feature for nearly all

species, and appears to represent a definite difference in management. Only one species, beech, has the same degree of purity (31 per cent.) in both State and Private Woodlands, and here it is known that much of the State area consists of young crops being established with the aid of conifer nurses, with the formation of pure, or nearly pure, beech crops as the objective.

Of the individual conifers in State High Forest, Japanese larch with 79 per cent., and Corsican pine with 72 per cent., show exceptionally high proportions of pure Stands. The Japanese larch is usually planted pure, since few other trees can keep pace with its rapid growth in early youth. The Corsican pine is often planted pure on sand dunes or other sandy soils, where few other trees could be expected to grow successfully. On the other hand, lodgepole pine, with only 52 per cent. in pure Stands, is frequently planted in mixture with spruces, as a pioneer or nurse species to assist their establishment on difficult sites.

Among the individual broadleaved trees, poplar, with 66 per cent. in pure Stands, stands out as a species that is usually grown on its own. The low proportion of 31 per cent. pure, for both beech and sycamore, reflects the general practice of raising these two species with nurse crops.

Elite Stands

The areas of elite Stands, that is Stands of outstanding quality as regards straightness of stem and crown development, are given in Tables 78 and 79, but are seen to be quite small, both actually and in relation to the total area of State High Forest. A very high proportion of these State Forests represents plantations in the youngest age-classes, and few Stands under 30 years of age give sufficient indication of their probable development to enable them to be classed as Elite. Nevertheless, elite Stands of all the main conifers except lodgepole pine (a species virtually confined to the under thirty year age-classes), were found in the State Forests, which also include a few elite Stands of oak, beech, ash and Spanish chestnut.

(iii) Principal Species in Relation to Age-Classes

PRINCIPAL SPECIES IN HIGH FOREST IN RELATION TO AGE-CLASSES—STATE FORESTS, GREAT BRITAIN

Table 82

Age-Class in Years	Principal Species in Order of Area					
	First	%(1)	Second	%(1)	Third	%(1)
1 to 10	Sitka spruce	39	Norway spruce	22	Scots pine	15
11 to 20	Sitka spruce	28	Scots pine	21	Norway spruce	16
21 to 30	Scots pine	38	Sitka spruce	12	Douglas fir	12
Other	Oak	38	Scots pine	23	Beech	15

Note. (1) Percentage of total High Forest area within the age-class concerned.

Table 82 is a simplified summary of the classification of High Forest by principal species and age-classes, and provides a comparison with the similar details for Private Woodlands which have already been examined in Table 53, page 93.

In the State Forests the most widely used species during the last thirty years has been Sitka spruce. Its importance has increased steadily from

12 per cent. in the 21-30 age-class when it took second place, to 28 per cent. in the 11-20 age-class and no less than 39 per cent. in the youngest age-class of all. Norway spruce has also increased in importance. In the 11-20 age-class it occupied third place with 16 per cent., while in the 1-10 year age-class it was second in order of importance with 22 per cent. of the total.

Scots pine on the other hand, though still a leading component of our forests, has diminished in relative importance over the last 30 years. In the 21-30 age-class it was the most widely-used species (38 per cent.); in the next decade, the second most widely used; in the last decade it took only third place.

Douglas fir is a much more prominent component of the 21-30 year age-class than of the younger plantations. In recent years it fell out of favour for planting to some extent, owing to wind damage and the attacks of the *Adelges* insects.

(iv) General Condition of the High Forest Crops

The assessment of the general condition of High Forest, in terms of stocking and tree form, has been discussed under Private Woodlands on page 93.

Stocking

Table 83 gives an analysis of stocking of State Forests by principal species and age-classes. In this case, Satisfactory stocking is taken to include over-stocked Stands, since only 697 acres of these were recorded. The percentages in each category refer to the total areas given in Table 73, page 119, for Mainly Coniferous and Mainly Broadleaved State High Forest.

STOCKING OF HIGH FOREST IN STATE FORESTS, BY SPECIES AND AGE-CLASSES—GREAT BRITAIN

Table 83

Principal Species	Percentage of Satisfactory Stocking				
	Age-Class in Years				
	Up to 30				Over 30 and Uneven
	1 to 10	11 to 20	21 to 30	Total	
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Scots pine	93	96	96	96	67
Corsican pine	92	91	98	93	96
Lodgepole pine	87	92	64	89	69
European larch	95	89	83	89	87
Japanese larch	95	97	97	97	89
Norway spruce	97	94	91	95	83
Sitka spruce	96	93	92	95	93
Douglas fir	85	96	94	94	85
Undifferentiated	93	89	94	92	53
Total Conifers	95	94	94	94	76
Oak	70	70	77	70	84
Ash	61	50	72	59	65
Beech	85	94	86	89	83
Birch	70	75	87	76	78
Spanish chestnut	100	89	81	89	88
Sycamore	68	94	72	87	51
Alder	84	94	27	74	8
Poplar	70	63	71	69	10
Undifferentiated	78	73	62	75	60
Total Broadleaves	75	74	76	75	83

Table 83 shows that the general level of stocking in the coniferous areas of State High Forest is remarkably high, particularly in the age-classes up to 30 years of age which have been established by the Forestry Commission. In this age-range, the general average is 94 per cent. Satisfactorily stocked, and no single species shows less than 89 per cent. Satisfactory. In view of the many difficulties that attend the first establishment of coniferous crops on new ground, the absence of any considerable proportion of Poor or Bad stocking, is an encouraging feature. The figures are, in fact, slightly better than those found in Private Woodlands (Table 55, page 94).

The general level of stocking in young Broadleaved High Forest in State Forests, is appreciably lower than that for conifers, averaging only 75 per cent. Satisfactory; but even so it is somewhat higher than the corresponding figure for Private Woodlands. Wide differences are apparent between species and age-classes, but this survey does not provide any data as to causes. Beech and Spanish chestnut show relatively high levels of stocking, but oak and ash fall below the average.

Tree Form

The criteria whereby tree form was assessed are set out in Appendix II, page 179. A simple analysis of tree form by species, for the State High Forest of Great Britain as a whole, is set out in Table 84 below. This analysis is confined to pure Stands, and the proportion regarded as Satisfactory includes the few Elite Stands.

TREE FORM OF HIGH FOREST IN STATE FORESTS, BY SPECIES AND AGE-CLASSES—GREAT BRITAIN

Table 84

Species: Pure Stands Only	Percentage of Satisfactory Tree Form				
	Age-Class in Years				
	Up to 30				Over 30 and Uneven
	1 to 10	11 to 20	21 to 30	Total	
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Scots pine	96	95	96	96	84
Corsican pine	92	92	99	94	100
Lodgepole pine	97	96	92	96	99
European larch	97	92	88	92	97
Japanese larch	98	98	99	98	100
Norway spruce	98	98	97	98	100
Sitka spruce	97	94	95	96	97
Douglas fir	84	96	97	95	99
Undifferentiated	96	96	94	96	99
Total Conifers	97	95	96	96	90
Oak	92	94	98	93	92
Ash	86	69	96	80	77
Beech	99	98	99	99	93
Birch	87	92	90	92	56
Spanish chestnut	96	86	91	88	90
Sycamore	100	90	88	92	97
Alder	91	97	80	90	97
Poplar	89	50	67	62	100
Undifferentiated	95	97	92	96	99
Total Broadleaves	94	89	93	92	90

Taking coniferous species first, the proportion of Stands of Satisfactory tree form is seen to be remarkably high for all species under 30 years, averaging 96 per cent. With the exception of Scots pine, all species show a very high proportion of Satisfactory tree form, 97 per cent. or more, in the older Stands also. But the Scots pine aged over 30 years (or Uneven-aged) shows the relatively low figure of 84 per cent. Satisfactory, and depresses the general average for this age group to 90 per cent.

These figures may be compared with the similar data for Private Woodlands in Table 57, page 97. It will be seen that, on the whole, the State Coniferous High Forest has a slightly higher proportion of Stands of Satisfactory (including Elite) tree form.

When the Broadleaved species are considered, it is seen that the proportion of stands of Satisfactory tree form is high. Most species in the age-classes up to 30 years average at least 92 per cent. Species that fall significantly below this proportion are ash, with 80 per cent., and poplar, with only 62 per cent. In older Stands the general level is still good, at 90 per cent., but variations between species become more pronounced. Ash, at 77 per cent., is again poor, but the small area of poplar is 100 per cent. Satisfactory. The low figure of 56 per cent. recorded as Satisfactory for birch reflects the general character of most of the older birch High Forest, which is remarkable for its unsatisfactory tree form.

A comparison with similar data for privately-owned broadleaved High Forest in Table 57, shows that the tree form in the State Forests is substantially better for all age-classes.

CHAPTER 14

COPPICE, SCRUB, DEVASTATED AND FELLED AREAS IN STATE FORESTS

Coppice-with-Standards and Simple Coppice

Forestry Commission Woodlands contain a very small proportion of the two Coppice sub-types. The classification of these by the principal species of the Coppice is given in Table 85. By comparison with Private Woodlands the total is made up of a much smaller proportion classed as "Mixed and Other", and a much larger proportion of chestnut coppice. The proportion grown with standards is (except in the case of oak) considerably less than in Private Woodlands; it is lowest in the chestnut coppice.

Taken as a whole, these figures reflect a policy of retaining only the better Stands under the Coppice system, and of converting all these to simple Coppice, which can be more easily managed than can Coppice-with-Standards. Of the total still classed as Coppice-with-Standards, 65 per cent. is Satisfactorily stocked; 90 per cent. contains oak as the principal species of standards.

PRINCIPAL SPECIES OF COPPICE, BY SUB-TYPES, IN STATE FORESTS—GREAT BRITAIN

Table 85

Sub-type	Principal Species				Total Area
	Mainly Chestnut	Mainly Hazel	Mainly Oak	Mixed and other	
	Acres	Acres	Acres	Acres	Acres
With standards	510	542	299	726	2,077
Per cent.(1)	15	23	15	28	20
Coppice only	2,798	1,804	1,712	1,829	8,143
Per cent.(1)	85	77	85	72	80
Total	3,308	2,346	2,011	2,555	10,220

Note. (1) Percentage of total area of each species (or description).

Details of the areas of All Coppice, Coppice-with-Standards, and Simple Coppice in State Forests are given for each county in Appendix VI, Tables K, L and M, pages 212 to 217.

Scrub

The small area of Scrub occurring in State Forests has nearly all been acquired from Private ownership and is awaiting re-stocking. Examples can be quoted from new forest units established just prior to the Census survey, as follows: Andover (Hampshire) 258 acres of hazel and mixed Scrub, formerly Coppice; Cotgrave (Nottingham) 157 acres of mixed and undifferentiated broadleaved Scrub, including hawthorn on derelict agricultural land; Farigaig (Inverness) 995 acres of birch Scrub, formerly grazed; Glendaruel and Strath Lachlan (Argyll) 618 acres of oak and birch Scrub, formerly coppiced and partly grazed; and Derry Ormond (Cardigan) 200 acres of oak Scrub, formerly Coppice. A few small Stands of Scrub are retained for amenity and other reasons, notably in the New Forest (Hampshire) where 331 acres occur on commonable land outside the statutory enclosures, and in the Queen's Forest (Inverness) where 418 acres of Scots pine Scrub represent remnants of the old Caledonian forest growing at a high elevation.

A classification of the 24,696 acres of Scrub by principal species and by countries is given in Table 86.

Most of the coniferous Scrub consists of Scots pine and represents semi-natural growth and some failed plantations on difficult sites, principally in Scotland. The proportions of birch, oak and hazel in the broadleaved Scrub resemble those for similar Scrub in the Private Woodlands, discussed in Chapter 10, page 104.

Only 78 per cent. of the Scrub in State Forests was classed as "Suitable for economic management", compared with an average of 97 per cent. for all other Types. This suggests that much of the Scrub is found on sites that are inherently poor for tree growth or accessible only with difficulty.

The area of Scrub in State Forests is given for each county in Appendix VI, Table N, page 218.

SPECIES COMPOSITION OF SCRUB, BY COUNTRIES—STATE FORESTS
Table 86

Principal Species	England	Scotland	Wales	Great Britain	
	Acres	Acres	Acres	Acres	%(1)
Scots pine	681	3,108	—	3,789	16
Undifferentiated	524	1,228	148	1,900	7
Total Coniferous	1,205	4,336	148	5,689	23
Oak	1,075	1,169	1,454	3,698	15
Birch	3,772	6,284	262	10,318	42
Hazel	908	493	159	1,560	6
Undifferentiated	2,622	700	109	3,431	14
Total Broadleaved	8,377	8,646	1,984	19,007	77
Grand Total	9,582	12,982	2,132	24,696	100

Note. (1) Percentage of total area of Scrub.

Devastated Areas

A classification by principal species and by countries of the 11,609 acres recorded as Devastated is given in Table 87. Compared with similar figures for Private Woodlands (Chapter 10, page 107) the larger proportion of conifers in the Forestry Commission total shows the susceptibility of young plantations to damage by fire. Records show that in the five years immediately preceding the Census survey, a total area of 4,896 acres was burnt in State Forests, and examples can be given in Woolmer Forest (Hampshire) with 354 acres, and Gwydyr Forest (Caernarvon) with 209 acres, both classed as Devastated from this cause. On the other hand, the Queen's Forest (Inverness) with remnants of open Caledonian pine forest totalling 119 acres, and a newly established unit at Shalfleet (Isle of Wight) containing 108 acres of scattered oak, can be quoted as examples of areas which were already "Devastated" at the time of acquisition.

SPECIES COMPOSITION OF DEVASTATED AREAS, BY COUNTRIES—STATE FORESTS
Table 87

Principal Species	England	Scotland	Wales	Great Britain	
	Acres	Acres	Acres	Acres	%(1)
Scots pine	1,673	3,253	42	4,968	43
European larch	1,027	134	5	1,166	10
Norway spruce	91	988	35	1,114	10
Undifferentiated	328	1,665	131	2,124	18
Total Coniferous	3,119	6,040	213	9,372	81
Oak	1,011	106	52	1,169	10
Undifferentiated	979	89	—	1,068	9
Total Broadleaved	1,990	195	52	2,237	19
Grand Total	5,109	6,235	265	11,609	100

Note. (1) Percentage of total Devastated area.

Details of the areas classed as Devastated in State Forests are given by counties in Appendix VI, Table O, page 220.

Felled Areas

Particulars of the 42,015 acres recorded as Felled are shown in Table 88 by date of felling and by countries.

FELLED AREAS BY SUB-TYPES AND COUNTRIES—STATE FORESTS

Table 88

Sub-type	England			Scotland			Wales		
	Acres	%(1)	%(2)	Acres	%(1)	%(2)	Acres	%(1)	%(2)
Before Sept., 1939	726	6	6	12,360	47	92	313	15	2
Since Sept., 1939	12,663	94	45	14,125	53	49	1,828	85	6
Total	13,389	100	32	26,485	100	63	2,141	100	5

Notes. (1) Percentage of total Felled area of the country concerned.
(2) Percentage of the total area of the sub-type.

Felled areas which have been acquired for re-stocking occur principally in the north-eastern Highlands of Scotland.

The following examples, with the respective areas recorded as Felled, nearly all represent newly formed units: Pitfichie (Aberdeen) 3,166 acres; Speymouth (Moray) 2,424 acres; Tilliefoure (Aberdeen) 1,537 acres; Blackhall (Kincardine) 1,318 acres; Ardross (Ross-shire) 1,288 acres; Alltcailleach (Aberdeen) 1,267 acres; Kilcoy (Ross-shire) 1,255 acres; and Strath Dearn (Inverness) 995 acres.

In England, war fellings made in the former Crown woods, and not replaced at the time of the Census survey, accounted for a total of 4,840 acres, of which 2,676 acres were in the Forest of Dean (Gloucester), and 1,266 acres were in the New Forest (Hampshire). War-time fellings made in some of the earlier established of the Forestry Commissioners' own plantations, and still awaiting replacement, included 1,083 acres at Thetford Chase (Norfolk); 646 acres at Benmore Forest (Argyll); and 418 acres at Rheola Forest (Glamorgan).

Details of the total areas Felled, and those felled before and since 1st September, 1939, in State Forests are given for each county in Appendix VI, Tables P, Q and R, respectively, pages 222 to 227.

PART III

VOLUME AND INCREMENT SURVEYS

CHAPTER 15

SURVEY OF STANDING VOLUME OF TIMBER

The survey of the woodlands of Great Britain by area, which has been described in Part II, was supplemented, in 1949, by a volume survey to enable estimates to be made of the volume of timber standing in the woods. The information required was the average volume per acre, and also the total volume, both being classified by species, age-classes, and forest Types. These figures were required, not only for Great Britain as a whole, but also for England, Scotland and Wales separately. As in the case of the area survey, separate data had to be collected for the Private Woodlands and the State Forests. No attempt was made, however, to estimate the volumes of individual woods or forests, or to make estimates on a county basis. For administrative reasons the volume survey was carried out after the main area survey had been completed: but adjustments were made for fellings which had taken place in the interval, and the volume estimates, though giving the 1949 volumes, therefore relate to the corresponding areas recorded in the 1947 area survey. As in that survey, the estimates are limited to woods of five acres or over in extent. They apply to only two forest Types, namely High Forest and the Standard trees of Coppice-with-Standards.

The volumes were computed according to the quarter girth or Hoppus system of measurement, which is customary in Great Britain. They exclude limbs and branch wood, short crooks, all material less than $2\frac{1}{2}$ inches in quarter-girth (3 inches diameter) and all stems under 10 feet in length. In all cases, the volume stated includes the bark.

Method of Survey

Somewhat different procedures were followed for the Private Woodlands and for the State Forests, but the figures for both forms of ownership were compiled on a comparative basis.

In the Private Woodlands, the estimates of volume were based on stratified random samples. Random sampling was adequate for the purpose required, and, for two reasons, was actually capable of giving a more accurate overall result than could have been obtained by a complete enumeration of all the stands of timber concerned. First, it could be completed in the shortest possible time, before gains through growth and losses through felling had much opportunity of upsetting the calculations; and second, it enabled factors of personal bias to be eliminated to the greatest possible extent.

In the State Forests, sampling was not directly applied to the determination of volumes. The methods actually used are described in a subsequent paragraph.

The actual operations of sampling in the Private Woodlands, which were governed by the precise Instructions for Survey set out in Appendices I and II, on pages 165 to 183, allowed no scope for personal choice. Before starting, surveyors were thoroughly trained in the set procedure. A trial survey, in which a series of plots was measured independently by two field parties, was carried out, and it was ascertained that this set procedure was satisfactory.

The sampling unit was the one-tenth acre circular plot, one plot of this size being chosen, located and sampled for every 200 acres of woodland. The

sampling fraction was therefore 1/2,000. Only Coniferous High Forest, Broadleaved High Forest, Mixed High Forest and Standard trees in Coppice-with-Standards were sampled. Any volumes (whether of timber trees or coppice growth, etc.) in Coppice, Scrub and Devastated Woodlands were disregarded. The sample was taken systematically from a list, obtained during the Area Survey, of all the Stands enumerated, classified by counties, Types, species and age-classes, taking every 200th acre from a randomly selected starting point. (See Appendix III, page 183.) Although the sample was obtained systematically from the list, there is no reason why it should not be regarded as random on the ground; the position of the Stand on the ground did not determine its position on the list. By this method of sampling, the chances of a Stand being sampled were strictly proportional to its area, and no Stand of less than 200 acres could have more than one plot.

Once the Stand had been obtained from the list, the appropriate Ordnance Survey sheet was referred to, and the actual situation of the Stand thereon was ascertained. A specially prepared celluloid grid was then applied to the map of the Stand, and this enabled the centre of the requisite sample plot (or plots) to be determined, on a strictly random basis. A special technique was employed for plots which fell on the edges of Stands. As explained in Appendix II.2.4, page 181, where the plot centre was .7 or more of the radius, from the edge of the Stand, it was moved inwards to the full radius; where it was less than .7 of the radius, from the edge, two adjacent semi-circular 1/20th acre plots were laid out along the edge of the Stand.†

The field parties who carried out the Volume Sampling Survey first located these predetermined plots in the Woodlands, and demarcated their boundaries. They then enumerated all the trees within each plot, noting their species, and following the detailed procedure given in Appendices I and II, pages 165 to 183. The next step was to select an appropriate number of sample trees, and to measure their breast-height girth and height. The volumes of these sample trees were not, however, measured directly in the woodlands, but volumes appropriate to their recorded measurements were obtained from general volume tables which had been specially prepared for this survey.

In the State Forests, as already mentioned, no sampling was carried out. The volumes of even-aged coniferous High Forest Stands up to thirty years of age (which comprised the greater part of the area concerned) were obtained by applying the data contained in *Forestry Commission Yield Tables** to the areas recorded in the main Area Survey. The volumes of all those other kinds of woodland in the State Forests, that fell to be included in this Volume Survey, were obtained by another procedure. This was applied to coniferous High Forest Stands over thirty years of age, or uneven-aged; to broadleaved and mixed High Forest of all ages; and to standard trees in Coppice-with-Standards. The method was to apply, to the areas ascertained in the Area Survey, the mean volumes per acre for the appropriate classes of woodland, as calculated for the Private Woodlands.

In practice, the 1 to 10 year age-class was ignored, as having no measurable volume.

A potential source of error arises from the use ot general volume tables in computing many of the results. These tables were all representative of Great Britain as a whole, but some, for conifers as well as for broadleaved species,

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* *Forestry Commission Yield Tables for Scots Pine and other Conifers.* H.M.S.O. 1*s.* 3*d.*

† For the usual one-tenth acre plot, .7 of the radius was taken as 26 feet.

were poorly supported by actual measurements in certain size classes. There are no data available at present to show whether this has introduced a bias, but if it has, corrections can easily be made as and when revised volume tables become available.

Another potential source of error is one inherent to all sampling, and concerns the extent to which each sample is representative of the population from which it is taken. In this case it was possible to estimate the probable limits of the sampling errors by the standard methods applicable to stratified random sampling. The incidence of the sampling plots was stratified by counties, Types, principal species and age-classes or sub-types, but was strictly at random within these groups. The probable sampling errors were calculated from the squared deviations of the individual plot volumes from the mean volume per plot in each group. In all groups there was a wide variation of individual plot volumes, ranging from zero in some thicket crops and in blanks, to volumes of more than twice or even three times the mean in some particularly vigorous or overstocked Stands. With a standard deviation varying between 0.6 and 0.7 of the mean volume, there were few county, principal species, age-class or sub-type groups with a sufficiently large number of plots to give precise estimates of the mean volume per acre, and so of their respective total volumes; but estimates of adequate precision were obtainable for Types, and within countries, and a satisfactorily precise global estimate was obtained for Great Britain as a whole.

This was calculated to have a standard sampling error of less than one per cent.; or, in other words, there is a probability of twenty to one that the actual overall error is not more than two per cent.

It will be appreciated that the validity of the total volumes in each group must rest upon the accuracy of the classification by area to which the mean volumes per plot (or per acre) are transposed. The conclusion has been reached that errors of measurement, computation and classification should not between them affect the results of the volume sampling survey by more than ten per cent. Sampling errors, varying inversely with the size of the group sampled, have to be allowed for in addition to this, and may be either cumulative or partly compensatory. Details are given in two tables which follow (Tables 93 and 97) and indicate the relative variations of accuracy which are likely to occur from the latter source alone.

Assortments of Timber

The main assessments of volumes were amplified, in the case of Private Woodlands, by breaking them down into three assortments or classes of produce as set out below. The object of this classification was that "Timber" would consist entirely of saw timber; "Seconds" would contain inferior or small saw timber and workable wood, with, in conifers, a proportion of pitwood; and "Poles" would consist entirely of pitwood, or of similar material unsuitable for sawing.

Timber. In the case of conifers, "Timber" comprised all material with a top quarter-girth of 7 inches (=9 inches diameter) combined with a length of at least 10 feet. In practice this included all trees with a breast-height quarter-girth of over 8 inches, and within this girth class the proportion of total volume to be recorded as timber was taken direct from the appropriate volume tables.

In broadleaved species, "Timber" comprised the butt or first length of all trees over 8 inches quarter-girth at breast height, computed to a minimum of 10 feet, or measured to the first stop, the throat of the fork, or the spring of the crown, as the case might be.

Seconds, or second lengths, comprised the upper portion of the main stem in all trees which contained "Timber", computed to a top of $2\frac{1}{2}$ inches quarter-girth (3 inches diameter) in conifers, and 5 inches quarter-girth (6 inches diameter) in broadleaved species. In the case of conifers, the proportion of total volume to be recorded as "Seconds" was taken direct from the appropriate volume tables. In broadleaved species, the volume of "Seconds" was calculated as a fixed average proportion at one-third of the volume of the first length, but included any short butts, otherwise measurable, as "Timber", which "stopped" below 10 feet and were over 6 feet in length.

Poles, in both conifers and broadleaved species, comprised all trees from 8 inches down to $2\frac{1}{2}$ inches quarter-girth at breast height, which had a minimum straight length of 10 feet.

Total Volume

The survey carried out by the methods outlined above showed that the total volume contained in High Forest and in the Standard trees of Coppice-with-Standards, occurring in woods with a total area of five acres or over, at 30th September, 1949, was 2,658.4 million hoppus feet, over bark measure. Table 89 below gives details by ownership, countries and forest Types.

ESTIMATE OF VOLUME BY PRINCIPAL TYPES OF WOODLAND

Table 89 — At 30th September, 1949 — Millions of Hoppus Feet Quarter-girth Measure, Over Bark

Type	Private Woodlands				State Forests				All Woodlands			
	England	Scotland	Wales	Great Britain	England	Scotland	Wales	Great Britain	England	Scotland	Wales	Great Britain
High Forest												
Coniferous	162.6	518.3	23.6	704.5	127.1	108.0	33.0	268.1	289.7	626.3	56.6	972.6
Mixed	154.9	88.7	17.6	261.2	18.9	2.1	2.2	23.2	173.8	90.8	19.8	284.4
Broadleaved	841.9	214.9	106.4	1,163.2	78.2	3.4	3.8	85.4	920.1	218.3	110.2	1,248.6
Total	1,159.4	821.9	147.6	2,128.9	224.2	113.5	39.0	376.7	1,383.6	935.4	186.6	2,505.6
Coppice-with-Standards (Standard trees only)	150.3	—	1.1	151.4	1.3	—	0.1	1.4	151.6	—	1.2	152.8
Grand Total	1,309.7	821.9	148.7	2,280.3	225.5	113.5	39.1	378.1	1,535.2	935.4	187.8	2,658.4

Table 89 shows firstly that, out of a total volume of 2,658.4 million hoppus feet, 2,280.3 million are in private ownership, and only 378.1 million in State Forests. This low proportion, only 14 per cent., under State ownership, is a reflection of both the relatively small area of land in the State Forests, and their recent establishment. Large areas of plantations established by the Forestry Commissioners since 1919, are still too young to contain measurable volumes of timber; only the former Crown woods, such as the New Forest and Dean Forest, contain substantial volumes of mature timber in trees of the older age-classes. The present standing volume cannot, therefore, be taken as any measure of the potential or relative productivity of the State Forests.

Turning to the columns under the main heading of "All Woodlands", it will be seen that England and Wales together have the larger share of all timber volumes in Broadleaved and Mixed High Forest, and in the Standard trees of Coppice-with-Standards. Scotland, however, has the larger timber volume in the

Coniferous High Forest. This latter comparison holds good when the Private Woodlands are considered separately; but in the State Forests, Scotland's share of the volume of timber in coniferous High Forest is somewhat less than that of England.

Taking Great Britain as a whole and considering all the High Forest woodlands, both Private and State, it appears that the greater part of the volume is standing in Broadleaved High Forest, which holds 1,248.6 million hoppus feet compared with 972.6 million in Coniferous High Forest.

The further analysis of total volumes was carried out separately for Private Woodlands and for State Forests as set out below.

Analysis of Volume in Private Woodlands

Volume by Species and Countries

An analysis of the estimated volume by species and by countries appears in Table 90, and is a computation of the total volume of every species which was sufficiently well represented in the volume sample to give a reasonably precise result.

TIMBER VOLUME IN HIGH FOREST AND STANDARD TREES OF COPPICE-WITH-STANDARDS, BY SPECIES AND COUNTRIES—PRIVATE WOODLANDS

Table 90 At 30th September, 1949 Millions of hoppus feet over bark

Species	England	Scotland	Wales	Great Britain
Scots pine	99.7	336.1	4.0	439.8
European larch	80.0	84.7	11.6	176.3
Norway spruce	31.6	67.4	5.4	104.4
Undifferentiated Conifers	54.6	76.4	14.2	145.2
Total coniferous	265.9	564.6	35.2	865.7
Oak	514.7	81.3	55.6	651.6
Ash	89.4	14.8	9.8	114.0
Beech	199.5	97.0	16.4	312.9
Birch	40.5	6.6	5.3	52.4
Sycamore	66.4	25.5	12.2	104.1
Elm	46.7	24.7	6.9	78.3
Undifferentiated Broad-leaves	86.6	7.4	7.3	101.3
Total broadleaved	1,043.8	257.3	113.5	1,414.6
Grand Total	1,309.7	821.9	148.7	2,280.3

Table 90 shows that the species with the largest volume of standing timber is oak, with 651.6 million hoppus feet; followed by Scots pine, with 439.8 million hoppus feet, and beech, with 312.9 million hoppus feet, and then by European larch, ash, Norway spruce, sycamore, elm and birch. In general, the species with the greatest timber volume are those that occupy the largest areas, as set out in Table 48, page 88. Birch, however, has a relatively low volume, only 52.4 million hoppus feet, largely owing to the fact that it normally carries less timber per acre than do other species.

When the figures for individual countries are examined, it is seen that in England the order for priority of species, as having the largest volumes, is: oak, beech, Scots pine, ash, European larch, sycamore, elm, birch and Norway spruce.

In Scotland, the order is quite different, namely: Scots pine, beech, European larch, oak, Norway spruce, sycamore, elm, ash and birch.

Yet another pattern is evident in Wales, where the order of relative importance is: oak, beech, sycamore, European larch, ash, elm, Norway spruce, birch and Scots pine.

The analysis by species shows that the bulk of nearly all the coniferous species is in Scotland; only in the case of European larch does the total for England and Wales exceed the Scottish figure. On the other hand, the bulk of all the broadleaved species is in England and Wales.

Volume by Assortments—Private Woodlands

An analysis of the volume of timber in Private Woodlands, by assortments and countries, is given in Table 91 below. A definition of the assortments used appears on page 137.

TIMBER VOLUME IN HIGH FOREST AND STANDARD TREES OF COPPICE-WITH-STANDARDS, BY ASSORTMENTS AND COUNTRIES—PRIVATE WOODLANDS

Table 91 At 30th September, 1949 Millions of hoppus feet over bark

Assortment	England	Scotland	Wales	Great Britain
CONIFERS:				
Timber	123.6	258.9	10.8	393.3
Seconds	24.3	78.9	2.4	105.6
Poles	118.0	226.8	22.0	366.8
Total, Coniferous	265.9	564.6	35.2	865.7
BROADLEAVES:				
Timber	672.8	180.8	71.6	925.2
Seconds	234.9	60.8	25.0	320.7
Poles	136.1	15.7	16.9	168.7
Total, Broadleaved	1,043.8	257.3	113.5	1,414.6
Grand Total	1,309.7	821.9	148.7	2,280.3

It will be seen that the bulk of the volume of broadleaved species is contained in "Timber", but that a large proportion of the volume of conifers consists of "Poles". In England and in Scotland, the conifer volume contains almost equal proportions of "Timber" and "Poles", but in Wales the volume of "Poles" is twice that of "Timber".

With the broadleaved species in Scotland and in Wales only a very small proportion of the volume consists of "Poles"; but in England the assortment is much less out of balance.

Table 92 breaks down the estimate by species and by assortments, and enables the analysis to be taken further. In conifers, Scots pine accounts for both the largest amount and the highest proportion of "Timber", while European larch, Norway spruce and undifferentiated conifers, including all the newer exotics, all contain relatively high proportions of "Poles". In broadleaved species, birch and ash contain relatively high proportions of "Poles", but beech has a relatively high proportion classed as "Timber" and "Seconds".

In the case of oak, which accounts for nearly half of the broadleaved volume, the proportions are: "Timber" 9, "Seconds" 3, "Poles" 1.

TIMBER VOLUMES, IN HIGH FOREST AND STANDARD TREES OF COPPICE-WITH-STANDARDS, BY ASSORTMENTS AND SPECIES—GREAT BRITAIN, PRIVATE WOODLANDS

Table 92 At 30th September, 1949 Millions of hoppus feet over bark

Species	Assortment			Total
	Timber	Seconds	Poles	
Scots pine	217.4	62.1	160.3	439.8
European larch	71.2	20.4	84.7	176.3
Norway spruce	48.9	11.7	43.8	104.4
Undifferentiated	55.8	11.4	78.0	145.2
Total Coniferous	393.3	105.6	366.8	865.7
Oak	448.9	155.8	46.9	651.6
Ash	59.0	21.0	34.0	114.0
Beech	223.5	76.8	12.6	312.9
Birch	17.6	5.9	28.9	52.4
Sycamore	60.3	21.2	22.6	104.1
Elm	52.4	18.4	7.5	78.3
Undifferentiated	63.5	21.6	16.2	101.3
Total Broadleaved	925.2	320.7	168.7	1,414.6
Grand Total	1,318.5	426.3	535.5	2,280.3

Volumes in Relation to Age-Classes—Private Woodlands

These differences are mainly a reflection of variations in age-class structure, which have already been examined in the area classification (Chapter 9, page 81). A detailed breakdown of the volume estimate for privately-owned High Forest by age-classes, within types and within countries, is shown in Table 93; but it must be realised that, owing to the low intensity of sampling, many of the figures given are inadequately supported and may be subject to rather wide margins of error. The computed probable limits of the sampling error for each Type and country are recorded against their respective totals. The table as a whole can be related directly to the area classification of privately-owned High Forest by age-classes already given in Tables 43 and 44, with the exception that the 1 to 10 year age-class has been omitted because it contains no measurable volume.

Even allowing for probable discrepancies, several of the results are sufficiently prominent to justify comment. Thus the Uneven-aged class is seen to supply nearly a third of the total volume, and as would be expected, most of this is contained in Broadleaved High Forest in England. The 21 to 30 year age-class contains the largest individual volume for Coniferous High Forest in both England and Wales, but this precedence shifts to the 41 to 60 year age-class both in Scotland and for Great Britain as a whole. In the even-aged classes of Mixed High Forest, the largest volume occurs at 41 to 60 years in England, but at 81 to 120 years in Scotland and in Wales. In even-aged Broadleaved High Forest, the largest volumes occur in each country in the 81 to 120 year age-class, and in England the progression from the younger age-classes, although steep, is fairly regular. In Scotland there is a similar progression but the increase at 80 years is sudden and considerable, while in Wales the volumes rise irregularly throughout.

TIMBER VOLUMES OF HIGH FOREST, BY AGE-CLASSES FOR SUB-TYPES AND INDIVIDUAL COUNTRIES—PRIVATE WOODLANDS

Table 93 At 30th September, 1949 Millions of hoppus feet over bark

Country	Sub-type	Age-Class in Years								Total	Standard Error
		11 to 20	21 to 30	31 to 40	41 to 60	61 to 80	81 to 120	Over 120	Un-even		
England	Coniferous	18.7	38.5	27.6	31.4	20.8	5.0	—	20.6	162.6	± 7.25
	Mixed	3.6	9.2	11.3	24.6	14.0	10.5	0.3	81.4	154.9	± 5.52
	Broadleaved	3.8	9.5	17.6	45.2	104.3	167.1	56.0	438.4	841.9	± 12.06
	Total	26.1	57.2	56.5	101.2	139.1	182.6	56.3	540.4	1,159.4	± 15.04
Scotland	Coniferous	20.1	64.4	76.7	122.4	111.7	58.5	40.0	24.5	518.3	± 10.70
	Mixed	0.2	0.9	2.3	6.5	10.5	21.6	8.8	37.9	88.7	± 3.73
	Broadleaved	0.2	0.9	2.4	5.1	17.3	80.9	69.7	38.4	214.9	± 6.11
	Total	20.5	66.2	81.4	134.0	139.5	161.0	118.5	100.8	821.9	± 12.84
Wales	Coniferous	3.6	10.9	5.1	3.6	0.1	0.3	—	—	23.6	± 2.16
	Mixed	—	1.5	2.0	1.8	1.2	3.6	—	7.5	17.6	± 1.46
	Broadleaved	0.2	1.9	4.3	6.4	9.9	23.6	11.6	48.5	106.4	± 4.22
	Total	3.8	14.3	11.4	11.8	11.2	27.5	11.6	56.0	147.6	± 4.96
Great Britain	Coniferous	42.4	113.8	109.4	157.4	132.6	63.8	40.0	45.1	704.5	± 12.35
	Mixed	3.8	11.6	15.6	32.9	25.7	35.7	9.1	126.8	261.2	± 6.91
	Broadleaved	4.2	12.3	24.3	56.7	131.5	271.6	137.3	525.3	1,163.2	± 14.70
	Total	50.4	137.7	149.3	247.0	289.8	371.1	186.4	697.2	2,128.9	± 20.34

Taking all Types together, and bearing in mind the fact that the age-classes represent ten-year groupings between 11 and 40 years, twenty-year groupings between 41 and 80 years and a forty-year grouping of 81–120 years, the distribution of the total volume in even-aged High Forest is found to be abnormally weighted towards the younger age-classes, and provides a reflection of the losses which have been sustained by war fellings.

Size Classes in Uneven-aged High Forest—Private Woodlands

The volume in privately-owned uneven-aged High Forest is analysed by size classes based on quarter-girth at breast-height, separately for England, Scotland and Wales, in Table 94. In conifers the largest volume in England and Scotland occurs in the 10-inch quarter-girth class (*i.e.*, between $8\frac{1}{2}$ and $11\frac{1}{4}$ inches), but in Wales there is an anomalous group of large volume in the class of 19-inch quarter-girth and over. England shows a high proportion of trees and a relatively high proportion of volume in the 4-inch quarter-girth class, and Wales and Monmouth in the 7-inch class, while in Scotland the distribution of the smaller sizes is more normal. Above 10 inches quarter-girth, there is a sharp drop in the number of trees, and a corresponding fall of volume in each case.

In broadleaved species the range of girths is much wider, and the largest volume in each country is seen to occur in the 13-inch quarter-girth class. The bulk of uneven-aged Broadleaved High Forest occurs in England, and the figures for that country, which therefore carry most weight, show what

appears to be a very normal progression of sizes and volumes. In Scotland, however, there is a marked trend towards an accumulation of volume in the larger size classes, while in Wales the volume is fairly evenly distributed, and most trees are correspondingly in the smaller size classes.

DISTRIBUTION OF SIZE CLASSES IN UNEVEN-AGED HIGH FOREST— PRIVATE WOODLANDS, BY COUNTRIES

Table 94 At 30th September, 1949

Species	Mean Breast-Height Quarter-Girth Over Bark: Inches	England		Scotland		Wales	
		Per cent. of Trees	Per cent. of Volume	Per cent. of Trees	Per cent. of Volume	Per cent. of Trees	Per cent. of Volume
Coniferous	4	58	13.5	34	6.0	18	2.5
	7	22	20.0	33	22.0	45	17.5
	10	11	26.0	20	31.0	19	25.0
	13	5	18.0	6	15.0	10	20.0
	16	2	10.0	4	13.0	—	—
	19 & over	2	12.5	3	13.0	8	35.0
	All sizes	100	100.0	100	100.0	100	100.0
Broadleaved	4	37	3.0	25	1.5	52	6.0
	7	27	13.5	22	6.5	23	13.5
	10	17	20.5	20	15.5	11	18.0
	13	10	23.0	13	18.0	7	18.5
	16	5	17.5	8	17.0	3	14.0
	19	2	9.5	6	16.0	2	12.5
	22	1	6.0	3	10.5	1	8.0
	25 & over	1	7.0	3	15.0	1	9.5
	All sizes	100	100.0	100	100.0	100	100.0

Note. The limits of the mean breast-height quarter-girth classes were used above:

4 inches: 2½ to 5¼ inches quarter-girth
7 ,, 5½ ,, 8¼ ,, ,, ,,
10 ,, 8½ ,, 11¼ ,, ,, ,,
13 ,, 11½ ,, 14¼ ,, ,, ,,
16 ,, 14½ ,, 17¼ ,, ,, ,,
19 ,, 17½ ,, 20¼ ,, ,, ,,
22 ,, 20½ ,, 23¼ ,, ,, ,,
25 and over: 23½ ,, ,, ,, and upwards
19 and over: 17½ ,, ,, ,, and upwards

All measurements were to the nearest quarter-inch of quarter-girth.

Analysis of Volume in State Forests

As shown in Table 89, page 138, the total volume of timber in State Forests at 30th September, 1949, was estimated at 378.1 million hoppus feet. Although most of this volume is contained in Coniferous High Forest, there is seen to be in England an appreciable volume in both Broadleaved and Mixed High Forest, which is contributed by the older Stands in the former Crown Woods such as the New Forest and the Forest of Dean. Few Broadleaved plantations made by the Forestry Commission (since its establishment in 1919) are as yet old enough to contain measurable volume.

Volume by Species and Countries—State Forests

Table 95 gives an analysis of the volume of timber in State Forests by species and by countries, and shows that, at the date of the survey, the most important conifers in point of measurable volume, over Great Britain as a whole, were Scots pine, Sitka spruce, and Norway spruce. Oak and beech are seen to be the only broadleaved species which are of individual importance, but it may be noted that oak is only exceeded in this respect by Scots pine and Sitka spruce.

TIMBER VOLUME IN HIGH FOREST AND STANDARD TREES OF COPPICE-WITH-STANDARDS, BY SPECIES AND COUNTRIES—STATE FORESTS

Table 95 At 30th September, 1949 Millions of hoppus feet over bark

Species	England	Scotland	Wales	Great Britain
Scots pine	49.8	21.9	2.4	74.1
Corsican pine	20.2	2.2	1.0	23.4
European larch	12.1	9.8	2.7	24.6
Japanese larch	5.4	4.4	4.8	14.6
Norway spruce	13.4	24.0	7.6	45.0
Sitka spruce	20.2	38.2	10.7	69.1
Douglas fir	12.1	5.5	4.5	22.1
Undifferentiated	1.3	3.3	0.7	5.3
Total coniferous	134.5	109.3	34.4	278.2
Oak	51.9	1.7	3.0	56.6
Beech	24.6	0.5	0.9	26.0
Undifferentiated	14.5	2.0	0.8	17.3
Total broadleaved	91.0	4.2	4.7	99.9
Grand Total	225.5	113.5	39.1	378.1

Volume in Relation to Age-Classes—State Forests

An analysis of the volume of timber in State Forests by age-classes is given in Table 96 below.

TIMBER VOLUME OF HIGH FOREST BY AGE-CLASSES FOR SUB-TYPES—GREAT BRITAIN, STATE FORESTS

Table 96 At 30th September, 1949 Millions of hoppus feet over bark

Sub-type	Age-Class in Years			Total
	11 to 20	21 to 30	Other	
Coniferous	94.9	101.1	72.1	268.1
Mixed	2.3	4.8	16.1	23.2
Broadleaved	1.8	1.5	82.1	85.4
Total High Forest	99.0	107.4	170.3	376.7

The column headed "Other" in Table 96, represents age-classes over 30 years, as well as a small area of uneven-aged woods. This volume, which has not been further sub-divided by age-classes, consists mostly of trees in the upper age-classes, in the old Crown woods, such as the New Forest and the Forest of Dean. It will be seen that the volume of such age-groups in Broadleaved High Forest, 82.1 million cubic feet, exceeds that in Coniferous High Forest, which is 72.1 million cubic feet.

But in the younger age-classes, and over the State Forests as a whole, the timber volume lies mainly in Coniferous High Forest.

Relationship of Volume to Area—All Woodlands

When the standing volume in all Productive Woodlands carrying timber crops (High Forest and Coppice-with-Standards) is compared with their area (2,018,587 acres) it is found to be 1,317 hoppus feet per acre, over bark measure. When the same volume is compared with the total area of woodlands of all Types (3,448,362 acres) it is equivalent to only 771 hoppus feet per acre, over bark measure. For comparison, reasonably well-stocked High Forest with a "normal" range of age-classes may be expected to have an average standing volume per acre of about 2,000 hoppus feet. If all our woodlands were restored to full productivity, the volume of standing timber would therefore be about three times what they carry today.

The relationship of timber volumes to areas naturally calls for analysis in relation to age-classes, and this has been done separately for Private Woodlands and State Forests, as set out below.

Mean Volume per Acre in Private Woodlands

Table 97 gives details of the mean volume per acre for each age-class in Coniferous, Mixed and Broadleaved High Forest, respectively, and for Standards in Coppice-with-Standards. The computed sampling errors are recorded in each case. Figures for Scotland are presented separately; but, owing to the relative smallness of the sample, the data for Wales have been thrown in with those for England to give combined averages. A few results are even then inadequately supported, and are seen to carry the possibility of unduly large sampling errors, but taken as a whole they are reasonable.

The first point to be noticed is that the mean volumes per acre are consistently higher in Scotland than in England and Wales. Such an effect is in accord with differences in stocking which have already been noted in Chapter 9, page 93. Broadleaved High Forest is seen to carry a much lower mean volume per acre than Coniferous High Forest, within each country and age-class, while the corresponding volumes in Mixed High Forest are intermediate and variable.

Scots pine is the main species in Coniferous High Forest, and according to current yield tables, fully stocked Stands of intermediate quality should carry at forty years a volume of about 2,400 hoppus feet in England, and 2,800 hoppus feet in Scotland; and at eighty years volumes of about 5,100 hoppus feet in England and 6,200 hoppus feet in Scotland (over bark and per acre in each case). The volumes per acre revealed by this survey are therefore well below the yield table figures for the older age-classes, from sixty years onwards.

In Broadleaved High Forest, while oak is the main species, a considerable proportion, and in Scotland a major proportion, of the volume has been seen (Table 90) to consist of beech, which normally carries heavier volumes per acre.

MEAN VOLUME PER ACRE OF VARIOUS AGE-CLASSES AND SUB-TYPES OF WOODLAND —ENGLAND AND WALES, AND SCOTLAND—PRIVATE WOODLANDS

Table 97

Hoppus feet over bark per acre

Type	Age-Class in Years	England and Wales	Standard Error	Scotland	Standard Error
HIGH FOREST					
Coniferous	11 to 20	659	± 50	573	± 72
	21 to 30	1,301	± 70	1,381	± 67
	31 to 40	2,010	± 142	2,500	± 112
	41 to 60	2,213	± 163	3,270	± 124
	61 to 80	2,606	± 270	3,501	± 139
	81 to 120	2,959	± 601	3,228	± 169
	Over 120	—	—	3,182	± 203
	Uneven	1,036	± 94	1,894	± 158
Mixed	11 to 20	463	± 96	478	± 706
	21 to 30	1,262	± 144	1,090	± 451
	31 to 40	1,710	± 194	1,893	± 518
	41 to 60	2,072	± 170	2,498	± 429
	61 to 80	1,772	± 215	2,700	± 317
	81 to 120	3,021	± 353	2,715	± 237
	Over 120	484	± 501	2,716	± 346
	Uneven	1,825	± 81	2,647	± 171
Broadleaved	11 to 20	463	± 91	664	± 765
	21 to 30	640	± 65	771	± 462
	31 to 40	1,033	± 78	1,098	± 261
	41 to 60	1,339	± 74	1,486	± 275
	61 to 80	1,752	± 68	1,859	± 184
	81 to 120	1,936	± 58	2,340	± 101
	Over 120	2,694	± 155	2,780	± 135
	Uneven	1,495	± 27	2,149	± 132
COPPICE-WITH-STANDARDS					
Standard trees only	——	665	± 20	—	—

According to Continental yield tables, fully stocked Stands of oak of intermediate quality should carry about 1,800 hoppus feet over bark per acre at sixty years, and about 3,000 hoppus feet at 120 years, while beech of intermediate quality might carry 4,500 hoppus feet over bark per acre at 120 years. The volumes per acre revealed by this survey fall below such yield table figures for the older age-classes.

Uneven-aged Broadleaved High Forest in England and Wales represents half the total area in this Type, and its low mean volume of only 1,495 hoppus feet per acre is seen to reflect its generally unsatisfactory condition.

The even lower average of less than 700 hoppus feet per acre for Standards in Coppice-with-Standards shows how little such areas contribute to the production of large-sized timber.

Mean Volume per Acre in State Forests

In the State Forests, the preponderance of the younger age-classes, from one to thirty years of age, and the relatively small area of older Stands, limit the effective range of analysis of volumes per acre to only two age-classes, *i.e.*, 11 to 20 years and 21 to 30 years.

The figures are given in Table 98 below.

MEAN VOLUME PER ACRE OF VARIOUS AGE-CLASSES AND SUB-TYPES OF WOODLAND —GREAT BRITAIN, STATE FORESTS

Table 98

Hoppus feet over bark, per acre

Type	Age-Class in Years	State Forests, High Forest and Standards in Coppice
		Volume per acre(1)
HIGH FOREST		
Coniferous	11 to 20	500
	21 to 30	1,400
	Other	3,033
Mixed	11 to 20	300
	21 to 30	1,100
	Other	2,723
Broadleaved	11 to 20	200
	21 to 30	600
	Other	2,259
COPPICE-WITH-STANDARDS		
Standard trees only....	—	650 (2)

Note. (1) For actual acreages—see Table 72, page 118. For actual volumes—see Table 96, page 144.

(2) Refers to 2,077 acres.

CHAPTER 16

SURVEY OF VOLUME INCREMENT

One of the main purposes of the Volume Sampling Survey and the preparation of volume estimates was to provide a basis upon which to calculate annual increment or growth in the volume of standing timber. The results could be applied to various aspects of management, and in particular, to the regulation of future fellings.

(a) Method of Computation

The most convenient method of expressing increment in calculations of this nature is as a percentage of the standing volume. It is known, moreover, that, except in the youngest age-classes, increment percentage varies less with density of stocking and with site quality, than does actual increment. This method was adopted and involved the computation of average current annual increment percentages over the period of each age-class, separately for both coniferous and broadleaved species. For the youngest age-classes of both descriptions, however, increment had to be computed directly.

In the case of the older conifers, the necessary data were obtained from the existing *Forestry Commission Yield Tables* (H.M.S.O. 1*s.* 3*d.*). These were converted to over-bark measure, and for each main species, periodic

annual increments and increment percentages were calculated for appropriate periods.

The increment between the *mean ages* of two successive age-classes, divided by the number of years of the interval, was expressed as a percentage of the volume at the beginning of the "mean-age" period. Thus, the annual increment percentage applicable to the 40 to 60 year age-class was taken as 1/20th of the increment between 50 and 70 years, expressed as a percentage of the volume at 50 years—since 50 is the mean age of the 40 to 60 year age-class.

The central quality class of each yield table was used, and no adjustment was made for stocking.

In the case of the older age-classes of broadleaved species, for which no applicable yield tables were available, a special increment investigation was carried out. A small party of surveyors visited felling areas and timber yards in various representative counties, and examined and measured felled stems. By counting the annual growth rings at each end of a log, it was possible, after taking appropriate measurements of height and girth, to reconstruct its dimensions and volume at various ages. In all, 852 stems of oak, 218 of ash, 152 of elm, 107 of beech and 180 of other broadleaved species combined, were analysed in this way, so as to obtain average figures for these species.

As an example of the subsequent computations, the average volume of oak trees at an age of 70 years was ascertained, as well as the volume for the same trees at 50 years. The difference between these two volumes represented the average increment during the period from 50 to 70 years. From this, the average periodic annual increment was calculated, being expressed as a percentage of the volume at 50 years. Since 50 years is the mid-point of the 41 to 60 year age-class, it was considered (as in the case of the conifers, previously discussed) that this annual increment percentage could be applied to the whole of that age-class.

As these annual increment percentages were obtained from individual trees, they could not be applied to the volumes of the whole Stands, ascertained by the Volume Survey, without adjustment. To allow for the reduction in the number of stems in a Stand, which normally occurs with advancing age, and for various other factors that cause the increment percentage of a Stand to be less than that of an individual tree, all these percentages were reduced by $33\frac{1}{3}$ per cent. before being applied to the relevant volumes.

The actual increment percentages for individual trees, ascertained by this survey, are set out, by species and age groups, in Appendix V, page 190. Certain Continental data is added for comparison. It will be noted that, for the reasons given in the previous paragraph, the figures there are higher (in the proportion 3 : 2) than those that appear in Table 102 in this Chapter.

In the youngest age-classes of both coniferous and broadleaved trees, neither of the above methods was found to be applicable. Although stocking tends to be more normal than in the older Stands, annual increment percentage changes so rapidly that its use might be very misleading. Increment in these young age-classes was therefore estimated directly from yield tables in species for which they were available, or to which tables for other similar species are known to apply. Age was taken as the mean of the age-class, and the central quality class of the yield table was taken unless there was definite evidence against that course.

If, in any species age-group, the average number of trees per acre as determined by the 1/10th acre plots measured in the Volume Survey, differed markedly from that given in the Yield Tables, then the estimates of increment based on the yield tables were adjusted accordingly.

For species for which there were no suitable yield tables, the difference in volume between successive age-classes, as determined by the 1/10th acre Volume Survey plots, was used as the basis for estimating the increment. An arbitrary allowance was made for thinning yield, where that appeared necessary.

Examples of increments calculated by these various methods are included in Table 102, page 153. There, in the first section, for coniferous High Forest, the increment for the 1 to 20 year age-class is calculated directly, mainly from yield tables, but adjusted to accord with measurements of 1/10th acre Volume Survey plots. The increments for older age-classes are calculated on a percentage basis, the percentages being derived from *Forestry Commission Yield Tables*. These increment percentages are seen to fall from 10 in the 21 to 30 year age-class, to 1 in the 81 to 120 year age-class, and to *nil* in the "over 120" year age-class.

In the third section, for broadleaved High Forest, the increment of the 11 to 20 year age-class is based on measurements of the 1/10th acre Volume Survey plots. In age-classes from 21 years upwards, it is calculated according to the percentages ascertained by the Increment Investigation outlined above. These percentages are seen to fall from 10 in the 21 to 30 year age-class to 1.4 in the 81 to 120 year age-class, and to only 0.6 in the "over 120" year age-class.

Average figures were computed for Mixed High Forest, while the increment of standard trees in Coppice-with-Standards was based on the Increment Investigation.

(b) Current Annual Volume Increment

(i) All Woodlands

On the basis of the calculations outlined above, it was found that current annual volume increment in High Forest, plus that in the Standard trees of the Coppice-with-Standards sub-type, in all the woodlands of Great Britain, amounted to 97,300,000 hoppus feet, over bark measure. Details by Types and sub-types of woodland are set out in Table 99 below.

CURRENT ANNUAL VOLUME INCREMENT IN HIGH FOREST AND THE STANDARD TREES OF COPPICE-WITH-STANDARDS, BY SUB-TYPES—ALL WOODLANDS, GREAT BRITAIN

Table 99

Type and Sub-type	Area		Volume		Volume Increment	
	Acres	Percentage of Area over which Volume was surveyed	Millions of Hoppus Feet	Percentage of Total Volume	Millions of Hoppus Feet	Percentage of Total Increment
HIGH FOREST						
Coniferous	867,797	43	972.6	37	63.7	65
Mixed	166,066	8	284.4	10	8.4	9
Broadleaved	754,936	38	1,248.6	47	21.8	23
Total High Forest	1,788,799	89	2,505.6	94	93.9	97
COPPICE						
Standards in Coppice-with-Standards	229,788	11	152.8	6	3.4	3
TOTAL	2,018,587	100	2,658.4	100	97.3	100

It is seen that Coniferous High Forest, which consists to a considerable extent of rapidly growing young Stands, accounts for 43 per cent. of the area surveyed, but for only 37 per cent. of the volume. Its share of the volume increment is a large one—65 per cent.—but much of this is accruing to small trees below saw timber size.

Mixed High Forest, which accounts for 8 per cent. of the area, 10 per cent. of the volume, and 9 per cent. of the increment, calls for no special comment.

Broadleaved High Forest, which occupies 38 per cent. of the area, consists to a large degree of old, maturing Stands, with a high volume but only a moderate increment. Thus, although it holds 47 per cent. of the volume surveyed, its share of the total increment is only 23 per cent.

The area occupied by the Coppice-with-Standards sub-type was 11 per cent. of the total covered by the Volume and Increment Surveys. The standard trees, though mainly in the older age-range, are widely spaced, and consequently the share of this sub-type in the total volume is a low one, only 6 per cent. Owing to the comparatively slow growth of these maturing trees, their share in the total increment is lower still, being only 3 per cent.

Relationship of Increment to Area

When the current annual volume increment of Productive Woodlands carrying timber crops (High Forest and Coppice-with-Standards) is divided by their area (Table 99), it is found to be 48.2 hoppus feet per acre per annum, over bark measure. When this same increment is divided by the total area of woodlands of all Types, it is equivalent to only 28.2 hoppus feet per acre per annum. It has been estimated that a reasonable rate of increment in well managed High Forest, taking coniferous and broadleaved trees together, is 70 hoppus feet per acre per annum. The difference between this figure and the actual 28.2 hoppus feet at present being produced in British woodlands, gives a measure of the improvement of output possible. The existing woodland area could be made to grow $2\frac{1}{2}$ times as much timber as it does today.

The Amount of Coniferous and Broadleaved Increment, and its Distribution by Countries and Ownership

For certain purposes it is more important to know whether the timber increment is taking place on coniferous or broadleaved trees, than in a particular Type of forest. The information given in Table 99 has therefore been reclassified on this basis and is set out again in Table 100, which also gives details of distribution by countries and ownership.

CURRENT ANNUAL VOLUME INCREMENT, BY DESCRIPTIONS AND OWNERSHIP, FOR INDIVIDUAL COUNTRIES

Table 100 — Millions of Hoppus Feet

Description	Private Woodlands				State Forests				All Woodlands			
	England	Scotland	Wales	Great B'tain	England	Scotland	Wales	Great B'tain	England	Scotland	Wales	Great B'tain
Coniferous	14	22	2	38	13	12	5	30	27	34	7	68
Broadleaved	20	4	3	27	2	—	—	2	22	4	3	29
Total	34	26	5	65	15	12	5	32	49	38	10	97

Table 100 shows that 70 per cent. of the increment is taking place on coniferous trees, although the broadleaved trees have a larger standing volume. This is accounted for by the large areas of young and rapidly growing coniferous plantations, which stand in contrast to the older and less rapidly growing broadleaved woods.

It is also seen that, for like reasons, 33 per cent. of the increment is taking place in the State Forests, although their area is only 18 per cent. of the country's total woodlands.

When the figures for individual countries are considered, it is seen that the increment of broadleaved woodlands is largely concentrated in England, while that of the coniferous woodlands is well distributed over England, Scotland and Wales

On an ownership basis, the State Forests account for 44 per cent. of all coniferous increment, but for only 7 per cent. of all increment on broadleaved trees.

Classification of Increment by Type of Woodland and Age-class

For management purposes it is essential to know whether the increment is accruing to young or old trees, as on this depends its availability for harvesting by fellings or thinnings. Details of the current annual volume increment in relation to types of woodland, age-classes, and ownership, are set out for Great Britain as a whole, in Table 101 overleaf.

Reference to Table 101 shows that in coniferous High Forest more than 75 per cent. (48.7 million cubic feet) of the increment is in the 11 to 30 year age-classes, which consist of small trees and consequently do not at the moment add appreciably to the stock of saw-timber. Other calculations have shown that the increment of coniferous saw-timber may be estimated at 4.7 million cubic feet, of which 3.7 million are in the Coniferous and Mixed sub-types, in age-classes over 60 years, and the remainder (1 million) is an apportionment of the uneven-aged categories.

In contrast with the coniferous forests, the bulk of the broadleaved increment is accruing to the older age-classes, that is to say to trees which approach or have reached saw-timber size. Of the total increment of 29 million cubic feet (see Table 100) at least 17 million cubic feet (nearly 60 per cent.) is in Stands over 60 years of age. There is in fact a great lack of young broadleaved Stands to replace these older crops as they are felled.

In considering the volume and increment estimates in Chapters 15 and 16, it must be realised that a good deal of woodland is normally more or less unavailable for felling either because of inaccessibility, or because it forms part of amenity woods round houses, or must be retained for one reason or another; also that the Census estimates of volume and increment make no allowance for defects, and include timber which would not customarily be measured in an ordinary commercial transaction for the sale or purchase of standing timber. Hence, it cannot be assumed that all the current annual volume increment is either suitable or available for harvesting.

CURRENT ANNUAL VOLUME INCREMENT BY TYPES OF WOODLAND AND AGE-CLASSES —ALL WOODLANDS, GREAT BRITAIN

Table 101 Millions of Hoppus Feet

Type	Age-Class, Years	Private Woodlands	State Forests	All Woodlands
High Forest—				
Coniferous	1 to 10	—	—	—
	11 to 20	8.5	18.8	27.3
	21 to 30	11.4	10.0	21.4
	31 to 40	5.5		
	41 to 60	4.7		
	61 to 80	2.6	.9	15.0
	81 to 120	.6		
	Over 120	—		
	Uneven-aged	.7		
	Total	34.0	29.7	63.7
Mixed	1 to 10	—	—	—
	11 to 20	.8	.6	1.4
	21 to 30	1.2	.5	1.7
	31 to 40	.8		
	41 to 60	1.0		
	61 to 80	.5	.1	5.3
	81 to 120	.4		
	Over 120	—		
	Uneven-aged	2.5		
	Total	7.2	1.2	8.4
Broadleaved	1 to 10	—	—	—
	11 to 20	.8	.3	1.1
	21 to 30	1.2	.1	1.3
	31 to 40	1.5		
	41 to 60	2.3		
	61 to 80	3.1	.6	19.4
	81 to 120	3.9		
	Over 120	.8		
	Uneven-aged	7.2		
	Total	20.8	1.0	21.8
Coppice—Standards	—	3.4	—	3.4
Grand Total	—	65.4	31.9	97.3

(ii) Private Woodlands

The total or gross current annual increment, in High Forest and standards in Coppice, is estimated for Private Woodlands, from the results of the Volume Sampling Survey, at 65,400,000 hoppus feet over bark.

Details of the assessment are set out in Table 102, and show that more than half of the increment occurs in Coniferous High Forest, and that of that amount, more than two-thirds is the increase of Stands which are below middle age. Mixed High Forest makes a very small contribution, and in Broadleaved High Forest more than a third of the increment comes from the uneven-aged class. The relatively lower ratio of total increment to standing volume in

Broadleaved, compared with Coniferous, High Forest, is seen to result mainly from the differences of age-class structure. The current increment *per acre* follows a normal trend in each High Forest type, being greatest during the period of fastest growth in the younger age-classes, and then falling away. This initial rate of growth is faster in conifers than in broadleaved species, but it falls off more rapidly.

CURRENT ANNUAL VOLUME INCREMENT IN HIGH FOREST, AND THE STANDARD TREES IN COPPICE-WITH-STANDARDS, IN PRIVATE WOODLANDS, GREAT BRITAIN, EXPRESSED AS PERCENTAGE, MEAN PER ACRE AND TOTAL, FOR VARIOUS TYPES OF WOODLAND

Table 102

Type	Age-Class in Years	Periodic Annual Increment Per cent.	Mean per Acre: (1) Hoppus Feet Over Bark		Total: Millions of Hoppus Feet Over Bark	
			Volume	Increment	Volume	Increment
High Forest— Coniferous	1 to 10	—	—	—	—	—
	11 to 20	—	615	123	42.4	8.5
	21 to 30	10	1,345	135	113.8	11.4
	31 to 40	5	2,330	117	109.4	5.5
	41 to 60	3	2,956	89	157.4	4.7
	61 to 80	2	3,321	66	132.6	2.6
	81 to 120	1	3,205	32	63.8	0.6
	Over 120	—	3,165	—	40.0	—
	Uneven	1.5	1,374	21	45.1	0.7
				Total:	704.5	34.0
Mixed	1 to 10	—	—	—	—	—
	11 to 20	—	464	93	3.8	0.8
	21 to 30	10	1,247	125	11.6	1.2
	31 to 40	5	1.734	87	15.6	0.8
	41 to 60	3	2,144	64	32.9	1.0
	61 to 80	2	2,061	41	25.7	0.5
	81 to 120	1	2,828	28	35.7	0.4
	Over 120	—	2,358	—	9.1	—
	Uneven	2	2,012	40	126.8	2.5
				Total:	261.2	7.2
Broadleaved	1 to 10	—	—	—	—	—
	11 to 20	—	470	94	4.2	0.8
	21 to 30	10	648	65	12.3	1.2
	31 to 40	6	1,039	62	24.3	1.5
	41 to 60	4	1,351	54	56.7	2.3
	61 to 80	2.3	1,766	41	131.5	3.1
	81 to 120	1.4	2,041	29	271.6	3.9
	Over 120	0.6	2,737	16	137.3	0.8
	Uneven	1.4	1,529	21	525.3	7.2
				Total:	1,163.2	20.8
Coppice—Standards	—	—	665	15	151.4	3.4
				Grand Total:	2,280.3	65.4

Note. (1) For actual acreages see Table 43, page 82.

(iii) State Forests

Calculations for State Forests produced an estimate of 31,900,000 hoppus feet over bark as the total current annual increment in High Forest and standards in Coppice, and details of the assessment are given in Table 103.

CURRENT ANNUAL VOLUME INCREMENT IN HIGH FOREST AND THE STANDARD TREES IN COPPICE-WITH-STANDARDS IN STATE FORESTS, GREAT BRITAIN, EXPRESSED AS PERCENTAGE, MEAN PER ACRE, AND TOTAL, FOR VARIOUS TYPES OF WOODLAND

Table 103

Type	Age-Class in Years	Periodic Annual Increment Per cent.	Mean per Acre: (1) Hoppus Feet Over Bark		Total: Millions of Hoppus Feet Over Bark	
			Volume	Increment	Volume	Increment
High Forest—						
Coniferous	1 to 10	—	—	—	—	—
	11 to 20	—	500	100	94.9	18.8
	21 to 30	10.0	1,400	140	101.1	10.0
	Other	1.25	3,033	38	72.1	0.9
				Total:	268.1	29.7
Mixed	1 to 10	—	—	—	—	—
	11 to 20	—	300	80	2.3	0.6
	21 to 30	10.0	1,100	110	4.8	0.5
	Other	0.6	2,723	17	16.1	0.1
				Total:	23.2	1.2
Broadleaved	1 to 10	—	—	—	—	—
	11 to 20	—	200	40	1.8	0.3
	21 to 30	10.0	600	60	1.5	0.1
	Other	0.8	2,259	17	82.1	0.6
				Total:	85.4	1.0
Coppice-with-Standards Standard trees only	—	—	650	15	1.4	—
				Grand Total:	378.1	31.9

Note. (1) For actual acreages see Table 72, page 118.

In the State Forests, practically the whole of the increment occurs in Coniferous High Forest.

PART IV

COMPARISONS AND CONCLUSIONS

CHAPTER 17

COMPARISONS WITH EARLIER SURVEYS

Differences of definition and method in the former returns and surveys of British woodlands at once invalidate any direct comparisons, both with the results of the present census, and with each other. At the same time, sufficient independent evidence can be adduced to provide approximate reconciliations of the worst discrepancies, while residual or minor differences can legitimately be smoothed out by confining comparisons to percentages instead of using the actual figures. On this basis, generalised conclusions can be drawn with a satisfactory measure of assurance.

Total Woodland Area

NOMINAL TOTAL WOODLAND AREA RECORDED BY SUCCESSIVE RETURNS AND SURVEYS FROM 1871 TO 1947, BY COUNTRIES

Table 104

Date of Return or Survey	England	Scotland	Wales	Great Britain
	Acres	Acres	Acres	Acres
1871	1,314,316	734,530	126,625	2,175,471
1887	1,518,321	874,850	167,573	2,560,744
1895	1,665,741	878,765	181,610	2,726,116
1905	1,683,324	868,409	216,510	2,768,243
1913–14	1,667,574	852,120	216,494	2,736,188
1924	1,630,987	1,074,224	253,461	2,958,672
1938–39	1,809,800	1,076,300	315,000	3,201,100
1947	1,865,046	1,266,838	316,478	3,448,362

Table 104 first of all presents for purposes of reference the nominal total woodland area by countries recorded in each major return or survey from 1871 to 1947. It will be recalled (Chapter 1) that the figures from 1871 to 1913-14 inclusive were compiled from statutory returns by the respective Boards of Agriculture for England and Wales and for Scotland; those for 1924 from voluntary returns collected by the Forestry Commissioners between 1921 and 1926; and those for 1938-39 from an uncompleted survey which was carried out by the Commissioners' own staff, and supplemented by random samples.

The Land Utilisation Survey of 1931-38 and the Home Timber Production Department's sample survey of 1941-42 do not contribute usefully to this discussion and have been omitted. The former recorded a total area of 3,216,421 acres of woodland (England 1,827,899, Scotland 1,094,294, and Wales 294,228 acres), but was not classified further. The latter recorded a total area of 1,887,500 acres of woodland in England and 271,500 acres in Wales, but provided no comparable figures for Scotland, and the data as a whole were purely of interim value and are superseded by the present Census.

The first discrepancy to require adjustment in Table 104 is the different minimum limits of survey. Thus the Board of Agriculture returns included

woods down to one acre in extent, the 1924 returns down to two acres, and the 1938-39 and 1947-49 surveys down to five acres only. Secondly, as far as can be ascertained, the Board of Agriculture returns included only woods which were nominally, or had recently been, productive, and excluded the majority of scrub and felled areas. Finally, there remain differences of classification, and considerable variations in accuracy and completeness.

For the present purpose it is not necessary to go back in detail beyond the period immediately preceding the 1914-18 war. The returns from 1871 to 1905 inclusive show an apparently progressive increase in the productive area, and this process is confirmed both by historical references, by observations and records of what has been felled since, and by the character and age-class structure of what remains. This process was, nevertheless, only the culmination of earlier developments, and it should be noted that the area of productive woodland standing in 1913-14 had been built up over almost a century of considerable economic prosperity.

The key to the reconciliation of the various returns and surveys which have been made from 1913 onwards lies, first, in an adjustment of their respective totals to include all areas of woodland down to one acre in extent, and second, in seeking confirmation or explanation of observed changes and discrepancies, in basic evidence such as that contained on the six-inch Ordnance Survey Maps. The latter process is facilitated by the fact that more than half the maps in current use date from before 1914.

Thus the total woodland area in 1913-14 must have comprised all woods recorded in the 1924 census, *less* new afforestation between 1914 and 1924, and *plus* areas below two acres in extent, areas missed in the 1924 census, and areas which were reclassified on those six-inch Ordnance Survey Maps revised between 1914 and 1924, through being disafforested. The conclusion reached is that it must have amounted to about 3,200,000 acres.

Similarly the complete total woodland area in 1924 would have comprised, additionally to the 1924 census figures, both the areas under two acres in extent, and those which were omitted from the returns, and must have covered about 3,100,000 acres.

The figures given for the 1938-39 survey include the recorded total area of State Forests as at 30th September, 1938, but the fraction relating to Private Woodlands is subject to sampling errors. On the face of it, the total for Scotland is too small and that for Wales too large, but the discrepancy over the whole is believed to be reasonably small. Thus, by adding an estimate of areas below five acres in extent, it appears that the complete total woodland area must have been about 3,400,000 acres. Finally, the complete total for the present 1947 census is obtained by adding to the recorded total woodland area the estimate for woods under five acres in extent (those for woods one to five acres are given in Table 8, page 40). This total amounts to a little more than 3,600,000 acres.

Taking the 1913-14 total as 100, the subsequent changes are thus indicated by 97 in 1924, 106 in 1938, and 112 in 1947. These figures represent successive balances between the rates of afforestation and disafforestation over the intervening periods. The influence of the Forestry Commissioners' operations on these results can already be appreciated, and their relatively increasing importance is brought out by Table 105. The area under State ownership in 1913-14 consisted entirely of Crown Woods, which at that date totalled 65,766 acres, compared with the 623,031 acres in Forestry Commission ownership in 1947,

and it can be seen that the difference between these two figures, *i.e.*, 557,265 acres, more than covers the net increase of 400,000 acres in the total woodland area during the interval.

RELATION BETWEEN STATE AND PRIVATE WOODLANDS AT FOUR SUCCESSIVE DATES
Table 105

Date of Return or Survey	Under Private Ownership		Under State Ownership		Estimated Total Area Acres
	Acres	Per Cent.	Acres	Per Cent.	
1913–14	3,134,234	98	65,766	2	3,200,000
1924	2,976,000	96	124,000	4	3,100,000
1938–39	2,958,000	87	442,000	13	3,400,000
1947–49	2,976,969	82	623,031	18	3,600,000

Note. Estimated areas only.

Classification of Woodland Area by Types

Turning to changes in the classification of the total woodland area by types, it is first of all necessary to reconstruct the composition of the woods covered by the adjusted 1913-14 return, which merely divided them into Coppice and "Other". Coppice comprised some 568,400 acres, or 39,700 acres more than were recorded in 1924. "Other" comprised some 2,167,800 acres, and of this total at least 1,349,400 acres must represent High Forest, which in 1924 was still standing or had recently been replaced (1,416,900 acres of High Forest recorded in 1924, less the 39,700 acres which may have been transferred from Coppice, and 27,800 acres which had been newly afforested). Moreover, it is legitimate to add to this area of 1,349,400 acres, certain other categories recorded in 1924 which must recently have been High Forest, and on a conservative basis these might include most of the area recorded as Felled or Devastated (478,100 acres), a third of the Scrub (say 110,200 acres), half the area recorded as Uneconomic (say 102,100 acres), half the area of woods which were omitted from or missed in the 1924 returns (say 70,000 acres), and half the area "lost" from the 1913-14 total owing to interim revisions of the six-inch Ordnance Survey Maps (say 50,000 acres). These bring the estimated total area of High Forest in 1913-14 to 2,159,800 acres, which is close enough to the total recorded for "Other Woods" to confirm the assumption that the latter description was confined to this type and included only those areas which were considered to be productive.

CLASSIFICATION OF WOODLANDS BY TYPE, AT FOUR SUCCESSIVE DATES FROM 1913 TO 1947—ALL WOODLANDS, GREAT BRITAIN
Table 106

Date of Return or Survey	Productive			Unproductive
	High Forest	Coppice	Total	
	Per Cent. (1)	Per Cent. (1)	Per Cent. (1)	Per Cent. (1)
1913–14	72	19	91	9
1924	48	18	66	34
1938–39	56	16	72	28
1947	52	10	62	38

Note. (1) Percentage of all woodland, Productive and Unproductive.

This conclusion makes it possible to compare successive changes in the classification of productive and unproductive types, which are presented for the Total Woodland area in Table 106, and for Private Woodlands in Table 107. The former shows that the productive area was reduced from 91 per cent. to 66 per cent. of the respective totals by the 1914-18 war, had recovered to 72 per cent. by 1939, and then suffered a further reduction to only 62 per cent. during the 1939 to 1945 war. Coppice types show a continuous decline from 19 per cent. to only 10 per cent. of the respective total woodland areas during the same interval, while High Forest types drop, with an intermediate stage of recovery, from 72 per cent. of the total to 52 per cent. The unproductive portion increases from 9 per cent. to 38 per cent. of the total woodland area at each date.

CLASSIFICATION BY TYPE, AT FOUR SUCCESSIVE DATES FROM 1913 TO 1947—PRIVATE WOODLANDS, GREAT BRITAIN

Table 107

Date of Return or Survey	Productive			Unproductive
	High Forest	Coppice	Total	
	Per Cent. (1)	Per Cent. (1)	Per Cent. (1)	Per Cent. (1)
1913–14	72	19	91	9
1924	48	18	66	34
1938–39	53	18	71	29
1947	44	12	56	44

Note. (1) Percentage of all woodland, Productive and Unproductive.

In Private Woodlands (Table 107), the overall proportions show similar changes up to 1939, but then a much heavier reduction, which is seen to be due to relatively greater losses in High Forest types (from which the compensating factor of expanding State Forests is here excluded). The general decline is from 72 to 44 per cent. The relative decline of Coppice types is from 19 per cent. to 12 per cent.

The increase of the Unproductive portion of Private Woodlands is very marked, from 9 per cent. to 44 per cent.

Sub-types of High Forest

An approximate classification of High Forest by sub-types can be reconstructed for the 1913-14 return by similar processes, and hinges upon evidence supplied by the six-inch Ordnance Survey maps, and by stumps on areas which are still bare. This suggests that the bulk of the 478,100 acres recorded as Felled or Devastated in 1924 formerly carried Coniferous High Forest. The experience of the present Census also indicates that much of the area recorded as Scrub in 1924 would formerly have carried Broadleaved High Forest, and that many areas of Broadleaved High Forest would have been classed as Mixed High Forest at earlier stages of the rotation. The latter point is again confirmed by evidence of the six-inch Ordnance Survey maps, which suggest that the majority of the present older even-aged Stands of Broadleaved High Forest originally contained some conifers.

The necessary calculations and adjustments were carried out on a regional basis and by counties, and need not be gone over in detail. The conclusion reached is that the nominal area of 2,167,800 acres of Other Woods standing in 1913-14 must have contained approximately 52 per cent. Coniferous High Forest, 15 per cent. Mixed, and 33 per cent. Broadleaved High Forest.

A comparison of the changes which have ensued since, is presented most clearly by taking the respective estimated total areas for 1913-14 as 100 in each case, and indicating the corresponding totals recorded in subsequent returns and surveys as percentages of the same figures. This is done for the total area of High Forest in Table 108 and for privately-owned High Forest in Table 109.

AREAS OF HIGH FOREST OF VARIOUS TYPES, AT FOUR DATES FROM 1913 TO 1947, EXPRESSED AS PERCENTAGES OF THE 1913 AREA—ALL WOODLANDS, GREAT BRITAIN

Table 108

Date of Return or Survey	Coniferous	Mixed	Broadleaved
	Per Cent. (1)	Per Cent. (1)	Per Cent. (1)
1913–1914	100	100	100
1924	61	91	61
1938–39	86	79	84
1947	77	50	105

Note. (1) Percentage of 1913–14 figure for each description of woodland.

In Table 108 Coniferous High Forest is seen to have been reduced, by 1924, to only 61 per cent. of its original (1913–14) extent, and to have recovered to 86 per cent. by 1939. Thereafter it has suffered a further reduction to 77 per cent. Broadleaved High Forest, which fell to 61 per cent. in 1924, has since continued to increase, and now covers a slightly larger area than in 1913-14. Mixed High Forest shows a continuous decline to only half of its original area.

AREAS OF HIGH FOREST OF VARIOUS TYPES, AT FOUR DATES FROM 1913 TO 1947, EXPRESSED AS PERCENTAGES OF THE 1913 AREA—PRIVATE WOODLANDS, GREAT BRITAIN

Table 109

Date of Return or Survey	Coniferous	Mixed	Broadleaved
	Per Cent. (1)	Per Cent. (1)	Per Cent. (1)
1913–14	100	100	100
1924	57	91	60
1938–39	58	78	81
1947–49	37	43	97

Note. (1) Percentage of 1913–14 figure for each description of woodland.

In Private Woodlands (Table 109), Coniferous High Forest shows a heavier reduction between 1913-14 and 1924, and after scarcely any recovery, a further heavy drop between 1939 and 1947 to only 37 per cent. of its original (1913) area. In Broadleaved High Forest there is a sharp decline from 1913 to 1924, followed by a gradual recovery. In Mixed High Forest the decline is continuous from 1913 to 1947, and is even more marked than is the case in All Woodlands.

Besides re-emphasising the relatively heavier losses sustained by Coniferous High Forest during the two wars, these tables between them bring out and confirm three important points. First, the area of Coniferous High Forest in Private Woodlands made a negligible recovery in the inter-war period between 1918 and 1939, and it appears that the known extent of re-planting must have been offset by continued felling. Second, losses in the area of

Coniferous High Forest during the 1939-45 war are seen to have been partly offset, and their total effect greatly reduced, as a result of the expansion of State Forests which continued throughout the same period. Finally, Broadleaved High Forest has not, on balance, diminished in area since 1914. It has been demonstrated that active replanting, other than in State Forests, has been on a relatively small scale, and it again appears that this result has been obtained partly by recruitment from Mixed High Forest and from Coppice types, both of which show a marked decline, and partly by natural regrowth.

Thus, as it turns out, broadleaved trees must now be more prominent, and conifers less prominent, over large stretches of the British landscape, than at any time during the past three-quarters of a century.

All these comparisons are summarised and presented in diagrammatic form in Appendix IX, page 258, which, however, reduces the areas plotted for each return or survey to include only the totals or estimated totals contained in woods of five acres or more in extent. An important feature, well emphasised by this diagram, is the fact that the increase in the total woodland area between 1924 and 1947 has been attained without any ultimate reduction of the unproductive area. Such a result reflects mainly the continued expansion of State Forests on to new land.

Another point to be noted is the fact that the combined area of Coppice, and of Broadleaved and Mixed High Forest, has altered very little since 1924, and so supports the conclusion that the changes occurring in these types have arisen largely from re-classification as Broadleaved High Forest at the expense of the other two classes.

Changes in Productivity by Counties, 1924 to 1947

Turning from what, necessarily, has so far been only a general review, it is found that the more detailed 1924 census affords material for closer comparisons on a county basis. These are shown graphically on pages 240 and 241.

Map 2 gives a diagrammatic representation by counties of the Productive and Unproductive Types recorded in the 1924 return, and is directly comparable with similar details for the present (1947) Census which appear in Map 3. Substantial increases of total woodland area since 1924 are seen to be confined to relatively few counties, all of which contain considerable areas of the new State Forests. Such changes are most noticeable in Norfolk, Suffolk and Northumberland in England; Argyll and Moray in Scotland; and in many Welsh counties. Second, Coppice types are seen to have been more widely distributed in 1924, and their subsequent decline to have been more pronounced in the northern, western and Midland counties. Third, it is seen that increases in the proportion of Unproductive types since 1924 are by no means evenly distributed. The southern counties generally show little nett change, Wales and some southern Scottish and northern English counties show a relative improvement in productivity, and most Midland counties a decline. The most marked loss of productivity is seen to have occurred in the Highland counties of Scotland, which were already the most heavily depleted in 1924.

Timber Volume

Both the 1938-39 and the 1941-42 sampling surveys made detailed estimates of the volume of timber standing in British woodlands. The results are presented as a matter of record in Table 110, but as different methods of survey, measurement and computation were used in each case, and as these were again

different from the methods used in the present 1947 to 1949 survey, it would be unwise to draw from them even the most tentative comparisons.

The differences between the total volumes, as computed at different dates, are due not only to losses through fellings, and increases due to natural growth, but also to the variations in the method of computation employed in each case.

ESTIMATED VOLUME OF STANDING TIMBER IN GREAT BRITAIN, ACCORDING TO THREE DIFFERENT SURVEYS, FROM 1938 to 1949

Table 110 — Millions of hoppus feet over bark

Description	Date of Survey		
	1938—39	1941—42	1947—49
Private Woodlands—			
(*a*) 5 acres and over			
High Forest	1,969	—	2,129
Coppice, etc.	258	—	151
Total (*a*)	2,227	1,695	2,280
(*b*) Under 5 acres	480	144	—
Total	2,707	1,839	—
State Forests	90	—	378
All Woodlands TOTAL	2,797	—	—
Hedgerow and Park....	575	427	—
GROSS ESTIMATE	3,372	2,266	2,658

CHAPTER 18

CONCLUSIONS

Before presenting the main conclusions reached by this Census of Woodlands, it may be as well to point out that its scope was limited to an examination of land that was actually woodland, or had recently been woodland, at the 30th September, 1947. The broader question of whether this is adequate or otherwise for national requirements is a matter of policy, rather than of a factual survey of existing conditions; those interested are therefore referred to the White Paper entitled *Post-War Forest Policy*, issued by the Forestry Commission in 1943 (H.M.S.O., Cmd. 6447, price 3s. 0d.).

The main conclusions of the Census Survey are as follows:—

(1) The total area of woodland in Great Britain at 30th September, 1947, excluding woods less than five acres in extent, was 3,448,000 acres. It covered 6.1 per cent. of the land surface, and represented only 0.07 acres per head of population; these proportions are among the lowest in western Europe.

(2) The total standing volume, in the High Forest areas and the Standard trees of Coppice-with-Standards, at 30th September, 1949, was estimated at 2,658 million hoppus feet over bark, equivalent to only 771 hoppus feet per acre, taking the total area of all woodlands. The current annual increment, in the same descriptions of forest, was 97 million hoppus feet over bark. This represents an average current annual increment of only 28 hoppus feet, over bark, per acre, of all woodlands, which is estimated to be only two-fifths of their potential sustained yield.

(3) The total area is made up of 2,825,000 acres, or 82 per cent., which are in private ownership, and 623,000 acres, or 18 per cent., which are under the direct administration of the Forestry Commission and constitute the actual woodland area of the State Forests.

(4) Of the privately-owned woods, only 365,607 acres or 13 per cent. were classed as Unsuitable for economic management. In the State Forests, only 16,839 acres or 3 per cent. are considered Unsuitable, mainly because they are growing on lands that cannot legally be enclosed.

(5) Woods productive or potentially productive at the date of survey account for 2,139,000 acres, or 62 per cent.; while 1,309,000 acres, or 38 per cent., were Unproductive.

(6) Taking the Productive area, 1,594,000 acres are in private ownership, and 545,000 acres, or 25 per cent., are held by the Forestry Commission. High Forest comprises 1,789,000 acres, while 350,000 acres (or 16 per cent. of the Productive area) are Coppice.

(7) The High Forest area contains 945,000 acres, or 53 per cent., of "Mainly Coniferous" species, and 844,000 acres, or 47 per cent., of "Mainly Broadleaved" species. Half the Mainly Coniferous High Forest is in the State Forests; but 93 per cent. of the Mainly Broadleaved High Forest is in private ownership.

(8) The Mainly Coniferous High Forest is nearly all (93 per cent.) even-aged; and as a result of war fellings and recent planting, most of the existing area is below middle age.

(9) Mainly Broadleaved High Forest includes 47 per cent. of uneven-aged woods. Owing to a decline of replanting broadleaved trees, there is a deficiency of younger growing stock, and much of what does exist has been self-sown.

(10) The younger even-aged High Forest, up to 30 years of age, is 90 per cent. coniferous. Taking the woods of this description in private ownership, the percentage of conifers is 85, while in the State forests the conifers occupy 94 per cent. It is evident that the bulk of both private and State planting over the past thirty years has been done with coniferous trees.

(11) Of the Coppice area, 230,000 acres, or 66 per cent., contain Standards, while 120,000 acres, or 34 per cent., are worked as Simple Coppice. Practically the whole amount is in private ownership.

(12) The Unproductive area includes 1,231,000 acres, or 94 per cent., in private ownership; 79,000 acres, or about six per cent., are in State Forests, but nearly all this latter area has recently been acquired in order to make it productive. Scrub comprises 497,000 acres, Devastated areas 151,000 acres, and Felled areas 662,000 acres.

(13) The area classed as Scrub for the most part represents degraded or neglected natural growth on land which formerly carried, or which would be

capable of carrying, High Forest, though possibly of another species. The fraction representing inherently poor site qualities is small.

(14) Devastated Areas for the most part represent recent exploitation in Mainly Broadleaved High Forest.

(15) Felled Woodlands represent land which, in nearly every case, formerly carried High Forest, and it is considered that the greater part was under coniferous crops. It comprises 289,000 acres, or 44 per cent., which have been lying idle for more than eight years, and 373,000 acres, or 56 per cent., which have been cleared of timber during or since the 1939-1945 war.

(16) Summing up, the main points that emerge from the Census are that, out of a total woodland area of 3,448,000 acres, only 2,139,000 acres can be regarded as productive of timber or other economically valuable forest products. The area utilised for the growing of High Forest timber crops is 1,789,000 acres, or just over one half of the country's total woodland area. The remainder of the productive area consists of 350,000 acres devoted to the growing of Coppice or Coppice-with-Standards. No less than 1,309,000 acres of woodland are either occupied by scrub, or have been clear-felled or devastated, and are therefore unproductive. An extensive programme of restocking will thus be required if all the country's woodland is to be brought into full productivity.

	COUNTY	MAP NO.	STAND NO.	AREA: Acres. gross
(1)	KENT	45 NE	64	21
	SURVEYOR. NO. ITLS. DATE / CODE NO.	CODE NO.	CODE NO.	PRIVATE [X] / FOR. COM. 2
(2)	39.J.P.W. 16·6·49 / 86	45–2	64	
	NAME OF F.C. FOREST	CODE NO.	COMPT. NO.	CODE NO.
(3)				

(4)	TYPE	C.H.F. 1	M.H.F. 2	B.H.F. 3	COPP WSTD. [X] 4	COPP. 5	SCRUB 6	DEVST. 7	FELLED 8	LOST 9
(5)	AGE CLASS	1/10 1	11/20 2	21/30 3	31/40 4	41/60 5	61/80 6	81/120 7	OVER 120 8	UNEVEN 9
(6)	SUB-TYPE	CHEST. COPP. [X] 1	HAZEL COPP. 2	OAK COPP. 3	OTHER COPP 4	UNEVEN AGED UND PL. 5	NT. REG. 6	BEFORE 8/39 7	AFTER 8/39 8	
(7)	TREE FORM	ELITE FOR SEED 1	SATIS. [X] 2	POOR 3	BAD 4	STOCK-ING	BADLY OVER-STOCKED [X] 1	SATIS. 2	POOR 3	BAD 4
(8)	SUITABILITY for ECONOMIC MANAGEMENT	SUIT-ABLE [X] 1	DOUBT-FUL 2	UNSUIT-ABLE 3						
(9)	PURE OR PRINCIPAL CONIFERS	S.P. 1	C.P. 2	P. CON. 3	E.L. 4	J.L. 5	H.L. 6	N.S. 7	S.S. 8	D.F. 9
(10)		TSUGA 1	L. CYP. 2	AB. GR. 3	AB. PEC. 4	AB. NOB. 5	THUYA 6	OTHER CONIF. 7		
(11)	PURE OR PRINCIPAL BROAD-LEAVED	OAK [X] 1	ASH 2	BEECH 3	BIRCH 4	SPAN. CHEST. 5	SYCA-MORE 6	COMM. ALDER 7	HAZEL 8	HORN-BEAM 9
(12)		POPLAR 1	LIME 2	ELM 3	WILLOW 4	NORWAY MAPLE 5	CHERRY 6	OTHER B/L 7		
(13)	SUBSIDIARY (IN MIXT.) CONIFERS	S.P. 1	C.P. 2	P. CON. 3	E.L. 4	J.L. 5	H.L. 6	N.S. 7	S.S. 8	D.F. 9
(14)		TSUGA 1	L. CYP. 2	AB. GR. 3	AB. PEC. 4	AB. NOB. 5	THUYA 6	OTHER CONIF. 7		
(15)	SUBSIDIARY (IN MIXT.) BROAD-LEAVED	OAK 1	ASH 2	BEECH 3	BIRCH 4	SPAN. CHEST. 5	SYCA-MORE 6	COMM. ALDER 7	HAZEL 8	HORN-BEAM 9
(16)		POPLAR 1	LIME 2	ELM 3	WILLOW 4	NORWAY MAPLE 5	CHERRY 6	OTHER B/L 7		

Fig. 1. Stand Data Form for Area Survey : Front

APPENDIX I

FIELD RECORD FORMS

Stand Data Form

An example of a completed Stand Data Form, as used throughout the Area Survey, is shown in Figures 1 and 2. The actual forms used were punched for ease of handling in the loose-leaf folders which were used in the field. A list of abbreviations used follows on page 174.

In Figure 1, the first line gives in turn the County, the Ordnance Survey six-inch quarter-sheet reference, the stand reference number used in the survey, and the acreage of the stand concerned. The second line carries the surveyor's identity and the date on which he visited the stand, together with certain code numbers used for subsequent handling of the data; it also shows, by means of a cross in the square marked 1, that the area is in private ownership. The third line, reserved for Forestry Commission areas, is therefore not appropriate and is left blank.

In the fourth line, a cross in space 4 shows that the stand is of the Coppice-with-Standards Type. As this Type has no age-class classification, no entry is made in the fifth line.

The cross in space 1 of the sixth line* shows that the main coppice constituent of the stand is chestnut.

Spaces 5 to 8 in this sixth line do not refer to Coppice-with-Standards areas such as this. Spaces 5 and 6 are only used in the case of Uneven-aged High Forest which is definitely two-storied. Then a cross in space 5 signifies that the two-storied effect is the result of under-planting; while the alternative space 6 shows that it is the outcome of natural regeneration. Spaces 7 and 8 are only used for Felled Areas. A cross in space 7 implies that the felling was done before 1st September, 1939; a cross in space 8 shows that the felling was done on or after 1st September, 1939.

In the seventh line, under "Tree Form", a cross in space 2 shows the form of the Standard trees to be satisfactory; while another cross in space 1 of the portion devoted to "Stocking", records them as being badly overstocked. In the eighth line, a cross in space 1 shows that the stand is suitable for economic management.

No entry is appropriate in the next two lines, which refer to conifers, but in the eleventh line a cross against oak shows that to be the principal species of the Standards. No entries were required in subsequent lines, which refer to other broadleaved trees and subsidiary species in mixtures, and are mainly used for High Forest stands.

The classification used throughout is based on definitions given in the Instructions for Field Parties, shown in Appendix II, page 176.

Figure 2 shows the reverse of the same form, and the first section is used for details of the species of Standard trees. The next section deals in the same way with the coppice. As subsidiary species (*i.e.* those other than oak standards and chestnut coppice) comprised only ten per cent. of the crop in each case, they were neglected in the coded classification. The entry under "Remarks" shows that the stand included small clumps of Scots and Corsican pine, the area of which was insufficient to justify recording them as separate stands.

Hollerith Card

The information recorded on the front of the Stand Data Form was transferred to a Hollerith Card, by using a special punching machine, and the result is shown in Figure 3, page 167.

The first entry falls in the column headed "CTY", for "County". The first hole represents 80, and the second hole 6, giving together 86, which is the code number appropriate to the county concerned, Kent. Similarly, the next group of holes, dealing with map references, reads (0) 452, the code for quarter-sheet 45 North-east. The next group covers the stand number, and reads (0) 64. In the next group again, the area is seen to be (0) 21 acres.

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* Although this line is headed "Sub-type" on the Stand Data Form and the Hollerith Card and List, it does not refer to the "Sub-types" cited elsewhere in this *Report*.

SUMMARY STATEMENT OF SPECIES

SPECIES STANDARDS	PER CENT (BY CANOPY)*	SPECIES COPPICE	PER CENT (BY CANOPY)*
OAK	90	S.CHESTNUT	90
S.P.		HAZEL	10
S.CHESTNUT	10	ALDER	
BEECH			
C.P.			

*Or by number of stems in young crops where the canopy has not closed.

REMARKS

THREE SMALL CLUMPS OF S.P. AND C.P. INCLUDED

FOR OFFICE USE

Fig. 2. Stand Data Form for Area Survey : Back

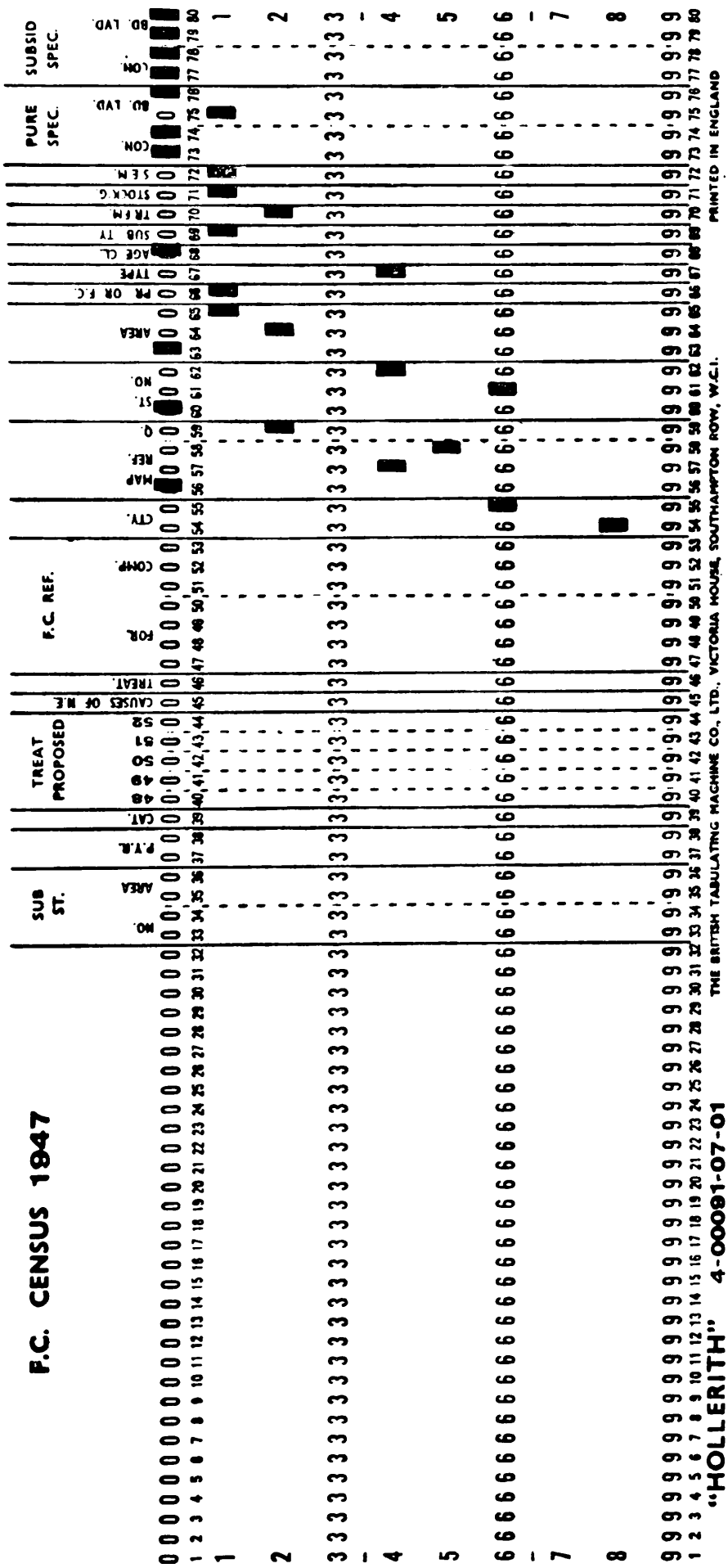

Fig. 3. Hollerith Card punched to show details recorded on Stand Data Form shown in Fig. 1.

The following columns and punch holes all relate directly to the numbers of the squares on the Stand Data Form. Thus the entry 1 under Pr(ivate) or F(orestry) C(ommission) shows that this is a privately-owned stand. Proceeding, it is seen to be of Type 4—Coppice-with-Standards; the next entry of "0", shows that no Age-class was recorded; the Sub-type entry of 1 indicates that the main species of coppice is chestnut. Tree form is 2, that is "Satisfactory". Stocking is 1—"Badly Overstocked".* Suitability for Economic Management (S.E.M.) is 1—"Suitable".

Under Pure (or Principal) Species, no Coniferous (CON) species are recorded, and the hole against 1 refers to the first line of the Broadleaved (BD.LVD.) group, and therefore signifies oak. No subsidiary species are recorded on this form.

The left-hand side of the form refers mainly to special data required only for State Forests (see Appendix X, page 259), and so was not used for this Private Woodland stand.

After this card had been put through the Hollerith tabulating machine, the code numbers recorded above were reproduced (though in a different order) in tabular form, as shown by the underlined entry in List "B" of Appendix III, page 186. By appropriate sortings and tabulations, total areas for any required description of stand could be obtained mechanically.

Plot Data Form

An example of a completed Plot Data Form is shown in Figures 4 to 8 and a list of abbreviations used appears on page 174. This form was only used for those stands that were selected for the Volume Sampling Survey, which followed the Area Survey. This selection was done on a random basis, by using a Hollerith list of tabulated stand data, such as that shown in Appendix III, List "B", page 186. Starting from a random original number, the acreages of all stands recorded were added together until a total of 200 acres (or more) had been reached. The stand in which the 200th acre fell was taken—automatically—as one of those to be sampled. In this case, the stand represented as an example of one so treated is the same stand as that already described under the headings "Stand Data Form" and "Hollerith Card".

The Plot Data Form consists of four pages, folding into a handy size for field use. For convenience of presentation these are shown here as five figures, the last page being divided. The form, which was printed on one side only, was so arranged as to be carried and used on a loose-leaf folder, having punch-holes not shown in the illustration.

Figure 4 shows the front of the Form. The five top columns running *across* the top of the form (from "County" down to "Sub-type") were completed in the office before the form was issued to the Volume Survey party. Most of the information was copied from the Stand Data Form already discussed. Exceptions are the Plot Number (simply a reference number), and the space divided for "Whole" or "Halves". The latter was completed after the site of the plot to be sampled had been determined on the Ordnance Survey sheet (See Chapter 15, page 135, for details of method); in some cases a plot had to be made up of two half-plots.

Turning to the sixth column headed "Stand Data", the first two spaces (Principal Species) were copied from the Stand Data Form. The remaining spaces (Plot Volume) were not completed until the volume had been computed as outlined below.

In the section headed "Plot Data", the first vertical column was completed in the field after inspection of the plot: this particular plot is considered "Unrepresentative" of the stand in which it falls.

The remainder of this page was completed in the office, from the details recorded on subsequent pages. The data are brought together on this front page for ease of reference.

The form opens to show the page (Inside flap) illustrated in Figure 5, page 170. This flap is actually folded over to cover the right-hand page (Figs. 7 and 8) which is to be used for subsequent computations. The flap was used for the enumeration of the stems on the various sectors of the plot; they were booked by species, and totals were cast up for each species.

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*Referred to as "Overstocked" elsewhere in this *Report*.

COUNTY	MAP Nº	STAND Nº	PLOT Nº
KENT	45-NE	64	82
SURVEYOR Nº ITLS DATE: 39 J.P.W. 14:10:49	CODE Nº: 86	CODE Nº: 45-2	CODE Nº: 64
			WHOLE 1 (X) HALVES 2.

TYPE	CHF 1	MHF 2	BHF 3	COPPICE W STD 4 (X)	TREE FORM – SATISFACTORY / OVERSTOCKED / PURE

AGE CLASS	–	11/20 2	21/30 3	31/40 4	41/60 5	61/80 6	81/120 7	OVER 120 8	UNEVEN 9

SUB TYPE	CHEST COPP. 1 (X)	HAZEL COPP. 2	OAK COPP. 3	OTHER COPP. 4	UNEVEN AGED: UND PL 5	UNEVEN AGED: NTREG 6

STAND DATA	PRINCIPAL SPECIES	CODE	PLOT VOLUME CF QG OB: TIMBER	SECONDS	POLES	TOTAL
	OAK	0010	81	39	52	172

PLOT DATA — 1. 2 (3) REPRESENTATIVE. FAIRLY REPRESENTATIVE. UNREPRESENTATIVE.

SPECIES	CODE	METHOD	VOLUME CF QG OB: TIMBER	SECONDS	POLES	TOTAL
S.P.	1000	11	5	9	48	62
C.P.	2000	12	24	13	–	37
OAK	0010	51	52	17	–	69
S.CHT	0050	51	–	–	4	4
			81	39	52	172

Fig. 4. Plot Data Form for Volume Survey : Front

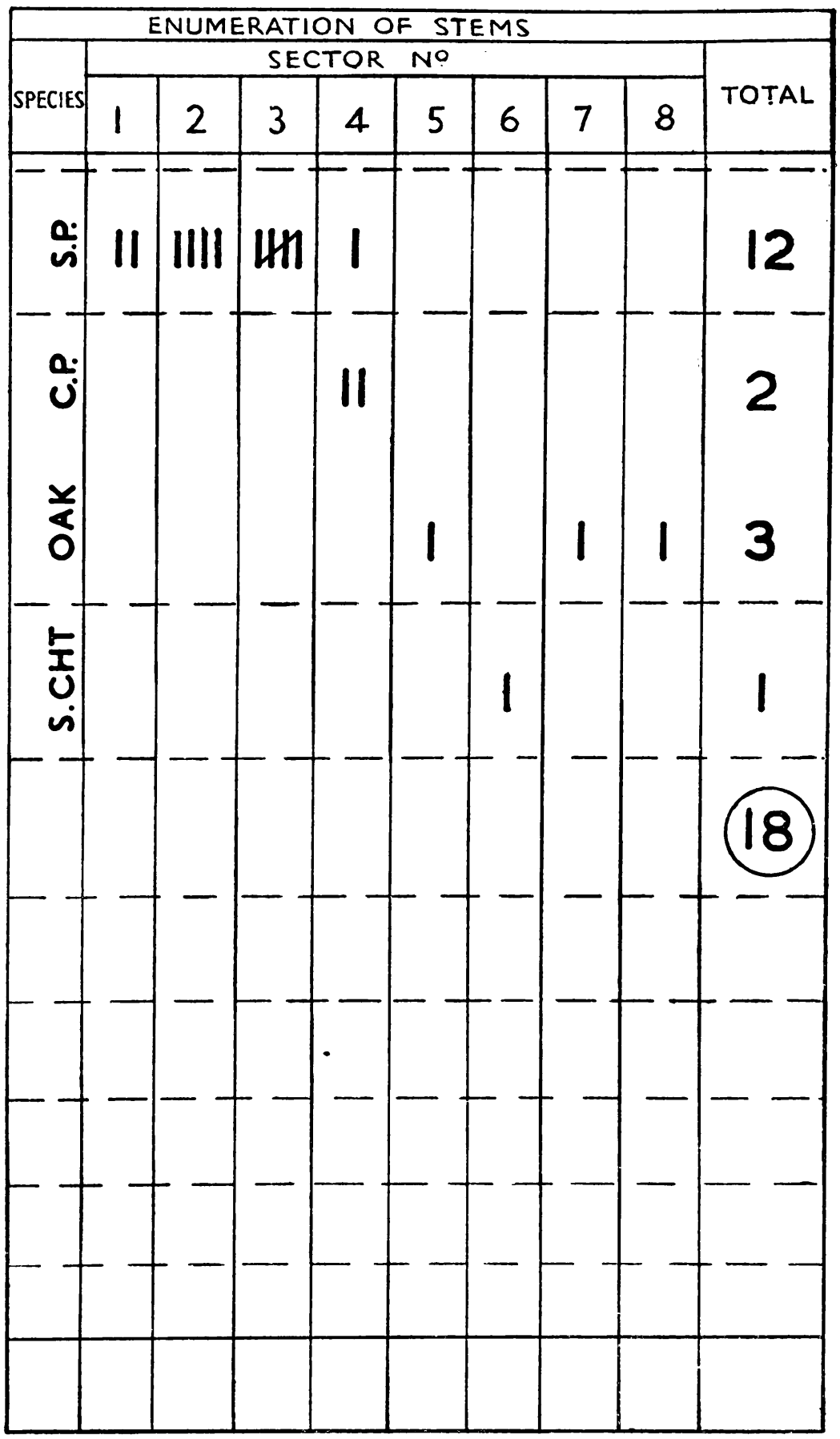

Fig. 5. Plot Data Form for Volume Survey : Inside Flap

The "gate" symbol which appears against S(cots) P(ine) in Sector 3 represents 5 stems. Altogether there were 18 trees in this plot.

Sample stems for actual measurement were selected, for each species but otherwise at random, in accordance with Paragraph 7(c), of the Instructions for Field Parties given in Appendix II, page 182. Coppice growth, which was present in this case, was not recorded or measured.

Facing the flap is the inside left-hand page shown in Figure 6, page 172. This was used to record the actual measurements of the selected sample trees, which were taken and booked by the surveyors in accordance with Paragraph 7(d) of the Instructions for Field Parties shown in Appendix II, page 182. Scots pine was here treated as the main species of the *plot*, though it is not the principal species of the *stand* (which is oak, this plot being unrepresentative). As there were more than 10 stems of Scots pine (actually 12), only 10 were selected for measurement. Consequently two tree numbers (5 and 10) do not appear in the first column, headed "Tree Number", and in all only 16 trees were measured. In a plot with a larger number of stems, the fraction sampled would, of course, be less.

The second column shows the species, and the third the quarter-girth, measured (over bark) at breast-height. 6^{1} indicates $6\frac{1}{4}$ inches, 3^{3} stands for $3\frac{3}{4}$ inches, and 5^{2} for $5\frac{1}{2}$ inches, and so on. Under "Height measurements", different procedures were followed for conifers and broadleaved trees. With the conifers (S.P. and C.P.) the simple 45 degree or right-angled triangle method of height computation was adopted (in this example). Hence 45 degrees is entered in the "Upper Angle" column, and 5 feet, being the height of the observer's eye, in the "Lower Angle" column. Consequently the "Distance in Feet" recorded for each tree, plus 5 feet, gives the tree height. The height measurements for broadleaved trees are "first length" heights, and, being under 40 feet, were taken with a measuring rod; therefore no angle measurements were needed.

The last column (Basal area, square feet), on this page, and the first two columns on the next page, are for use in the case of an exceptionally large tree, falling outside the range of the volume tables. They were completed, where necessary, in the office.

The next stage of the work, the completion of the inside right-hand page, shown as Figures 7 and 8, was done in the office. First, the left-hand portion of the page (Fig. 7) showing only the volumes of trees actually measured, was completed.

The contents of the sample trees were entered from specially prepared volume tables, which show mean volumes over bark according to breast-height quarter-girth and height, for each of the main species. In the case of conifers, for which total height was recorded, the proportions of timber, seconds and poles were read direct from the tables.

With broadleaved trees, as the first length had been measured both by height and breast-height quarter-girth, its volume—usually timber—could be computed direct from tables.

An allowance for the volume of second lengths was added by use of a mean multiplying factor. The last column, headed "Method", was used to record, for future reference, the code number of the table used.

The final stage was carried out on the right-hand portion of the inside right-hand page, which is shown as Figure 8. This involved the increasing of the volumes actually measured, by an appropriate proportion, so that volumes for all the trees in the plot—both measured and unmeasured—were obtained. This was done separately for each species, but in the example given, adjustment was only needed for Scots pine. As has been seen, only 10 out of 12 trees were measured; consequently, the volume has been raised, in the proportion 12/10, from a total of 52 cubic feet to 62 cubic feet. The volumes for other species remain unchanged in this instance. In a plot carrying a larger number of stems, where only a small fraction had been measured, the adjustment at this stage would naturally be of a much larger order. This adjustment is done not only for the total volume, but also for each assortment, *i.e.* "Timber", "Seconds" and "Poles".

The column headed "Number of Stems" is used to record the total number of trees of each species in the plot, and not the number actually measured (which in this case was 10).

TREE Nº	SPECIES	Q. G. B. H. INS.	HEIGHT MEASUREMENTS.					BASAL AREA SQ. FT.
			DISTANCE FT.	UPPER ANGLE	LOWER ANGLE	TOTAL HEIGHT FT	FIRST LENGTH FT	
1	SP	6^{1}	55	45	5FT	60		
2		5^{1}	47	45	5FT	52		
3		3^{3}	36	45	5FT	41		
4		5^{2}	45	45	5FT	50		
6		5^{1}	45	45	5FT	50		
7		4^{3}	41	45	5FT	46		
8		5^{3}	47	45	5FT	52		
9		6	51	45	5FT	56		
11		4^{1}	40	45	5FT	45		
13		8^{1}	55	45	5FT	60		
12	CP	8^{2}	67	45	5FT	72		
14		9	67	45	5FT	72		
15	OAK	13^{3}					22	
17		10					20	
18		13^{1}					22	
16	S.CHT	6^{2}					18	

2151-P.1081-1603-10 M 8/48 (Ty P.)

*Fig. 6. Plot Data Form for Volume Survey : **Inside Left-hand Page***

FORM FACTOR	% OVER 8 INS. Q.G.B.H	VOLUME CU. FT. Q. G. O. B.				METHOD	No STI
		TIMBER	SECONDS	POLES	TOTAL		
				7·3	7·3		
				4·3	4·3		
				1·6	1·6		
				4·7	4·7		
				4·3	4·3		
				3·5	3·5		
				5·2	5·2		
				6·8	6·8		
				2·7	2·7		
		4·5	7·2	—	11·7		
		4·5	7·2	40·4	52·1	11	
		10·1	7·5	—	17·6		
		13·8	5·9	—	19·7		
		23·9	13·4	—	37·3	12	
		21·9	7·3	—	29·2		
		10·3	3·4	—	13·7		
		20·2	6·7	—	26·9		
		52·4	17·4	—	69·8	51	
				4·1	4·1	51	

Fig. 7. Plot Data Form for Volume Survey : Inside Right-hand page— Left-hand portion

By the "Remarks" column, the surveyors have noted the fact that this plot was "Unrepresentative" because part of it fell in Coniferous High Forest, aged between 31 and 40 years; the stand as a whole was, as has been seen, Coppice-with-Standards, being actually chestnut coppice with oak Standards. Under the set procedure, however, such stands had to be accepted and measured. It was not permissible to choose another, more representative, area for sampling. On the average, the plots selected for volume measurement gave a fair representation of the stands, and hence of the forest Type, that they were intended to represent.

The final stage was completed by the copying across of the volume entries from the portion of the form shown as Figure 8, to the front of the form shown as Figure 4. The "Method" column in Figure 4 is completed from the "Method" column in Figure 7. The "Code" column in the lower half of Figure 4 refers to the species, as shown in the Stand Data Form reproduced as Figure 1. Finally, the volumes, by assortments, for the various species, were totalled and entered at the bottom right-hand corner of the front page.

List of Abbreviations Used

STAND DATA FORM:

FOR. COM. (F.C.)=Forestry Commission. COMPT.=Compartment. C.H.F.=Coniferous High Forest. M.H.F.=Mixed High Forest. B.H.F.=Broadleaved High Forest. COPP. W. STD.=Coppice with Standards. COPP.=Coppice. DEVST.=Devastated. LOST=Disafforested. CHEST.=Chestnut.* UND. PL.=Underplanting. NT. REG.=Natural Regeneration. SATIS.=Satisfactory. S.P.=Scots pine.* C.P.=Corsican pine. P. CON.=*Pinus contorta.* E.L.=European larch. J.L.=Japanese larch. H.L.=Hybrid larch. N.S.=Norway spruce. S.S.=Sitka spruce. D.F.=Douglas fir. L.CYP.=Lawson cypress. AB.GR.=*Abies grandis.* AB.PEC.=*Abies pectinata.* AB.NOB.=*Abies nobilis.* CONIF.=Conifers. SPAN.CHEST.=Sweet or Spanish chestnut. COMM.=Common. B/L.=Broadleaves. MIXT.=Mixture.

Ordnance Survey six-inch Quarter-sheets were coded as follows: Sheet number in County series, followed by: 1 for North-west, 2 for North-east, 3 for South-west, 4 for South-east. Thus, "45-2"=Sheet No. 45, North-east.

PLOT DATA FORM

C.F., Q.G., O.B.=Cubic feet, quarter-girth, over bark, *i.e.* volume according to Hoppus system of measurement.

Q.G., B.H., INS.=Quarter-girth at breast height in inches (measured over bark).

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* See Chapter 2, page 21, for scientific names of trees listed.

HOD	SUMMARY BY SPECIES					REMARKS
	No OF STEMS	VOLUME CUBIC FEET Q.G.O.B.				
		TIMBER	SECONDS	POLES	TOTAL	
	12	5	9	48	62	
	2	24	13	—	37	
	3	52	17	—	69	
	1	—	—	4	4	

UNREPRESENTATIVE BECAUSE PART OF PLOT FALLS IN C.H.F. 31-40

Fig. 8. Plot Data Form for Volume Survey : Inside Right-hand page— Right-hand portion

APPENDIX II

INSTRUCTIONS FOR FIELD PARTIES

1. AREA SURVEY

I. GENERAL

1. Contact with owners

Wherever possible contact should be made with owner or agent before woods are entered. No ownership need be recorded on field form except distinction between:—

(*a*) Private 1.
(*b*) Forestry Commission 2.

2. Stands

(*a*) Each block of 5 acres or over, whether on one map or several, which is now woodland, or which is shown on the map as such, must be visited, demarcated into stands and these entered up on separate field forms.

(*b*) Strips of woodland less than 1 chain (66 feet) wide to be excluded.

(*c*) A minimum distance of 1½ chains (99 feet) to constitute a division between blocks and between similar stands within a block.

(*d*) Stands to be numbered consecutively from (1) upwards. A fresh sequence of numbers must be begun for each six-inch Ordnance Survey quarter-sheet, or for each part of each County shown thereon. Except by arrangement with the Conservator, field parties will omit Forestry Commission areas, leaving the numbering and recording of Forestry Commission stands to the local staff.

(*e*) Stands normally to be stopped at edge of map. Where a wood extends on to adjacent quarter-sheets, field parties must see that description and data agree for each sheet. Overlaps of less than four acres may be included on the map showing the major portion of the stand.

(*f*) Each stand is to comprise an area which is uniform for purposes of description, *i.e.* as regards Type and Sub-type, Age-Class, Species and Condition. All stands 5 acres or more in area (within each block inspected) must be differentiated. Stands below 5 acres in area are to be recorded only when important changes in description are involved.

(*g*) Where two or more stand categories occur within one block, and these cannot easily be delimited on the ground, the approximate percentage by area of each stand category must be estimated and a separate form prepared for each. In "Stand No." space, write *e.g.*, (15)+16 indicating that the form refers to the bracketed stand category. In space for area, write estimated percentage of area and under it the corresponding acreage, *e.g.* if the total area of stand 15 +16 is 10 acres and 15 is 80% of the whole, the space for area on the field form applying to stand (15)+16 should read:—

Area
80%
8

and for stand 15+(16) should read:—

Area
20%
2

(*h*) In the case of blocks, of over 5 acres, of scrub or natural regeneration which has invaded land not previously woodland, the outer limit of scrub, etc. should be roughly mapped to include that area which is at least 50 per cent. stocked.

(*j*) When operations such as planting or felling are in progress when the area is inspected, the actual state of affairs as observed on that date to be recorded.

(*k*) Each stand form and map will on completion be initialled and dated by the surveyor, and marked with his serial number in the space provided.

3. **Maps**

(*a*) Stand boundaries are to be delineated in pencil (H.B.) in the field, and the stand given the appropriate number.

(*b*) Areas. The total area of each block must be measured by acre grid (to nearest acre). Individual stands comprising the block will be measured, and their sum should agree with the total for the block, any necessary adjustments being made in the area of the larger stands.

4. **Coding of Maps**

Field surveyors will code:

(*a*) The County according to the appropriate serial number on the list provided;

(*b*) the six-inch Ordnance Survey maps. The four quarters of each six-inch Ordnance Survey Sheet will be coded numerically as follows:—N.W.=1, N.E.=2, S.W.=3, S.E.=4. These numbers will follow the number of the six-inch sheet, *i.e.*, ¼-sheet 23 N.E. will be coded as "23-2".

(*c*) Ordnance sheets having a letter (*e.g.* A) prefixed to their numbers will be regarded for all purposes (numbering of stands, etc.) as part of the sheets whose number they bear, so the prefix will not be coded.

II. CLASSIFICATION OF STANDS

A. *Types of Woodland

1. **Coniferous High Forest (C.H.F.)**

Include:—Pure Coniferous Forest and also coniferous forest with broadleaved mixture (or standards) if these form less than 20% of the crop (as a rule in terms of canopy).

2. **Mixed High Forest (M.H.F.)**

Include all mixtures of conifers with broadleaved trees where either category forms 20% or more of the crop.

3. **Broadleaved High Forest (B.H.F.)**

Include:—

(*a*) Pure Broadleaved High Forest.

(*b*) Broadleaved forest with conifer mixture (or standards) if these form less than 20% of the crop (as a rule in terms of canopy).

(*c*) More or less widely-spaced standards over coppice, but only if the coppice is too poor to class the stand as Coppice-with-Standards. Stands of this type but with fewer than 6 sizeable standards per acre are not to be classified as High Forest, but as Scrub.

(*d*) Poles of coppice origin (with or without standards) with an average of less than two stems per stool.

4. **Coppice-with-Standards**

Stands carrying Standards of actual or potential timber value; the coppice to be capable of being worked or marketed, or suitable for conversion to High Forest.

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* The word "Type" is used here in a slightly different sense to its use in the body of this *Report*. It includes certain of the *Report* Sub-types.

5. Coppice

To include all coppice growths (except osiers) if averaging more than two stems per stool; the coppice to be capable of being worked or marketed, or suitable for conversion to High Forest.

6. Scrub

Inferior growth unlikely to develop into a utilisable crop of coppice, poles or timber.

7. Devastated

Stands from which the best timber has been removed, leaving a scattered or patchy remnant of the original crop, not capable of satisfactory development. The removal of standards from coppice will not be included in this category so long as the coppice remains capable of being worked as coppice.

8. Felled

To include all High Forest Stands which have been more or less completely clear-felled. Coppice which is being worked over on rotation will not be included in this category. Birch regeneration which has sprung up on recent fellings should be classed as Broadleaved High Forest 1-10 years, if over 3 feet in height, dense and uniform, provided that the locality conditions are suitable for the satisfactory development of birch (given proper tending). If the conditions are not suitable, such a stand should be classed as Scrub.

Note: Suitability for satisfactory development depends on local conditions, and must be decided by the Census Officer.

If the regrowth described above is thin or very patchy, the stand should be classified as Felled.

9. Lost

Areas, irrespective of stocking, now converted or obviously under conversion to non-forestal uses such as agriculture, housing, gardens, sports grounds, aerodromes, etc.

B. Age-classes

Apply to High Forest Type, 1, 2 and 3 above only.

Years 1/10, 11/20, 21/30, 31/40, 41/60, 61/80, 81/120, Over 120, Uneven-aged.

Each stand in the High Forest Types must be put into its appropriate Age-class.

Note: If 90% or more of the trees forming a closed upper canopy are of one age-class, any subsidiary components are to be ignored and the stand recorded in the appropriate even-aged class.

C. Sub-Types*

Coppice-with-Standards—Type 4

Sub-Type 1: Coppice mainly composed of Spanish chestnut.
do. 2: Coppice mainly composed of hazel.
do. 3: Coppice mainly composed of oak.
do. 4: Coppice composed of other species, mixed coppice, etc. (Abbreviated as "Mixed or Other" coppice.)

Note: If the coppice is composed of less than 80% of either Spanish chestnut, hazel or oak, or if the quality and stocking are poor or the subsidiary species aggressive, the stand is to be recorded as "Mixed or Other" coppice.

Uneven-aged Class (9) of High Forest Types 1, 2 and 3

Sub-Type 5: Two-storied forest resulting from under-planting.
do. 6: Natural regeneration under mother trees.

Note: If the stand is "all-aged", no sub-type is to be recorded, the additional classification, as either under-planted or under natural regeneration, being restricted to two-storied High Forest.

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* "Sub-type" is here used in a different sense to that followed in the main body of the *Report*.

Felled—Type 8

Sub-Type 7: Felled before September 1st, 1939.

do. 8: Felled on or after September 1st, 1939.

D. Condition as regards Form of Stem and Degree of Stocking

Each Stand of Types 1 to 4 inclusive must be further classified according to the form (straightness) of the tree stems and the degree of stocking.

There are 4 Classes for Stem Form:—

1. Elite trees for purposes of seed collection; *i.e.* trees of outstanding quality as regards straightness of bole and crown development.
2. Satisfactory. Majority of stems reasonably straight.
3. Poor. Many defective stems but capable of improvement.
4. Bad. Stems very defective. Improvement doubtful.

There are 4 Classes for Degree of Stocking:—

1. Badly overstocked. Comprises neglected stands long overdue for thinning.
2. Satisfactory. 80% to 100% stocking, in terms of canopy.
3. Poor. From 50% to 80% stocking, in terms of canopy.
4. Bad. Below 50% stocking, in terms of canopy.

Note: The stocking of Standards in Coppice-with-Standards is to be assessed on the assumption that overwood and underwood are of equal importance, and therefore for full stocking at least 50% of the area should carry Standards. This proportion may be increased up to the stage (varying with the species concerned) when more than 50% of the underwood is being damaged by shade, after which the crop will be considered over-stocked.

E. Suitability for Economic Management

The object is to classify the stands, irrespective of ownership, according to their capability of being managed as part of the economically productive woodlands of the country.

There are 3 classes:—

1. Suitable for Economic Management

Stands forming part of a larger block of woodland; or in manageable proximity to other blocks. Isolated relatively small blocks of woodland must be of compact shape and have reasonable access for the extraction of forest produce.

2. Doubtful

Borderline cases.

3. Unsuitable for Economic Management

Blocks of scrub on land incapable of growing timber. Blocks of woodland occurring on common land. Blocks of ornamental trees and similar areas planted purely for amenity.

Small isolated blocks in areas of a predominantly agricultural or rough grazing character. Small blocks with a long boundary in relation to their total area (*e.g.* shelter-belts). Isolated blocks with no reasonable access.

F. Species

All stands in Types 1 to 7 inclusive are to be classified according to species. Pure stands are stands in which at least 90 per cent. of the crop is composed of the same species, and in such cases only one entry is made in the appropriate square on the front of the form against pure or principal species. In the case of mixed stands, the most abundant species in the mixture should be entered in the appropriate square in one of the rows headed "pure or principal species" and the second most abundant in one of the rows headed "subsidiary species". In the case of Coppice-with-Standards, the Standards only are to be recorded in the sections for species. (The coppice species will have already been roughly classified under "Sub-types 1 to 4").

"Other Conifers" and "Other Broadleaved" are to refer to species not listed on the Stand Data Form: these headings are not to be applied to undifferentiated mixtures of codeable species.

In the case of felled areas, if there is a substantial regrowth from broadleaved stumps or coppice, the species concerned should be entered in the appropriate squares in the species rows, and a note made under "remarks".

N.B. Only one cross may be put in the four lines of "Pure or principal species", and only one cross in the four rows of "Subsidiary species in Mixture". All information regarding species other than the two most abundant ones, will be included in the statement on the back of the form.

G. Statement of Proportion of Species

This information is to be given on the reverse of the form wherever more than one species occurs in the stand. Species which individually compose less than 10% of the crop should be grouped together, *e.g.*

S.P.	40%
E.L.	30%
N.S.	20%
Oak, Sp. Chest.	10%

In the case of Coppice-with-Standards (Type 4), and where both Standards and coppice are mixed, the species and proportions should be given separately for the Standards and for the coppice.

Remarks

Record whether felling or thinning is actually in progress at time of the visit of the Census surveyor. Also note any points of outstanding silvicultural interest.

2. VOLUME SAMPLING SURVEY

1. General

The purpose of the Volume Sampling Survey is to obtain global figures by species, age-classes and assortments of timber volume for certain major regions and for the country as a whole.

The method of sampling is based on a series of randomisations, and the value of the samples will be dependent upon the instructions for location, layout, and measurement being carried out without bias on the part of the surveyors. It must be clearly understood that it is unlikely that all plots will be representative of the stands in which they fall, or even that a series of plots will be fully representative of the county in which they fall, and that any attempt to make them so, whether conscious or unconscious, will tend to invalidate rather than to improve the results obtained.

2. Categories to be sampled

Sampling will be confined to Types 1 to 4, i.e.,

Coniferous High Forest
Mixed High Forest
Broadleaved High Forest
Coppice-with-Standards.

Within these Types the following categories will be differentiated as for the Area Survey

In Types 1, 2, and 3, Pure or Principal Species and Age-classes 2 to 9 with Sub Types 5 and 6.

In Type 4, Sub types* 1 to 4.

3. Distribution and Referencing of Plots

The plots to be measured will be selected in the office from the Hollerith lists by a process of stratified randomisation, at the rate of one plot to every 200 acres of each category to be sampled.

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* The words "Type" and "Sub-type" are here used in a somewhat different sense to that followed in the main body of this *Report*.

The position of each plot selected will be marked on a copy of the six-inch Ordnance Survey map already used for the Area Survey, by means of a randomised grid. Its computed distance from the nearest convenient fixed point (↟) will be indicated. It will be given a plot reference number, running serially within each county.

A check list of the plots selected will be prepared for each county. For each plot the top half of the front page of the relative Plot Data Form will be completed in the office to show details of reference and of the categories sampled, agreeing with the Area Survey Stand Data Form. These particulars are on no account to be altered, even although on the ground the description of the actual plot taken does not tally with them. (See paragraph 8.)

4. Size and Form of Plots

The normal whole plot will be a circular 1/10th acre (radius 37 ft. 3 in.).

In order to obtain a statistically correct sample of the edge effect in blocks of woodland of varying size and shape, plots whose centres fall less than 26 ft. from the boundary of a wood, or the edge of a major ride which has been excluded from the Census survey, will be moved on to the boundary and measured as two semi-circular (1/20th acre) half plots. Plots whose centres fall more than 26 ft. but not more than 37 ft. from the boundary will be moved inwards and their new centres taken at 38 ft. from the boundary.

The boundary in each case will be taken as the fence or other line on the six-inch Ordnance Survey Map.

5. Location of Plots

The centre of each plot will be determined on the ground by pacing the appropriate distance from the nearest fixed point (↟), in accordance with measurements recorded on the Area Survey map and check list.

In the case of combined stands, four alternative positions will be given, and each centre is to be located *in the order given on the check list.* The first to fall within the stand category which it is required to sample will be accepted as the plot site.

If a centre falls in the transition zone between the required stand category and a second category of the combined stand, it will be accepted as the plot site if it is the first or the third position to be located, and rejected if it is the second or fourth.

If none of the four positions given falls within the category which it is required to sample (nor can be accepted as falling within the transition zone between that and a second category), take the position which comes nearest to the required category, and move from it to the *nearest* point on the stand boundary, or on the median line of any surrounding transition zone. From this point continue into the stand in the same direction for a further distance of one chain and take this as the plot centre.

6. Lay-out of Plots

Measuring tapes will be used to lay out the circle, and to divide it into segments for convenience of booking and avoidance of bias in the distribution of the sample trees.

(*a*) *Whole Plots*: In densely stocked stands run out eight tapes radially from the plot centre to 37 ft. 3 in. and place an arrow or stick at the end of each radius. In sparsely stocked stands run out three or more tapes in the same manner, but direct them towards those trees or groups of trees whose inclusion or exclusion appears to be in doubt.

(*b*) *Halved Plots*: Measure along the boundary 37 ft. 3 in. on either side of the plot centre, leaving this marked with a stick or arrow. Using four tapes in densely stocked stands and a minimum of two in sparsely stocked stands, lay out from each new centre a semi-circular plot of 37 ft. 3 in. radius in a similar manner to (*a*). The two half plots touch each other at the original plot centre.

(*c*) *Adjustment for slope*: On ground of more than 15° slope (measured with the Abney level), the length of the radii running up and down the slope should be adjusted as follows:—

16—25°—increase radius to 38 ft. 3 in.

26—35°— ,, ,, ,, 40 ft. 3 in.

With slopes of more than 35°, and on broken and uneven ground, the measurement of the radii should be taken in steps.

7. Measurement of Plots

All measurable trees (2½ inches quarter girth, over bark, breast height and up, and having a straight or usable length of more than 10 feet) will be counted and numbered by segments, serially for each species. An appropriate number of sample trees will be selected at random for each species, girthed at breast height, and measured for total height or height of first length, as required.

(*a*) *Enumeration of Stems*: These will be recorded on the back of the inside flap of the Plot Data Form. The person booking should stand at the plot centre and indicate the first segment to be counted. Only one segment will be done at a time, and the persons counting will take the trees in sequence, working from the centre outwards and from left to right. They will call the species of each tree as they come to it, and in each case the booker will call back the serial number, which is to be marked on the inward side of the tree so that it can be seen from the plot centre. Trees which are not measurable will be marked with a cross, and will not be counted or recorded; the remainder will be booked (in "gates*" of 5) by species and segments in the columns provided. When enumeration is complete the totals for each species will be checked against the final serial number in each case.

(*b*) *Inclusion of Boundary Trees*: Where there is doubt as to whether a tree falls inside or outside the radius of the plot, its exact distance from the centre should be checked with one of the tapes. Trees whose butt at ground level is touched by the 37 ft. 3 in. mark on the tape (or the equivalent length where adjustments have been made for slope) will be treated as follows:—

If the total number of trees in the first segment (not counting the boundary tree or trees if they come in that segment) is odd, then exclude the first such boundary tree and include the second, and so on alternately. If the total number of trees in the first segment is even, include the first such boundary tree and exclude the second, and so on alternately.

In halved plots, these provisions apply to trees falling on the circumference only, and not to those occurring on the diameter. In order to obtain a correct sample of the edge effect, the latter have all to be included.

(*c*) *Selection of Sample Trees*: The selection of sample trees will be on a random basis by numbers.

(i) If there is a total of ten trees or less in the plot, all will be taken.

(ii) If there is a total of more than ten trees in the plot, ten samples, or as many as are present up to a maximum of ten, will be taken for the species having the largest total volume (not necessarily the Principal Species for the stand), plus five samples or as many as are present up to a maximum of five for each secondary species, but subject to a maximum of twenty samples for all secondary species together.

For the main species, if more than ten trees are present, the selection will be made by dividing the total by ten, and picking one number from the resultant quotient at random, using the sets of randomised numbers provided. Take as the first sample the tree having this number as its serial, and take the remaining samples at intervals of the quotient.

e.g. If there are 32 trees, select one number out of 3, say 2, and take the second tree and every third tree thereafter, *i.e.*, the 2nd, 5th, 8th, 11th, etc.

For each secondary species, if more than five trees are present, proceed in a similar manner but divide the total by five. If the number of samples so selected exceeds twenty for *all secondary species together*, reduce the quota for each species proportionately to the number of trees present, *i.e.*, also taking fewer samples for those species with the lower totals, until the number of samples is reduced to twenty.

(*d*) *Measurement of Sample Trees*: These will be recorded on the first (left hand) inside page of the Plot Data Form. Sample trees will be booked by species in order of their serial code numbers, and when space permits two lines should be left blank at the end of each species group to provide room for insertion of totals and means.

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* See Plot Data Form in Appendix I, page 170, for illustration of a "gate".

The breast-height quarter-girth will be recorded for each sample tree. Height measurements will then be taken on the following basis:—

(i) Conifers will be measured for total height, *i.e.*, to the tip of the leading shoot.

(ii) Broadleaves will be measured to the top of the first length, *i.e.*, to the first stop, to the throat of the fork, or to the spring of the crown, as the case may be.

In the case of a crop in which the maximum total height, or height of first length, as required, is less than forty feet, heights may be taken with the measuring rod. Where maximum heights are over forty feet, the heights of the three sample trees of largest girth in the main species are to be taken by Abney level, and the remaining heights may be taken with the measuring rod, and by reference to these check trees.

As far as possible heights by Abney level should be taken at 45° so as to give a direct reading, and where convenient the actual height in feet from ground to eye level may be recorded in lieu of the lower angle.

8. Completion of Plot Data Form

The last column of the left-hand inside page, and all columns of the right-hand inside page will be filled up in the office, and the summarised data will be transferred from those pages to complete the front of the form.

Before the form is sent to the office the final field entries will be made on the front of the form:

(a) Surveyor's number and initials and the date of measurement.

(b) Marking of the plot, relative to the Area Survey stand description. As Representative, Fairly Representative or Unrepresentative. This will be done by ringing the appropriate code number (respectively 1, 2 or 3) on the following basis:

Representative plots will be those which agree with the stand description in respect of Type, Age-class and/or Sub-type, Principal Species, Stocking and Tree Form.

Fairly Representative plots will be those which agree with the stand description in the major classifications, but differ in the proportion of the Subsidiary Species, in Stocking or in Tree Form.

Unrepresentative plots will be those which differ from the stand description in respect of either Type, Age-class and/or Sub-type, or Principal Species.

If a plot is marked as "Unrepresentative", the reasons for the marking should be noted on the blank space to the right of the Remarks column on the inside right-hand page of the Plot Data Form.

APPENDIX III

HOLLERITH LISTS

The preparation of the Hollerith cards, which carry the details obtained from the Stand Data Forms, has been discussed in Appendix I, page 165. Each stand has its own card, and when a number of such cards are passed through the Hollerith sorting and tabulating machines, the information recorded upon them is reproduced in typewritten form on Lists such as Sample 1 and Sample 2 shown on the following pages. These machines can also total, automatically, certain columns of figures, and provide further totals at different levels of classification. In this Census, the totals required were those of acreages of woodland, and of numbers of stands, as shown in Sample 1 Columns (15) to (19).

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FORESTRY COMMISSION CENSU

P. or FC	County	Forest	Type	ST 1—4 7—8	Princ. Species	Sub Species	Age Class	ST 5—6	Stock	Tree Form	SE
1	2	3	4	5	6	7	8	9	10	11	12
1	86		3	0	0060	0030	9	0	4	2	3
1	86		3	0	0070	0000	2	0	2	2	1
1	86		3	0	0090	0020	3	0	2	2	1
1	86		3	0	0090	0020	5	0	2	3	3
1	86		3	0	0090	0050	6	0	2	3	1
1	86		3	0	0090	0010	6	0	2	3	1
1	86		3	0	0090	0060	6	0	3	4	3
1	86		3	0	0090	0020	6	0	3	3	3
1	86		3	0	0090	0050	9	0	3	3	1
1	86		3	0	0090	0010	9	0	3	3	3
1	86		3	0	0090	0030	9	0	4	3	1

Sample 1 is part of a general list (List A) prepared for all High Forest Stands. This section of it relates to all privately-owned Broadleaved High Forest in the County of Kent; the sample is the end of that Section. To prepare the section as a whole, cards for all Private Woodlands (1 in the first column) in the County of Kent (86 in the second column) that fell in the Broadleaved High Forest sub-type (3 in the fourth column) were fed into a sorting machine which sorted them out in accordance with their coding. After sorting into due order, the cards were put in a tabulating machine which automatically prepared the list. This list is in the same code as the Stand Data Forms. The third column is reserved for the code numbers of individual State Forests, so is left blank against all these Private Woodland entries. The fourth column is mentioned above. The fifth column throughout this example shows "0", as it was not required for the classification of the High Forest Stands here represented. It was used (1-4) for Coppice-with-Standards or alternatively (7-8) for Felled areas. (See 6th row down on Stand Data Form.)

Taking the first entry, the columns from (6) to (15) are read as follows:

Column 6 : 0060 : Principal species is sycamore
„ 7 : 0030 : Subsidiary species is beech
„ 8 : 9 : Age-class is "Uneven"
„ 9 : 0 : A "nil entry" showing that the stand (though uneven-aged) was not under-planted, nor did it represent natural regeneration. The other possible entries are 5—under-planted, or 6—natural regeneration. (See 6th Row down on Stand Data Form.)

ple 1

OF WOODLANDS 1947—LIST A (Sheet No. 55)

Map No.	Stand No.	AREA IN ACRES			No. OF STANDS		
		Minor	Inter	Major	Inter	Major	
13	14	15	16	17	18	19	
581	019 ▲	5					
		5	166	202	26	35	
394	039	5					
		5	5	5	1	1	
444	017	12					
		12	12		1		
651	003	4					
		4	4		1		
191	007	13					
671	037	1					
		14					
562	061	1					
464	017	4					
		5	19		4		
191	006	14					
573	035	7					
		21					
173	011	10					
		10	31	66	3	9	
				12,769 ●		1,404 ●	

Column 10 : 4 : The stocking is "Bad"
,, 11 : 2 : The tree form is "Satisfactory"
,, 12 : 3 : Unsuitable for Economic Management (S.E.M.=Suitability for Economic Management)
,, 13 : 581 : The map on which the stand is shown is Ordnance Survey six-inch quarter-sheet No. 58 N.W. (for the County of Kent)
,, 14 : 019 : Reference number on map, Stand Data Form, etc., is 19. County, Map, and Reference Numbers are needed to identify a stand, as reference numbers start afresh on each map; and Map Numbers start afresh for each County.
,, 15 : 5 : Area of stand is 5 acres
,, 16 : 166 : An intermediate total of stands of a similar description
,, 17 : 202 : A major total of these stands, and others, of a more general common description
,, 18 : 26 : Total number of stands represented by acreage shown in Column (16)
,, 19 : 35 : Total number of stands represented by acreage shown in Column (17)

(The symbols ▲ and ● were not put on by the Hollerith machine, but have been added to this example as reference marks.)

So, expressing it more briefly, the first entry is that for stand number 19 on Map sheet 58, north-west, in Kent, which consists of 5 acres of sycamore, with beech as a subsidiary species.

It is uneven-aged, badly stocked, and of satisfactory tree form; it is considered unsuitable for economic management.

This example shows how the description of any stand can easily be reconstructed from the Hollerith Lists; this could be done very quickly by a worker who was familiar with the code. It is not necessary to refer to either the Stand Data Forms or the Hollerith Cards.

Further inspection of Sample 1 shows that the Major Totals in Column (17) refer to all stands having the same entry in Column (6). For example, the last entry shown, 66, means that in Kent there are 66 acres of Broadleaved High Forest with a Principal Species of Code Number 0090—that is, hornbeam. This area is comprised of 9 stands (Col. 19).

The parallel Intermediate Total in Column (16), refers to all stands having the same entries in Columns (6) *and* (8). It shows that 31 acres of this hornbeam High Forest is "Uneven-aged" (Code No. 9). This is made up of 3 stands (Col. 18).

Minor totals represent stands which are similar in species (Col. 6) and age-class (Col. 8) but differ in stocking (Col. 10). Thus, the last stand, being the only one of its species and age-class "badly stocked" (Code No. 4), stands alone, with its own minor "total" of 10 acres. But above it are two otherwise similar stands that are "poorly stocked" (Code No. 3); these are therefore added together to show the minor total of 21 acres (Col. 15).

The entries here marked with a ● in Columns (17) and (19) are "full totals", that is, the sum of all major totals at the end of each sectional list. They show that there are 12,769 acres of Broadleaved High Forest in Kent, comprised in 1,404 stands.

In general, in each category that is being classified, the lowest code numbers come first, with others in order up to the highest; categories which have not been sorted appear at

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FORESTRY COMMISSION CENSUS

P. or FC	County	Forest	Type	ST 1—4 7—8	Princ. Species	Sub Species /	Age Class	ST 5—6	Stock	Tree Form	SEM
1	2	3	4	5	6	7	8	9	10	11	12
1	86		4	1	0010	0000			1	2	1
1	86		4	1	0010	0000			1	2	1
1	86		4	1	0010	0000			1	2	1
1	86		4	1	0010	0000			1	2	1
1	86		4	1	0010	0000			1	2	1
1	86		4	1	0010	0000			1	3	1
1	86		4	1	0010	0000			1	2	1
1	86		4	1	0010	0000			1	2	1
1	86		4	1	0010	0000			1	2	1
1	86		4	1	0010	0000			1	2	1
1	86		4	1	0010	0000			1	2	1
1	86		4	1	0010	0000			1	3	1
1	86		4	1	0010	0000			1	2	1
1	86		4	1	0010	0000			1	2	1
1	86		4	1	0010	0000			1	2	1
1	86		4	1	0010	0050			1	2	1
1	86		4	1	0010	0000			1	2	1
1	86		4	1	0010	0050			1	2	1
1	86		4	1	0010	0050			1	2	1
1	86		4	1	0010	0050			1	2	1
1	86		4	1	0010	0000			1	2	1
1	86		4	1	0010	0050			1	2	1
1	86		4	1	0010	0050			1	2	1
1	86		4	1	0010	0050			1	2	1

random. Stands that are identical as regards the "sorted" classification normally follow one another in sequence of Map and Stand number, but to avoid unnecessary sortings this order was not insisted upon.

The symbol ▲ indicates a stand in which a Volume Survey Plot was taken.

Sample 2 is part of another general list (List B) prepared for all Coppice-with-Standards woods in the country. It is actually the start of the section of it that dealt with the County of Kent. The general scheme of coding is the same as for Sample 1, but the entry "1" in Column (5) signifies "Chestnut coppice", (see 6th row down on Stand Data Form), and Columns (8) and (9) are not used, being inapplicable. As it happens, there are no totals in this sample, but actually totals by Standard species (Col. 6), coppice species (Col. 5) and stocking (Col. 10) were cast up further down the List.

The stands marked by the symbol ▲ were taken for Volume Survey Plots. The first of them, underlined, is that previously described in Appendix I, page 165. Being the first of a series, its selection represents a random factor. A number selected at random, between 0 and 200, was taken, in this case 122. The areas of the first stands to appear in the list were then totalled until this figure was reached, so:

$$3 + 21 = 24$$
$$24 + 82 = 106$$
$$106 + 21 = 127$$

As the random number required, i.e., 122, falls between 106 and 127, the 122nd acre lies in the fourth stand in the list, and this stand must be sampled.

ple 2

OF WOODLANDS 1947—LIST B (Sheet No. 1)

Map No.	Stand No.	AREA IN ACRES Minor	Inter	Major	No. OF STANDS Inter	Major	
13	14	15	16	17	18	19	
443	011	3					
443	026	21					
312	025	82					
452	064 ▲	21					
312	005	9					
434	021	9					
353	054	92					
353	057	12					
344	008	16					
344	015	11					
411	027	7					
331	003	11					
352	019	11					
352	021	10					
352	025 ▲	45					
352	035	13					
352	043	7					
352	074	56					
352	080	13					
352	087	10					
352	089	17					
352	100	4					
352	103	3					

Subsequent stands for sampling are selected by finding subsequent 200th acres. So, carrying forward 5 (127—122) from the fourth stand down, the calculation proceeds:

$$5 + 9 + 9 + 92 + 12 + 16 + 11 + 7 + 11 + 11 + 10 = 193.$$

But: $193 + 45 = 238$.

As 200 falls between 193 and 238, the next stand to be sampled is that of 45 acres, indicated by another symbol ▲.

Within the stands to be sampled, the site of the plots are taken at random, as explained in Chapter 15, page 136. No attempt was made to site them on any particular acre.

To make the selection of stands to be sampled as random as possible, the series of "200 acres" was carried over from one description of forest to another, and also from one county to the next.

As, however, the stands are selected from a sorted list, there is an element of "stratification" in their choice. For High Forest stands, the list (as in Sample 1) had been arranged by ownership of woodland, county, sub-type of High Forest, principal species, age-class, and stocking. One result of this is, that if there are 200 acres or more of woodlands having a common description in all these respects, at least one stand for sampling is bound to be selected from among them.

DETAILS OF CLASSIFICATION

The mechanical sorting and tabulating procedure can be so arranged as to produce an almost infinite variety of classifications of data, by appropriate settings of the machines. Hence, it is necessary to record those classifications which were actually used in the Area Survey as set out below.

Key to Hollerith Lists and Summaries used in this Census of Woodlands

LIST A =List of every stand in "Types" 1, 2 and 3 separately (Coniferous, Mixed and Broadleaved High Forest, described as "Sub-types" in the main *Report*), classified by Stocking, within Age-class, within Principal Species, with totals for the area and number of stands in each category. (See Sample 1 for example.)

LIST B =List of every stand in "Type" 4 (Coppice-with-Standards, a "Sub-type" in the main *Report*), classified by Principal Species (of Standards), within Stocking, within "sub-type" (species of coppice), with totals for the area and number of stands in each category. (See Sample 2.)

LIST C1 =List of every stand in "Types" 5, 6 and 7 separately (Coppice, Scrub and Devastated), classified by Suitability for Economic Management, within Principal Species; and of every stand in "Type" 9 (Lost or Disafforested); with totals for the area and number of stands in each category.

LIST C2 =List of every stand in "Type" 8 (Felled), classified by Suitability for Economic Management, within Sub-type (date of felling) with totals for the area and number of stands in each category.

LIST E =List of every (pure) stand without a Subsidiary Species in "Types" 1 and 3 separately (Coniferous and Broadleaved High Forest), classified by stocking within Age-class, within Pure (or Principal) Species, with totals for the area and number of stands in each category (except stocking), and number of stands for each species.

SUMMARY D1 =Summary of all "Types" classified by Suitability for Economic Management, with totals for the area and number of stands in each category.

SUMMARY D2 =Summary of "Types" 1, 2 and 3 separately (Coniferous, Mixed and Broadleaved High Forest), classified by Age-class, within Suitability for Economic Management, with totals for the area and number of stands in each category.

APPLICATION OF CLASSIFICATIONS

The totals obtained by the classifications detailed above, formed the basis of nearly all the tables set out in this *Report*. The figures were obtained for counties, for countries, and for Great Britain as a whole. Only the country and Great Britain figures are given in this main *Report*, those for counties will appear in its *Supplements*.

In all cases, three sets of classified figures were obtained—for All Woodlands, Private Woodlands, and State Forests.

APPENDIX IV

NOTE ON CLASSIFICATION BY TYPE

As described in Chapter 2, Method of Survey, all woods covered by the Census, after deducting areas recorded as Disafforested, were classified by stands into eight Types. The definitions of these Types are given in Appendix II, and are explained more fully below.

The degree of accuracy attained by any classification of this sort rests upon two considerations. First, the amount of approximation involved in the definitions themselves; and second, the degree of uniformity and care with which they are applied.

A larger measure of approximation is acceptable for the purpose of a census than would be desirable in a purely local stock-taking, and sufficient latitude must be allowed in the definitions to ensure that they remain applicable to a varying range of conditions over the whole country. In the present survey, compromises were made on three main points, which are as follows:—

(1) Areas were computed to the nearest whole acre only. Stands less than one acre in extent were therefore normally ignored, or if considered to be of outstanding interest and importance, had to be recorded as a whole acre.

(2) Stands less than five acres in extent were only separated if important changes in description were involved. Within this five acre limit, variations which did not materially affect classification by Type, Age-class, or Principal Species were therefore either ignored, or combined under some intermediate heading.

(3) Stand categories which were so intermixed on the ground that the delimitation of internal boundaries would have taken an undue amount of time, were allotted proportions of their combined area, by estimation.

In the case of State Forests, classification was based on existing stock maps and records, and subject to the above approximations, is of known and acceptable accuracy. Information on the relative accuracy of the classification of Private Woodlands was obtained as a result of the Volume Sampling Survey, in which the randomly distributed one-tenth acre plots were marked as either "Representative", "Fairly Representative", or "Unrepresentative" of the stands in which they fell.

The proportions in each category were consistent for any major grouping of plots, and averaged 55 per cent. Representative, 23 per cent. Fairly Representative, and 22 per cent. Unrepresentative. The Unrepresentative plots were analysed in detail for Sussex, which not only contained the largest individual total number of plots, but was known to be a particularly intricate and difficult county to survey.

This analysis showed that 12 per cent. of all plots had a different principal species, and one per cent. were of a different age-class, to that recorded for the relative stand as a whole. Five per cent. fell partly or completely on rides or blanks, and only the remaining four per cent. were strictly Unrepresentative in regard to classification by Type. At least half these latter plots fell in small stands which, by definition, had legitimately not been separated in the course of survey; in particular, many of them were located in patches of simple coppice which occurred in stands recorded as Coppice-with-Standards.

On these grounds it seems justifiable to infer that the survey of Private Woodlands for the Types sampled, *i.e.*, for High Forest and for Coppice-with-Standards, is certainly accurate within five per cent., and probably accurate to within two per cent. The classification of the remaining Types is possibly somewhat less satisfactory than this, but distinctions are immaterial in view of the many gradual transitions which occurred from one such type to another. Taking all factors into account, it is considered that a fair representation of the degree of accuracy attained in the total classification would be given by rounding the results off to the nearest five acres in every hundred, up to a total of about 10,000 acres. Thereafter, owing to the tendency of a sufficient series of approximations of this nature to balance out, the degree of accuracy may be expected gradually to increase.

APPENDIX V

INCREMENT PERCENTAGES OF BROADLEAVED TREES

INCREMENT PERCENTAGES OF OAK, BEECH, ASH AND ELM

Source and species	Average annual increment percentage between the ages of:				
	Years 30—50	Years 50—70	Years 70—90	Years 90—110	Years 110—130
BRITISH STEM ANALYSES—					
Oak	13.9	6.0	3.5	2.3	1.9
Beech	13.9	6.3	3.7	2.9	2.2
Ash	10.9	5.8	3.4	2.4	1.8
Elm	14.3	6.3	3.5	2.6	1.9
GERMAN YIELD TABLES (Gehrhardt)—					
Oak Q.C. I	12.1	4.8	3.2	2.4	1.8
,, II	18.3	5.6	3.5	2.6	1.9
,, III	—	9.8	4.5	2.8	1.9
Beech Q.C. I A	19.5	5.1	2.8	1.8	
C	19.1	5.8	3.7	2.7	
D	15.1	6.3	4.3	3.2	
,, III A	34.2	6.3	3.2	2.0	
B	33.8	6.5	3.4	2.1	
C	33.1	6.5	3.7	2.4	
,, V A	(200)	11.2	4.2	2.2	

Definitions:— Q.C. =Quality Class
A =Light thinnings
B =Moderate Thinnings
C =Heavy thinnings
D =Very heavy thinnings

Reference:— Gehrhardt, E. *Ertragstafeln für reine und gleichartige Hochwaldbestände von Eiche, Buche, Tanne, Fichte, Kiefer, grüner Douglasie und Lärche.* Julius Springer. Berlin. 1930.

The British stem analyses from which these percentages were derived were based on 852 stems of oak, 218 of ash, 152 of elm and 107 of beech; but many of these trees were less than 130 years old so that the figures for the older age-classes are supported by fewer data.

Preliminary studies in the very few broadleaved permanent sample plots in Britain suggest that the periodic annual increment percentage of a stand is about 20-30 per cent. less than the increment percentage figure calculated from the stem analyses of individual trees. Of the several factors contributing to this difference the most important is probably the gradual reduction in the number of stems during the life of a crop. The close agreement in the above table between the British stem analysis data and Gehrhardt's yield tables therefore suggests that the crop increment percentages for broadleaved species in this country are lower than on the continent of Europe.

APPENDIX VI

DETAILED CLASSIFICATION BY COUNTIES

CONTENTS

NOTES

Argyll, Islands. Only Islay, Jura, Gigha, and Mull were surveyed, but all islands are included under Total Land Areas, Tables B and T.

Bute. The islands surveyed were Bute itself, Arran, and Great Cumbrae.

Inverness, Islands. Only Skye, Scalpay, and Raasay were surveyed, but all islands are included under Total Land Areas, Tables B and T.

Ross and Cromarty. The islands of this county were not surveyed, and are only shown in Table T.

Orkney and Zetland. Not surveyed. Only shown in Table T.

TABLE A: MAPS USED AS BASIS OF SURVEY AND

County	6″ O.S. Maps Used		Mean Date of Survey	Gross Area Surveyed
	Principal Edition	Boundaries Revised to:		Acres
Bedford	1902	4/42	1/47	12,521
Berkshire	1913	6/46	6/47	42,948
Buckingham	1926	7/46	11/48	35,911
Cambridge	1903	12/41	12/48	5,796
Chester	1911	7/39	8/48	18,921
Cornwall	1908	9/46	4/49	32,705
Cumberland	1926	6/46	12/47	34,911
Derby	1923	3/45	9/48	25,488
Devon	1906	9/46	3/49	91,767
Dorset	1902	8/45	12/48	42,541
Durham	1923	9/38	7/48	30,160
Essex	1924	6/46	4/49	32,041
Gloucester	1924	7/46	4/48	42,951
Hampshire	1910	7/46	5/47	106,079
,, I. of Wight	1909	7/46	5/48	5,100
Hereford	1905	9/46	7/48	40,932
Hertford	1925	7/46	2/49	27,834
Huntingdon	1927	4/42	12/48	5,972
Kent	Provisional	7/46	4/49	99,781
Lancashire	1919	3/46	2/48	41,112
Leicester	1931	9/46	10/48	12,434
Lincoln	1907	7/46	10/48	36,673
London	Provisional	6/36	3/49	734
Middlesex	Provisional	7/46	1/49	2,951
Norfolk	1907	7/39	12/48	50,268
Northampton	1901	9/46	11/48	20,972
Northumberland	1925	8/43	4/48	48,528
Nottingham	1921	6/40	10/48	26,900
Oxford	1922	4/42	10/48	25,697
Rutland	1905	8/43	12/48	3,395
Shropshire	1903	4/42	6/48	50,694
Somerset	1904	11/38	2/49	44,170
Stafford	1925	7/46	11/48	34,820
Suffolk	1905	9/46	3/49	35,144
Surrey	Provisional	6/40	4/47	71,967
Sussex	1914	4/48	10/48	138,654
Warwick	1906	7/46	9/48	19,780
Westmorland	1920	4/37	10/47	19,309
Wiltshire	1926	7/46	5/48	47,092
Worcester	1929	7/46	8/48	20,366
Yorkshire E.R.	1910	7/46	9/48	17,578
,, N.R.	1914	8/39	7/48	56,477
,, W.R.	1910	9/45	7/48	65,075
ENGLAND	—	—	—	1,625,149

NOTES

1. *Principal Edition:* The edition named is that covering the largest area of woodland in the county.
2. *Boundaries:* The county boundaries were revised to agree with the latest Index Sheets, published at the respective dates given.
3. *Mean date of Survey:* The datum to which all figures of area refer. Except in a few of the larger counties, survey did not extend more than a month before and after the respective dates given.
4. *Gross Area Surveyed:* The total area, within the revised county boundaries, of blocks five acres and upwards, and exceeding one chain in width, shown as woodland on the current editions of the six-inch Ordnance Survey maps, or existing as such at the date of survey.

These figures only refer to Private Woodlands. Corresponding figures for State Forests may be obtained by adding the second column of Table B to the second column of Table S.

GROSS AREA SURVEYED IN PRIVATE WOODLANDS, BY COUNTIES

County	6″ O.S. Maps Used		Mean Date of Survey	Gross Area Surveyed
	Principal Edition	Boundaries Revised to:		Acres
Aberdeen	1901	3/45	1/48	120,057
Angus	1927	8/45	6/47	44,569
Argyll Mainland	1900	7/46	8/48	69,814
,, Islands	1900	8/45	9/48	12,569
Ayr	1910	2/42	11/47	26,669
Banff	1905	3/45	12/47	36,942
Berwick	1908	7/46	4/47	14,405
Bute	1897	8/45	9/48	5,209
Caithness	1907	9/38	6/47	1,921
Clackmannan	1924	7/46	3/48	3,582
Dunbarton	1923	2/45	4/48	11,105
Dumfries	1900	7/46	8/47	29,208
East Lothian	1908	5/35	2/48	10,535
Fife	1920	7/46	3/48	24,354
Inverness Mainland	1903	7/46	5/48	173,273
,, Islands	1903	5/35	6/48	5,055
Kincardine	1927	8/40	8/47	24,050
Kinross	1920	7/46	2/48	3,138
Kirkcudbright	1910	7/42	9/47	17,921
Lanark	1912	7/46	9/47	24,238
Midlothian	1908	3/37	9/48	11,255
Moray	1906	7/46	5/47	48,145
Nairn	1906	3/45	11/47	18,514
Peebles	1909	7/46	6/47	9,986
Perth	1901	7/46	1/48	127,672
Renfrew	1915	2/42	3/48	6,648
Ross and Cromarty	1907	2/42	5/48	70,998
Roxburgh	1924	12/39	3/47	16,318
Selkirk	1900	7/46	6/47	4,865
Stirling	1923	8/45	7/48	16,962
Sutherland	1907	12/39	5/48	26,916
West Lothian	1922	2/42	8/48	4,699
Wigtown	1909	3/41	7/47	8,363
SCOTLAND	—	—	—	1,029,955
Anglesey	1926	7/40	4/48	2,029
Brecknock	1905	4/42	10/47	25,208
Cardigan	1906	4/42	11/47	14,089
Caernarvon	1920	4/42	4/48	10,582
Carmarthan	1907	4/42	11/47	23,947
Denbigh	1914	9/46	3/48	20,922
Flint	1914	2/46	3/48	8,120
Glamorgan	1921	6/46	12/47	28,047
Merioneth	1901	4/38	5/48	17,833
Monmouth	1922	4/42	2/48	27,970
Montgomery	1903	6/40	1/48	31,958
Pembroke	1908	8/43	10/47	10,293
Radnor	1905	8/43	11/47	13,582
WALES	—	—	—	234,580
GREAT BRITAIN	—	—	—	2,889,684

TABLE B: TOTAL WOODLAND AREA

County	Ownership		Total Area	Per Cent. Land Area
	Private	State		
	Acres	Acres	Acres	
Bedford	12,180	573	12,753	4.2
Berkshire	40,592	1,830	42,422	9.2
Buckingham	34,879	1,050	35,929	7.5
Cambridge	5,698	—	5,698	1.0
Chester	18,291	1,884	20,175	3.2
Cornwall	31,561	2,967	34,528	4.0
Cumberland	34,462	13,403	47,865	5.0
Derby	24,905	1,176	26,081	4.1
Devon	90,093	11,481	101,574	6.1
Dorset	41,961	5,439	47,400	7.6
Durham	29,022	4,326	33,348	5.2
Essex	31,074	—	31,074	3.2
Gloucester	41,909	21,834	63,743	7.9
Hampshire	102,599	40,962	143,561	14.9
,, I. of Wight	4,719	2,805	7,524	8.0
Hereford	39,851	6,069	45,920	8.6
Hertford	26,401	—	26,401	6.6
Huntingdon	5,902	—	5,902	2.5
Kent	94,897	7,635	102,532	10.5
Lancashire	40,762	4,181	44,943	3.8
Leicester	12,280	—	12,280	2.3
Lincoln	35,453	7,911	43,364	2.6
London	639	—	639	0.9
Middlesex	2,695	—	2,695	1.9
Norfolk	49,349	28,843	78,192	6.0
Northampton	20,143	8,871	29,014	4.6
Northumberland	48,284	33,474	81,758	6.4
Nottingham	25,933	8,579	34,512	6.4
Oxford	25,283	261	25,544	5.4
Rutland	3,130	200	3,330	3.4
Shropshire	48,808	3,605	52,413	6.1
Somerset	43,528	5,046	48,574	4.7
Stafford	33,845	5,396	39,241	5.4
Suffolk	34,402	21,422	55,824	5.9
Surrey	67,316	1,377	68,693	15.0
Sussex	136,010	7,664	143,674	15.5
Warwick	18,171	—	18,171	2.9
Westmorland	18,811	—	18,811	3.8
Wiltshire	46,018	6,939	52,957	6.2
Worcester	19,788	2,364	22,152	5.0
Yorkshire E.R.	16,850	245	17,095	2.3
,, N.R.	55,403	17,370	72,773	5.4
,, W.R.	63,218	749	63,967	3.6
ENGLAND	1,577,115	287,931	1,865,046	5.8

BY COUNTIES AND OWNERSHIP

County	Ownership		Total Area	Per Cent. Land Area
	Private	State		
	Acres	Acres	Acres	
Aberdeen	119,702	27,611	147,313	11.6
Angus	44,402	2,050	46,452	8.3
Argyll Mainland	69,665	46,050	115,715	7.9
,, Islands	12,567	2,267	14,834	2.8
Ayr	26,408	861	27,269	3.8
Banff	36,860	3,545	40,405	10.0
Berwick	14,195	1,046	15,241	5.2
Bute	5,206	—	5,206	3.7
Caithness	1,921	—	1,921	0.4
Clackmannan	3,482	65	3,547	10.2
Dunbarton	11,071	—	11,071	7.2
Dumfries	29,144	9,609	38,753	5.6
East Lothian	10,230	—	10,230	5.9
Fife	23,760	6,497	30,257	9.3
Inverness Mainland	172,694	33,572	206,266	10.7
,, Islands	5,044	1,306	6,350	0.8
Kincardine	24,050	8,169	32,219	13.4
Kinross	3,063	514	3,577	6.8
Kirkcudbright	17,801	13,854	31,655	5.5
Lanark	23,420	—	23,420	4.0
Midlothian	11,142	—	11,142	4.7
Moray	47,585	18,289	65,874	21.6
Nairn	18,473	1,556	20,029	19.1
Peebles	9,969	2,806	12,775	5.7
Perth	126,903	23,469	150,372	9.4
Renfrew	6,556	—	6,556	4.5
Ross and Cromarty	70,837	25,036	95,873	6.1
Roxburgh	16,235	4,018	20,253	4.7
Selkirk	4,858	236	5,094	3.0
Stirling	16,931	5,816	22,747	7.9
Sutherland	26,873	4,087	30,960	2.4
West Lothian	4,607	—	4,607	6.0
Wigtown	8,354	501	8,855	2.8
SCOTLAND	1,024,008	242,830	1,266,838	6.6
Anglesey	1,979	81	2,060	1.2
Brecknock	23,668	8,557	32,225	7.0
Cardigan	13,188	5,613	18,801	4.2
Caernarvon	10,480	9,202	19,682	5.5
Carmarthen	23,192	14,622	37,814	6.5
Denbigh	20,624	5,546	26,170	6.1
Flint	7,924	—	7,924	4.9
Glamorgan	26,272	12,529	38,801	7.5
Merioneth	17,513	12,782	30,295	7.2
Monmouth	26,644	10,615	37,259	10.7
Montgomery	29,811	9,509	39,320	7.7
Pembroke	9,938	—	9,938	2.5
Radnor	12,975	3,214	16,189	5.4
WALES	224,208	92,270	316,478	6.2
GREAT BRITAIN	2,825,331	623,031	3,448,362	6.1

TABLE C: AREA SUITABLE FOR ECONOMIC

County	Ownership		Total Area	Per Cent. Total Woodland
	Private	State		
	Acres	Acres	Acres	
Bedford	10,475	573	11,048	86
Berkshire	26,676	1,830	28,506	67
Buckingham	30,858	1,050	31,908	89
Cambridge	3,783	—	3,783	66
Chester	14,965	1,884	16,849	83
Cornwall	18,738	2,962	21,700	63
Cumberland	30,322	13,403	43,725	91
Derby	21,475	1,176	22,651	87
Devon	66,089	11,322	77,411	75
Dorset	39,712	5,427	45,139	95
Durham	24,040	4,311	28,351	85
Essex	26,381	—	26,381	85
Gloucester	31,112	21,389	52,501	82
Hampshire	81,216	31,101	112,317	78
,, I. of Wight	2,990	2,805	5,795	77
Hereford	33,806	6,069	39,875	87
Hertford	19,561	—	19,561	74
Huntingdon	4,472	—	4,472	76
Kent	79,282	7,634	86,916	85
Lancashire	33,539	4,181	37,720	84
Leicester	11,135	—	11,135	90
Lincoln	28,169	7,909	36,078	83
London	—	—	—	—
Middlesex	1,387	—	1,387	51
Norfolk	35,967	28,774	64,741	83
Northampton	16,099	8,860	24,959	86
Northumberland	44,072	33,336	77,408	94
Nottingham	23,684	8,579	32,263	93
Oxford	21,311	261	21,572	84
Rutland	2,435	200	2,635	80
Shropshire	40,692	3,605	44,297	84
Somerset	41,489	4,620	46,109	95
Stafford	31,192	5,396	36,588	93
Suffolk	22,997	21,416	44,413	80
Surrey	41,240	1,377	42,617	62
Sussex	120,851	7,662	128,513	89
Warwick	13,522	—	13,522	74
Westmorland	14,879	—	14,879	79
Wiltshire	35,566	6,931	42,497	80
Worcester	15,038	2,364	17,402	78
Yorkshire E.R.	10,994	230	11,224	66
,, N.R.	42,182	16,055	58,237	80
,, W.R.	55,258	749	56,007	88
ENGLAND	1,269,651	275,441	1,545,092	83

MANAGEMENT, BY COUNTIES AND OWNERSHIP

County	Ownership		Total Area	Per Cent. Total Woodland
	Private	State		
	Acres	Acres	Acres	
Aberdeen	110,070	26,620	136,690	94
Angus	39,950	2,050	42,000	90
Argyll Mainland	63,380	43,593	106,973	92
,, Islands	9,974	2,247	12,221	83
Ayr	21,689	861	22,550	82
Banff	34,240	3,385	37,625	93
Berwick	11,385	1,040	12,425	81
Bute	3,725	—	3,725	71
Caithness	331	—	331	17
Clackmannan	3,034	65	3,099	88
Dunbarton	8,967	—	8,967	81
Dumfries	25,263	9,585	34,848	90
East Lothian	8,219	—	8,219	81
Fife	20,741	6,463	27,204	90
Inverness Mainland	161,011	31,379	192,390	93
,, Islands	4,793	1,306	6,099	95
Kincardine	21,896	8,069	29,965	93
Kinross	2,653	514	3,167	88
Kirkcudbright	15,399	13,788	29,187	92
Lanark	16,474	—	16,474	70
Midlothian	6,265	—	6,265	56
Moray	43,935	18,248	62,183	94
Nairn	16,685	1,556	18,241	91
Peebles	8,219	2,751	10,970	86
Perth	119,851	23,302	143,153	95
Renfrew	5,313	—	5,313	81
Ross and Cromarty	64,434	22,945	87,379	91
Roxburgh	12,856	4,018	16,874	83
Selkirk	3,817	236	4,053	80
Stirling	14,439	5,706	20,145	88
Sutherland	24,833	4,081	28,914	93
West Lothian	3,757	—	3,757	82
Wigtown	7,291	501	7,792	88
SCOTLAND	914,889	234,309	1,149,198	91
Anglesey	933	81	1,014	49
Brecknock	15,705	8,457	24,162	75
Cardigan	8,246	5,611	13,857	73
Caernarvon	8,238	8,171	16,409	83
Carmarthen	13,527	14,409	27,936	74
Denbigh	15,276	5,423	20,699	79
Flint	5,658	—	5,658	72
Glamorgan	14,560	12,364	26,924	69
Merioneth	13,129	12,568	25,697	85
Monmouth	17,933	10,593	28,526	77
Montgomery	21,543	9,482	31,025	79
Pembroke	5,121	—	5,121	52
Radnor	8,467	3,195	11,662	72
WALES	148,336	90,354	238,690	76
GREAT BRITAIN	2,332,876	600,104	2,932,980	85

TABLE D: UNPRODUCTIVE AREA,

County	Ownership		Total Area	Per Cent. Total Woodland
	Private	State		
	Acres	Acres	Acres	
Bedford	2,763	14	2,777	21
Berkshire	9,752	22	9,774	24
Buckingham	9,001	133	9,134	26
Cambridge	1,626	—	1,626	28
Chester	6,957	236	7,193	35
Cornwall	10,334	14	10,348	30
Cumberland	14,197	185	14,382	31
Derby	10,814	—	10,814	41
Devon	27,607	251	27,858	27
Dorset	12,724	806	13,530	28
Durham	14,460	164	14,624	44
Essex	13,172	—	13,172	42
Gloucester	10,524	2,851	13,375	21
Hampshire	19,705	3,272	22,977	16
,, I. of Wight	957	273	1,230	16
Hereford	12,044	447	12,491	27
Hertford	6,848	—	6,848	26
Huntingdon	2,102	—	2,102	36
Kent	13,739	1,147	14,886	15
Lancashire	14,031	1,219	15,250	35
Leicester	5,339	—	5,339	44
Lincoln	12,848	1,982	14,830	34
London	139	—	139	22
Middlesex	269	—	269	10
Norfolk	16,231	1,288	17,519	22
Northampton	6,465	732	7,197	25
Northumberland	17,578	729	18,307	22
Nottingham	13,519	915	14,434	42
Oxford	5,543	—	5,543	22
Rutland	863	—	863	26
Shropshire	20,296	335	20,631	39
Somerset	16,874	146	17,020	35
Stafford	18,670	104	18,774	48
Suffolk	6,870	4,031	10,901	19
Surrey	15,795	18	15,813	23
Sussex	22,815	2,103	24,918	18
Warwick	5,670	—	5,670	31
Westmorland	6,379	—	6,379	34
Wiltshire	12,545	2,625	15,170	29
Worcester	5,062	185	5,247	23
Yorkshire E.R.	6,590	—	6,590	39
,, N.R.	23,878	1,843	25,721	36
,, W.R.	23,754	10	23,764	37
ENGLAND	477,349	28,080	505,429	27

BY COUNTIES AND OWNERSHIP

County	Ownership		Total Area	Per Cent. Total Woodland
	Private	State		
	Acres	Acres	Acres	
Aberdeen	76,619	8,472	85,091	58
Angus	28,650	—	28,650	62
Argyll Mainland	49,113	5,111	54,224	46
,, Islands	9,917	256	10,173	69
Ayr	13,992	36	14,028	51
Banff	23,025	1,352	24,377	60
Berwick	4,782	82	4,864	32
Bute	3,159	—	3,159	61
Caithness	1,223	—	1,223	64
Clackmannan	2,223	24	2,247	63
Dunbarton	7,526	—	7,526	68
Dumfries	12,732	102	12,834	34
East Lothian	4,012	—	4,012	39
Fife	13,026	94	13,120	43
Inverness Mainland	130,853	8,332	139,185	67
,, Islands	4,311	—	4,311	68
Kincardine	14,081	1,437	15,518	48
Kinross	2,137	—	2,137	59
Kirkcudbright	8,552	1,745	10,297	33
Lanark	11,305	—	11,305	48
Midlothian	4,288	—	4,288	38
Moray	23,427	5,111	28,538	44
Nairn	11,866	1,094	12,960	65
Peebles	5,154	67	5,221	41
Perth	83,525	2,466	85,991	57
Renfrew	3,479	—	3,479	53
Ross and Cromarty	53,107	7,443	60,550	64
Roxburgh	4,946	43	4,989	25
Selkirk	1,848	5	1,853	36
Stirling	9,368	10	9,378	41
Sutherland	19,689	2,370	22,059	71
West Lothian	1,950	—	1,950	42
Wigtown	3,339	50	3,389	39
SCOTLAND	647,224	45,702	692,926	55
Anglesey	680	—	680	33
Brecknock	12,313	392	12,705	39
Cardigan	6,033	454	6,487	35
Caernarvon	4,239	305	4,544	23
Carmarthen	11,408	872	12,280	33
Denbigh	9,406	27	9,433	36
Flint	3,050	—	3,050	39
Glamorgan	14,731	689	15,420	39
Merioneth	8,348	370	8,718	28
Monmouth	12,413	1,055	13,468	35
Montgomery	12,709	156	12,865	33
Pembroke	4,697	—	4,697	47
Radnor	6,649	218	6,867	43
WALES	106,676	4,538	111,214	35
GREAT BRITAIN	1,231,249	78,320	1,309,569	38

TABLE E. HIGH FOREST,

County	Ownership		Total Area	Per Cent. Total Woodland
	Private	State		
	Acres	Acres	Acres	
Bedford	6,598	559	7,157	57
Berkshire	20,991	1,795	22,786	53
Buckingham	22,536	917	23,453	65
Cambridge	2,732	—	2,732	48
Chester	11,283	1,644	12,927	65
Cornwall	16,990	2,647	19,637	57
Cumberland	19,032	13,218	32,250	67
Derby	13,590	1,176	14,766	57
Devon	58,985	11,094	70,079	69
Dorset	15,862	4,630	20,492	44
Durham	14,544	4,162	18,706	56
Essex	13,617	—	13,617	44
Gloucester	27,833	18,408	46,241	73
Hampshire	35,734	36,564	72,298	50
,, I. of Wight	2,090	2,374	4,464	60
Hereford	19,503	5,561	25,064	54
Hertford	13,493	—	13,493	51
Huntingdon	2,125	—	2,125	36
Kent	16,743	3,687	20,430	20
Lancashire	24,675	2,593	27,268	60
Leicester	6,106	—	6,106	49
Lincoln	20,266	5,628	25,894	60
London	500	—	500	78
Middlesex	1,820	—	1,820	68
Norfolk	30,337	27,484	57,821	74
Northampton	7,791	8,125	15,916	55
Northumberland	30,641	32,745	63,386	78
Nottingham	11,187	7,624	18,811	54
Oxford	16,507	261	16,768	65
Rutland	2,137	200	2,337	70
Shropshire	26,150	3,230	29,380	56
Somerset	22,255	4,875	27,130	56
Stafford	14,809	5,292	20,101	51
Suffolk	15,857	17,362	33,219	60
Surrey	33,194	1,071	34,265	50
Sussex	44,824	4,058	48,882	34
Warwick	10,108	—	10,108	56
Westmorland	9,374	—	9,374	50
Wiltshire	24,774	3,747	28,521	54
Worcester	10,112	1,804	11,916	55
Yorkshire E.R.	10,249	245	10,494	61
,, N.R.	31,406	15,527	46,933	64
,, W.R.	39,253	637	39,890	62
ENGLAND	778,613	250,944	1,029,557	55

BY COUNTIES AND OWNERSHIP

County	Ownership		Total Area	Per Cent. Total Woodland
	Private	State		
	Acres	Acres	Acres	
Aberdeen	43,074	19,139	62,213	42
Angus	15,752	2,050	17,802	38
Argyll Mainland	20,552	40,939	61,491	54
,, Islands	2,650	2,011	4,661	31
Ayr	12,416	825	13,241	49
Banff	13,832	2,193	16,025	40
Berwick	9,405	964	10,369	68
Bute	2,047	—	2,047	39
Caithness	698	—	698	36
Clackmannan	1,259	41	1,300	37
Dunbarton	3,545	—	3,545	32
Dumfries	16,412	9,488	25,900	66
East Lothian	6,210	—	6,210	61
Fife	10,734	6,403	17,137	57
Inverness Mainland	41,841	25,240	67,081	33
,, Islands	733	1,306	2,039	32
Kincardine	9,969	6,732	16,701	52
Kinross	926	514	1,440	41
Kirkcudbright	9,015	12,092	21,107	66
Lanark	12,115	—	12,115	52
Midlothian	6,854	—	6,854	62
Moray	24,158	13,178	37,336	56
Nairn	6,607	462	7,069	35
Peebles	4,815	2,739	7,554	59
Perth	43,120	21,000	64,120	43
Renfrew	3,077	—	3,077	47
Ross and Cromarty	17,730	17,593	35,323	36
Roxburgh	11,281	3,975	15,256	75
Selkirk	3,010	231	3,241	64
Stirling	7,563	5,806	13,369	59
Sutherland	7,184	1,717	8,901	29
West Lothian	2,650	—	2,650	58
Wigtown	5,013	451	5,464	61
SCOTLAND	376,247	197,089	573,336	45
Anglesey	1,285	81	1,366	66
Brecknock	8,936	8,154	17,090	53
Cardigan	3,258	5,159	8,417	45
Caernarvon	6,062	8,887	14,949	76
Carmarthen	6,448	13,491	19,939	52
Denbigh	11,076	5,519	16,595	63
Flint	4,749	—	4,749	59
Glamorgan	10,533	11,801	22,334	58
Merioneth	8,671	12,412	21,083	70
Monmouth	12,652	8,605	21,257	58
Montgomery	16,748	9,353	26,101	66
Pembroke	3,528	—	3,528	36
Radnor	5,502	2,996	8,498	52
WALES	99,448	86,458	185,906	59
GREAT BRITAIN	1,254,308	534,491	1,788,799	52

TABLE F: MAINLY CONIFEROUS HIGH FOREST, BY COUNTIES

County	Age Class			Total Area
	Under 40 years	Over 40 years	Uneven Aged	
	Acres	Acres	Acres	Acres
Bedford	1,610	531	98	2,239
Berkshire	5,914	623	2,255	8,792
Buckingham	2,345	449	264	3,058
Cambridge	272	89	126	487
Chester	2,821	754	278	3,853
Cornwall	4,026	506	489	5,021
Cumberland	17,498	1,166	2,105	20,769
Derby	3,874	495	201	4,570
Devon	19,537	2,122	1,784	23,443
Dorset	7,699	1,040	3,050	11,789
Durham	8,009	1,026	260	9,295
Essex	672	68	33	773
Gloucester	10,465	862	866	12,193
Hampshire	14,395	6,949	6,302	27,646
,, I. of Wight	1,124	75	40	1,239
Hereford	6,518	295	130	6,943
Hertford	1,453	240	235	1,928
Huntingdon	89	—	26	115
Kent	4,397	474	645	5,516
Lancashire	5,164	986	523	6,673
Leicester	699	79	12	790
Lincoln	6,170	646	283	7,099
London	—	—	—	—
Middlesex	37	5	12	54
Norfolk	30,255	1,683	2,034	33,972
Northampton	3,519	113	178	3,810
Northumberland	44,337	4,133	2,533	51,003
Nottingham	9,261	464	161	9,886
Oxford	1,425	212	177	1,814
Rutland	236	—	—	236
Shropshire	7,798	537	435	8,770
Somerset	8,404	554	262	9,220
Stafford	8,004	504	191	8,699
Suffolk	18,455	2,242	821	21,518
Surrey	2,686	1,392	6,722	10,800
Sussex	8,102	1,625	2,378	12,105
Warwick	822	150	51	1,023
Westmorland	1,430	1,141	153	2,724
Wiltshire	4,961	598	738	6,297
Worcester	2,491	104	119	2,714
Yorkshire E.R.	2,445	816	114	3,375
,, N.R.	20,575	2,501	2,783	25,859
,, W.R.	5,595	2,009	1,286	8,890
ENGLAND	305,589	40,258	41,153	387,000

AND PRINCIPAL AGE GROUPS—ALL WOODLANDS

County	Age Class			Total Area
	Under 40 years	Over 40 years	Uneven Aged	
	Acres	Acres	Acres	Acres
Aberdeen	32,521	19,832	3,223	55,576
Angus	8,100	4,020	364	12,484
Argyll Mainland	46,128	3,846	956	50,930
,, Islands	2,504	902	54	3,460
Ayr	7,106	1,111	282	8,499
Banff	8,552	4,012	870	13,434
Berwick	3,307	1,989	108	5,404
Bute	819	381	32	1,232
Caithness	67	255	71	393
Clackmannan	766	63	7	836
Dunbarton	821	716	21	1,558
Dumfries	17,869	1,504	602	19,975
East Lothian	1,649	1,043	76	2,768
Fife	10,015	1,656	214	11,885
Inverness Mainland	29,254	25,564	7,309	62,127
,, Islands	1,533	244	1	1,778
Kincardine	9,996	3,153	654	13,803
Kinross	898	181	8	1,087
Kirkcudbright	13,527	1,143	274	14,944
Lanark	5,108	1,256	150	6,514
Midlothian	1,120	1,173	52	2,345
Moray	25,195	8,036	1,551	34,782
Nairn	3,242	2,401	477	6,120
Peebles	4,672	1,112	201	5,985
Perth	38,151	7,460	2,631	48,242
Renfrew	998	971	58	2,027
Ross and Cromarty	19,233	10,180	3,197	32,610
Roxburgh	8,822	2,023	291	11,136
Selkirk	1,506	418	97	2,021
Stirling	8,074	934	116	9,124
Sutherland	5,238	2,696	351	8,285
West Lothian	943	278	63	1,284
Wigtown	1,188	682	203	2,073
SCOTLAND	318,922	111,235	24,564	454,721
Anglesey	209	67	13	289
Brecknock	9,310	143	172	9,625
Cardigan	5,667	141	60	5,868
Caernarvon	8,947	328	311	9,586
Carmarthen	13,627	143	93	13,863
Denbigh	7,487	595	303	8,385
Flint	710	288	92	1,090
Glamorgan	12,664	113	114	12,891
Merioneth	12,663	313	243	13,219
Monmouth	7,604	117	143	7,864
Montgomery	15,168	587	346	16,101
Pembroke	293	61	34	388
Radnor	3,705	246	106	4,057
WALES	98,054	3,142	2,030	103,226
GREAT BRITAIN	722,565	154,635	67,747	944,947

TABLE G: MAINLY BROADLEAVED HIGH FOREST, BY

County	Age Class			Total Area
	Under 60 years	Over 60 years	Uneven Aged	
	Acres	Acres	Acres	Acres
Bedford	1,374	1,537	2,007	4,918
Berkshire	1,129	2,655	10,210	13,994
Buckingham	2,448	4,706	13,241	20,395
Cambridge	404	376	1,465	2,245
Chester	1,205	5,583	2,286	9,074
Cornwall	1,270	2,745	10,601	14,616
Cumberland	2,590	5,384	3,507	11,481
Derby	3,790	4,267	2,139	10,196
Devon	3,873	6,169	36,594	46,636
Dorset	1,869	4,377	2,457	8,703
Durham	1,781	3,339	4,291	9,411
Essex	1,325	8,219	3,300	12,844
Gloucester	6,138	7,699	20,211	34,048
Hampshire	5,663	20,230	18,759	44,652
,, I. of Wight	1,191	591	1,443	3,225
Hereford	4,743	4,830	8,548	18,121
Hertford	1,602	3,967	5,996	11,565
Huntingdon	596	534	880	2,010
Kent	1,962	3,680	9,272	14,914
Lancashire	3,029	10,954	6,612	20,595
Leicester	1,679	2,895	742	5,316
Lincoln	6,562	2,549	9,684	18,795
London	21	71	408	500
Middlesex	285	862	619	1,766
Norfolk	3,720	4,279	15,850	23,849
Northampton	6,949	1,777	3,380	12,106
Northumberland	2,717	7,250	2,416	12,383
Nottingham	2,968	4,394	1,563	8,925
Oxford	1,798	3,068	10,088	14,954
Rutland	369	409	1,323	2,101
Shropshire	6,291	5,924	8,395	20,610
Somerset	4,007	9,596	4,307	17,910
Stafford	2,593	6,360	2,449	11,402
Suffolk	2,919	4,798	3,984	11,701
Surrey	2,296	2,864	18,305	23,465
Sussex	6,305	11,290	19,182	36,777
Warwick	1,182	2,769	5,134	9,085
Westmorland	1,058	3,016	2,576	6,650
Wiltshire	2,296	3,109	16,819	22,224
Worcester	1,750	1,857	5,595	9,202
Yorkshire E.R.	2,349	1,459	3,311	7,119
,, N.R.	3,474	4,859	12,741	21,074
,, W.R.	6,864	12,983	11,153	31,000
ENGLAND	118,434	200,280	323,843	642,557

COUNTIES AND PRINCIPAL AGE GROUPS—ALL WOODLANDS

County	Age Class			Total Area
	Under 60 years	Over 60 years	Uneven Aged	
	Acres	Acres	Acres	Acres
Aberdeen	413	3,504	2,720	6,637
Angus	196	1,767	3,355	5,318
Argyll Mainland	510	9,407	644	10,561
,, Islands	16	938	247	1,201
Ayr	258	3,341	1,143	4,742
Banff	191	1,576	824	2,591
Berwick	588	3,325	1,052	4,965
Bute	25	530	260	815
Caithness	16	176	113	305
Clackmannan	46	324	94	464
Dunbarton	56	1,741	190	1,987
Dumfries	321	3,484	2,120	5,925
East Lothian	156	3,068	218	3,442
Fife	637	3,764	851	5,252
Inverness Mainland	86	4,138	730	4,954
,, Islands	48	191	22	261
Kincardine	513	1,169	1,216	2,898
Kinross	90	229	34	353
Kirkcudbright	1,081	3,979	1,103	6,163
Lanark	489	2,994	2,118	5,601
Midlothian	108	4,188	213	4,509
Moray	152	1,135	1,267	2,554
Nairn	45	789	115	949
Peebles	46	1,200	323	1,569
Perth	2,416	9,743	3,719	15,878
Renfrew	11	928	111	1,050
Ross and Cromarty	143	1,903	667	2,713
Roxburgh	614	3,024	482	4,120
Selkirk	40	710	470	1,220
Stirling	549	2,999	697	4,245
Sutherland	31	454	131	616
West Lothian	83	1,268	15	1,366
Wigtown	659	1,506	1,226	3,391
SCOTLAND	10,633	79,492	28,490	118,615
Anglesey	167	691	219	1,077
Brecknock	1,115	1,303	5,047	7,465
Cardigan	704	824	1,021	2,549
Caernarvon	1,370	1,879	2,114	5,363
Carmarthen	2,037	922	3,117	6,076
Denbigh	2,228	3,273	2,709	8,210
Flint	953	1,610	1,096	3,659
Glamorgan	1,626	1,110	6,707	9,443
Merioneth	2,717	3,455	1,692	7,864
Monmouth	2,753	2,308	8,332	13,393
Montgomery	2,442	3,213	4,345	10,000
Pembroke	121	594	2,425	3,140
Radnor	291	2,093	2,057	4,441
WALES	18,524	23,275	40,881	82,680
GREAT BRITAIN	147,591	303,047	393,214	843,852

TABLE H: CONIFEROUS HIGH FOREST,

County	Ownership		Total Area	Per Cent. Total Woodland
	Private	State		
	Acres	Acres	Acres	
Bedford	1,784	128	1,912	15
Berkshire	5,025	1,789	6,814	16
Buckingham	1,852	277	2,129	6
Cambridge	253	—	253	5
Chester	1,876	1,522	3,398	17
Cornwall	1,837	2,522	4,359	13
Cumberland	6,869	12,968	19,837	41
Derby	2,971	560	3,531	14
Devon	10,342	10,633	20,975	21
Dorset	6,262	4,515	10,777	23
Durham	4,201	3,825	8,026	24
Essex	528	—	528	2
Gloucester	4,105	5,088	9,193	14
Hampshire	7,586	15,083	22,669	16
,, I. of Wight	85	644	729	10
Hereford	1,549	4,614	6,163	13
Hertford	1,301	—	1,301	5
Huntingdon	39	—	39	1
Kent	1,967	2,674	4,641	4
Lancashire	3,634	2,388	6,022	14
Leicester	546	—	546	4
Lincoln	1,949	2,902	4,851	11
London	—	—	—	—
Middlesex	35	—	35	1
Norfolk	6,196	23,472	29,668	38
Northampton	1,212	1,282	2,494	8
Northumberland	16,026	32,657	48,683	59
Nottingham	2,241	6,659	8,900	26
Oxford	1,062	15	1,077	4
Rutland	149	23	172	5
Shropshire	4,373	2,987	7,360	14
Somerset	3,558	4,725	8,283	17
Stafford	2,822	5,174	7,996	20
Suffolk	4,144	15,826	19,970	36
Surrey	6,952	419	7,371	11
Sussex	7,621	828	8,449	6
Warwick	547	—	547	3
Westmorland	2,091	—	2,091	11
Wiltshire	4,188	828	5,016	10
Worcester	1,051	1,248	2,299	11
Yorkshire E.R.	2,119	44	2,163	13
,, N.R.	8,262	15,198	23,460	32
,, W.R.	6,231	317	6,548	10
ENGLAND	147,441	183,834	331,275	18

BY COUNTIES AND OWNERSHIP

County	Ownership		Total Area	Per Cent. Total Woodland
	Private	State		
	Acres	Acres	Acres	
Aberdeen	35,152	19,037	54,189	37
Angus	9,936	2,041	11,977	26
Argyll Mainland	9,990	40,186	50,176	43
,, Islands	1,350	1,964	3,314	22
Ayr	6,956	820	7,776	29
Banff	10,978	2,193	13,171	33
Berwick	3,690	901	4,591	30
Bute	1,119	—	1,119	21
Caithness	280	—	280	14
Clackmannan	814	5	819	23
Dunbarton	1,440	—	1,440	13
Dumfries	9,778	9,336	19,114	49
East Lothian	2,419	—	2,419	24
Fife	4,920	6,270	11,190	37
Inverness Mainland	36,468	24,342	60,810	30
,, Islands	450	1,302	1,752	28
Kincardine	6,768	6,612	13,380	42
Kinross	621	427	1,048	29
Kirkcudbright	3,497	11,086	14,583	46
Lanark	5,993	—	5,993	26
Midlothian	2,026	—	2,026	19
Moray	21,190	13,126	34,316	52
Nairn	5,554	409	5,963	29
Peebles	2,818	2,699	5,517	43
Perth	26,961	19,701	46,662	31
Renfrew	1,860	—	1,860	28
Ross and Cromarty	14,413	17,454	31,867	33
Roxburgh	6,470	3,941	10,411	51
Selkirk	1,442	224	1,666	33
Stirling	3,039	5,763	8,802	39
Sutherland	6,419	1,717	8,136	27
West Lothian	1,090	—	1,090	24
Wigtown	1,552	75	1,627	18
SCOTLAND	247,453	191,631	439,084	34
Anglesey	100	81	181	9
Brecknock	1,404	8,027	9,431	29
Cardigan	604	5,131	5,735	31
Caernarvon	755	8,236	8,991	46
Carmarthen	549	13,047	13,596	35
Denbigh	2,266	5,453	7,719	30
Flint	724	—	724	9
Glamorgan	1,163	11,289	12,452	32
Merioneth	689	12,086	12,775	42
Monmouth	1,835	4,284	6,119	17
Montgomery	6,237	9,238	15,475	39
Pembroke	281	—	281	3
Radnor	963	2,996	3,959	24
WALES	17,570	79,868	97,438	31
GREAT BRITAIN	412,464	455,333	867,797	25

TABLE I: MIXED HIGH FOREST,

County	Ownership		Total Area	Per Cent. Total Woodland
	Private	State		
	Acres	Acres	Acres	
Bedford	650	78	728	6
Berkshire	4,037	2	4,039	9
Buckingham	1,657	293	1,950	5
Cambridge	569	—	569	10
Chester	956	16	972	5
Cornwall	1,629	7	1,636	5
Cumberland	2,421	80	2,501	5
Derby	1,936	164	2,100	8
Devon	4,581	261	4,842	5
Dorset	2,242	80	2,322	5
Durham	2,058	304	2,362	7
Essex	666	—	666	2
Gloucester	3,404	2,067	5,471	9
Hampshire	6,416	4,549	10,965	7
,, I. of Wight	229	772	1,001	13
Hereford	1,247	243	1,490	3
Hertford	1,774	—	1,774	6
Huntingdon	127	—	127	2
Kent	2,007	51	2,058	2
Lancashire	1,466	44	1,510	3
Leicester	596	—	596	5
Lincoln	3,541	886	4,427	10
London	8	—	8	1
Middlesex	44	—	44	2
Norfolk	4,982	2,624	7,606	10
Northampton	1,407	2,369	3,776	13
Northumberland	4,479	9	4,488	6
Nottingham	1,575	289	1,864	5
Oxford	1,694	—	1,694	7
Rutland	79	—	79	2
Shropshire	3,208	166	3,374	6
Somerset	2,031	27	2,058	4
Stafford	1,781	31	1,812	5
Suffolk	2,986	875	3,861	7
Surrey	5,665	66	5,731	8
Sussex	8,171	914	9,085	6
Warwick	1,029	—	1,029	6
Westmorland	1,369	—	1,369	7
Wiltshire	2,764	199	2,963	6
Worcester	656	19	675	3
Yorkshire E.R.	2,442	201	2,643	15
,, N.R.	4,561	150	4,711	6
,, W.R.	5,000	20	5,020	8
ENGLAND	100,140	17,856	117,996	6

BY COUNTIES AND OWNERSHIP

County	Ownership		Total Area	Per Cent. Total Woodland
	Private	State		
	Acres	Acres	Acres	
Aberdeen	2,900	19	2,919	2
Angus	1,561	—	1,561	3
Argyll Mainland	1,149	337	1,486	2
,, Islands	668	21	689	5
Ayr	2,159	—	2,159	8
Banff	742	—	742	2
Berwick	2,108	48	2,156	14
Bute	407	—	407	8
Caithness	187	—	187	10
Clackmannan	71	36	107	3
Dunbarton	447	—	447	4
Dumfries	2,041	27	2,068	5
East Lothian	1,040	—	1,040	10
Fife	1,387	46	1,433	5
Inverness Mainland	1,391	861	2,252	1
,, Islands	68	4	72	1
Kincardine	1,520	35	1,555	5
Kinross	130	—	130	4
Kirkcudbright	967	473	1,440	4
Lanark	1,236	—	1,236	5
Midlothian	709	—	709	6
Moray	809	46	855	1
Nairn	317	50	367	2
Peebles	900	11	911	7
Perth	3,692	205	3,897	3
Renfrew	363	—	363	6
Ross and Cromarty	1,121	111	1,232	1
Roxburgh	1,428	21	1,449	7
Selkirk	668	1	669	13
Stirling	917	41	958	4
Sutherland	319	—	319	1
West Lothian	359	—	359	8
Wigtown	905	156	1,061	12
SCOTLAND	34,686	2,549	37,235	3
Anglesey	241	—	241	11
Brecknock	351	15	366	1
Cardigan	235	22	257	1
Caernarvon	1,202	281	1,483	7
Carmarthen	280	127	407	1
Denbigh	1,594	49	1,643	6
Flint	583	—	583	7
Glamorgan	648	334	982	3
Merioneth	658	180	838	3
Monmouth	443	1,968	2,411	7
Montgomery	1,126	35	1,161	3
Pembroke	196	—	196	2
Radnor	267	—	267	2
WALES	7,824	3,011	10,835	3
GREAT BRITAIN	142,650	23,416	166,066	5

TABLE J: BROADLEAVED HIGH FOREST,

County	Ownership		Total Area	Per Cent. Total Woodland
	Private	State		
	Acres	Acres	Acres	
Bedford	4,164	353	4,517	36
Berkshire	11,929	4	11,933	28
Buckingham	19,027	347	19,374	54
Cambridge	1,910	—	1,910	33
Chester	8,451	106	8,557	43
Cornwall	13,524	118	13,642	39
Cumberland	9,742	170	9,912	21
Derby	8,683	452	9,135	35
Devon	44,062	200	44,262	43
Dorset	7,358	35	7,393	16
Durham	8,285	33	8,318	25
Essex	12,423	—	12,423	40
Gloucester	20,324	11,253	31,577	50
Hampshire	21,732	16,932	38,664	27
,, I. of Wight	1,776	958	2,734	37
Hereford	16,707	704	17,411	38
Hertford	10,418	—	10,418	40
Huntingdon	1,959	—	1,959	33
Kent	12,769	962	13,731	14
Lancashire	19,575	161	19,736	43
Leicester	4,964	—	4,964	40
Lincoln	14,776	1,840	16,616	39
London	492	—	492	77
Middlesex	1,741	—	1,741	65
Norfolk	19,159	1,388	20,547	26
Northampton	5,172	4,474	9,646	34
Northumberland	10,136	79	10,215	13
Nottingham	7,371	676	8,047	23
Oxford	13,751	246	13,997	54
Rutland	1,909	177	2,086	63
Shropshire	18,569	77	18,646	36
Somerset	16,666	123	16,789	35
Stafford	10,206	87	10,293	26
Suffolk	8,727	661	9,388	17
Surrey	20,577	586	21,163	31
Sussex	29,032	2,316	31,348	22
Warwick	8,532	—	8,532	47
Westmorland	5,914	—	5,914	32
Wiltshire	17,822	2,720	20,542	38
Worcester	8,405	537	8,942	41
Yorkshire E.R.	5,688	—	5,688	33
,, N.R.	18,583	179	18,762	26
,, W.R.	28,022	300	28,322	44
ENGLAND	531,032	49,254	580,286	31

BY COUNTIES AND OWNERSHIP

County	Ownership		Total Area	Per Cent. Total Woodland
	Private	State		
	Acres	Acres	Acres	
Aberdeen	5,022	83	5,105	3
Angus	4,255	9	4,264	9
Argyll Mainland	9,413	416	9,829	9
,, Islands	632	26	658	4
Ayr	3,301	5	3,306	12
Banff	2,112	—	2,112	5
Berwick	3,607	15	3,622	24
Bute	521	—	521	10
Caithness	231	—	231	12
Clackmannan	374	—	374	11
Dunbarton	1,658	—	1,658	15
Dumfries	4,593	125	4,718	12
East Lothian	2,751	—	2,751	27
Fife	4,427	87	4,514	15
Inverness Mainland	3,982	37	4,019	2
,, Islands	215	—	215	3
Kincardine	1,681	85	1,766	5
Kinross	175	87	262	8
Kirkcudbright	4,551	533	5,084	16
Lanark	4,886	—	4,886	21
Midlothian	4,119	—	4,119	37
Moray	2,159	6	2,165	3
Nairn	736	3	739	4
Peebles	1,097	29	1,126	9
Perth	12,467	1,094	13,561	9
Renfrew	854	—	854	13
Ross and Cromarty	2,196	28	2,224	2
Roxburgh	3,383	13	3,396	17
Selkirk	900	6	906	18
Stirling	3,607	2	3,609	16
Sutherland	446	—	446	1
West Lothian	1,201	—	1,201	26
Wigtown	2,556	220	2,776	31
SCOTLAND	94,108	2,909	97,017	8
Anglesey	944	—	944	46
Brecknock	7,181	112	7,293	23
Cardigan	2,419	6	2,425	13
Caernarvon	4,105	370	4,475	23
Carmarthen	5,619	317	5,936	16
Denbigh	7,216	17	7,233	27
Flint	3,442	—	3,442	43
Glamorgan	8,722	178	8,900	23
Merioneth	7,324	146	7,470	25
Monmouth	10,374	2,353	12,727	34
Montgomery	9,385	80	9,465	24
Pembroke	3,051	—	3,051	31
Radnor	4,272	—	4,272	26
WALES	74,054	3,579	77,633	25
GREAT BRITAIN	699,194	55,742	754,936	22

TABLE K: COPPICE (INCLUDING COPPICE-WITH

County	Ownership		Total Area	Per Cent. Total Woodland
	Private	State		
	Acres	Acres	Acres	
Bedford	2,819	—	2,819	22
Berkshire	9,849	13	9,862	23
Buckingham	3,342	—	3,342	9
Cambridge	1,340	—	1,340	24
Chester	51	4	55	—
Cornwall	4,237	306	4,543	13
Cumberland	1,233	—	1,233	2
Derby	501	—	501	2
Devon	3,501	136	3,637	4
Dorset	13,375	3	13,378	28
Durham	18	—	18	—
Essex	4,285	—	4,285	14
Gloucester	3,552	575	4,127	6
Hampshire	47,160	1,126	48,286	34
,, I. of Wight	1,672	158	1,830	24
Hereford	8,304	61	8,365	19
Hertford	6,060	—	6,060	23
Huntingdon	1,675	—	1,675	28
Kent	64,415	2,801	67,216	65
Lancashire	2,056	369	2,425	5
Leicester	835	—	835	7
Lincoln	2,339	301	2,640	6
London	—	—	—	—
Middlesex	606	—	606	22
Norfolk	2,781	71	2,852	4
Northampton	5,887	14	5,901	20
Northumberland	65	—	65	—
Nottingham	1,227	40	1,267	4
Oxford	3,233	—	3,233	13
Rutland	130	—	130	4
Shropshire	2,362	40	2,402	5
Somerset	4,399	25	4,424	9
Stafford	366	—	366	1
Suffolk	11,675	29	11,704	21
Surrey	18,327	288	18,615	27
Sussex	68,371	1,503	69,874	48
Warwick	2,393	—	2,393	13
Westmorland	3,058	—	3,058	17
Wiltshire	8,699	567	9,266	17
Worcester	4,614	375	4,989	22
Yorkshire E.R.	11	—	11	—
,, N.R.	119	—	119	—
,, W.R.	211	102	313	1
ENGLAND	321,153	8,907	330,060	18

STANDARDS), BY COUNTIES AND OWNERSHIP

County	Ownership		Total Area	Per Cent. Total Woodland
	Private	State		
	Acres	Acres	Acres	
Aberdeen	9	—	9	—
Angus	—	—	—	—
Argyll Mainland	—	—	—	—
,, Islands	—	—	—	—
Ayr	—	—	—	—
Banff	3	—	3	—
Berwick	8	—	8	—
Bute	—	—	—	—
Caithness	—	—	—	—
Clackmannan	—	—	—	—
Dunbarton	—	—	—	—
Dumfries	—	19	19	—
East Lothian	8	—	8	—
Fife	—	—	—	—
Inverness Mainland	—	—	—	—
,, Islands	—	—	—	—
Kincardine	—	—	—	—
Kinross	—	—	—	—
Kirkcudbright	234	17	251	1
Lanark	—	—	—	—
Midlothian	—	—	—	—
Moray	—	—	—	—
Nairn	—	—	—	—
Peebles	—	—	—	—
Perth	258	3	261	—
Renfrew	—	—	—	—
Ross and Cromarty	—	—	—	—
Roxburgh	8	—	8	—
Selkirk	—	—	—	—
Stirling	—	—	—	—
Sutherland	—	—	—	—
West Lothian	7	—	7	—
Wigtown	2	—	2	—
SCOTLAND	537	39	576	—
Anglesey	14	—	14	1
Brecknock	2,419	11	2,430	8
Cardigan	3,897	—	3,897	20
Caernarvon	179	10	189	1
Carmarthen	5,336	259	5,595	15
Denbigh	142	—	142	1
Flint	125	—	125	2
Glamorgan	1,008	39	1,047	3
Merioneth	494	—	494	2
Monmouth	1,579	955	2,534	7
Montgomery	354	—	354	1
Pembroke	1,713	—	1,713	17
Radnor	824	—	824	5
WALES	18,084	1,274	19,358	6
GREAT BRITAIN	339,774	10,220	349,994	10

TABLE L: COPPICE-WITH-STANDARDS,

County	Ownership.		Total Area	Per Cent. Total Woodland
	Private	State		
	Acres	Acres	Acres	
Bedford	1,171	—	1,171	9
Berkshire	8,522	—	8,522	20
Buckingham	2,233	—	2,233	6
Cambridge	1,063	—	1,063	19
Chester	—	—	—	—
Cornwall	15	—	15	—
Cumberland	695	—	695	1
Derby	453	—	453	2
Devon	714	43	757	1
Dorset	9,432	—	9,432	20
Durham	6	—	6	—
Essex	3,794	—	3,794	12
Gloucester	2,102	133	2,235	3
Hampshire	41,858	28	41,886	29
,, I. of Wight	1,364	79	1,443	19
Hereford	3,551	5	3,556	8
Hertford	4,101	—	4,101	15
Huntingdon	991	—	991	17
Kent	41,724	726	42,450	41
Lancashire	1,616	164	1,780	4
Leicester	572	—	572	5
Lincoln	1,363	73	1,436	3
London	—	—	—	—
Middlesex	581	—	581	21
Norfolk	1,153	—	1,153	2
Northampton	3,721	—	3,721	13
Northumberland	51	—	51	—
Nottingham	720	—	720	2
Oxford	2,401	—	2,401	10
Rutland	48	—	48	1
Shropshire	307	23	330	1
Somerset	3,089	3	3,092	6
Stafford	166	—	166	—
Suffolk	7,083	7	7,090	13
Surrey	13,526	70	13,596	20
Sussex	51,195	330	51,525	36
Warwick	1,646	—	1,646	9
Westmorland	2,511	—	2,511	14
Wiltshire	7,327	305	7,632	14
Worcester	2,503	—	2,503	11
Yorkshire E.R.	—	—	—	—
,, N.R.	27	—	27	—
,, W.R.	34	5	39	—
ENGLAND	225,429	1,994	227,423	12

BY COUNTIES AND OWNERSHIP

County	Ownership		Total Area	Per Cent. Total Woodland
	Private	State		
	Acres	Acres	Acres	
Aberdeen	—	—	—	—
Angus	—	—	—	—
Argyll Mainland	—	—	—	—
,, Islands	—	—	—	—
Ayr	—	—	—	—
Banff	—	—	—	—
Berwick	—	—	—	—
Bute	—	—	—	—
Caithness	—	—	—	—
Clackmannan	—	—	—	—
Dunbarton	—	—	—	—
Dumfries	—	—	—	—
East Lothian	—	—	—	—
Fife	—	—	—	—
Inverness Mainland	—	—	—	—
,, Islands	—	—	—	—
Kincardine	—	—	—	—
Kinross	—	—	—	—
Kirkcudbright	—	—	—	—
Lanark	—	—	—	—
Midlothian	—	—	—	—
Moray	—	—	—	—
Nairn	—	—	—	—
Peebles	—	—	—	—
Perth	89	—	89	—
Renfrew	—	—	—	—
Ross and Cromarty	—	—	—	—
Roxburgh	—	—	—	—
Selkirk	—	—	—	—
Stirling	—	—	—	—
Sutherland	—	—	—	—
West Lothian	—	—	—	—
Wigtown	—	—	—	—
SCOTLAND	89	—	89	—
Anglesey	—	—	—	—
Brecknock	883	—	883	3
Cardigan	9	—	9	—
Caernarvon	—	10	10	—
Carmarthen	73	—	73	—
Denbigh	—	—	—	—
Flint	—	—	—	—
Glamorgan	218	6	224	1
Merioneth	—	—	—	—
Monmouth	714	67	781	2
Montgomery	16	—	16	—
Pembroke	78	—	78	1
Radnor	202	—	202	1
WALES	2,193	83	2,276	1
GREAT BRITAIN	227,711	2,077	229,788	7

TABLE M: SIMPLE COPPICE,

County	Ownership		Total Area	Per Cent. Total Woodland
	Private	State		
	Acres	Acres	Acres	
Bedford	1,648	—	1,648	13
Berkshire	1,327	13	1,340	3
Buckingham	1,109	—	1,109	3
Cambridge	277	—	277	5
Chester	51	4	55	—
Cornwall	4,222	306	4,528	13
Cumberland	538	—	538	1
Derby	48	—	48	—
Devon	2,787	93	2,880	3
Dorset	3,943	3	3,946	8
Durham	12	—	12	—
Essex	491	—	491	2
Gloucester	1,450	442	1,892	3
Hampshire	5,302	1,098	6,400	5
,, I. of Wight	308	79	387	5
Hereford	4,753	56	4,809	11
Hertford	1,959	—	1,959	8
Huntingdon	684	—	684	11
Kent	22,691	2,075	24,766	24
Lancashire	440	205	645	1
Leicester	263	—	263	2
Lincoln	976	228	1,204	3
London	—	—	—	—
Middlesex	25	—	25	1
Norfolk	1,628	71	1,699	2
Northampton	2,166	14	2,180	7
Northumberland	14	—	14	—
Nottingham	507	40	547	2
Oxford	832	—	832	3
Rutland	82	—	82	3
Shropshire	2,055	17	2,072	4
Somerset	1,310	22	1,332	3
Stafford	200	—	200	1
Suffolk	4,592	22	4,614	8
Surrey	4,801	218	5,019	7
Sussex	17,176	1,173	18,349	12
Warwick	747	—	747	4
Westmorland	547	—	547	3
Wiltshire	1,372	262	1,634	3
Worcester	2,111	375	2,486	11
Yorkshire E.R.	11	—	11	—
,, N.R.	92	—	92	—
,, W.R.	177	97	274	1
ENGLAND	95,724	6,913	102,637	6

BY COUNTIES AND OWNERSHIP

County	Ownership		Total Area	Per Cent. Total Woodland
	Private	State		
	Acres	Acres	Acres	
Aberdeen	9	—	9	—
Angus	—	—	—	—
Argyll Mainland	—	—	—	—
,, Islands	—	—	—	—
Ayr	—	—	—	—
Banff	3	—	3	—
Berwick	8	—	8	—
Bute	—	—	—	—
Caithness	—	—	—	—
Clackmannan	—	—	—	—
Dunbarton	—	—	—	—
Dumfries	—	19	19	—
East Lothian	8	—	8	—
Fife	—	—	—	—
Inverness Mainland	—	—	—	—
,, Islands	—	—	—	—
Kincardine	—	—	—	—
Kinross	—	—	—	—
Kirkcudbright	234	17	251	1
Lanark	—	—	—	—
Midlothian	—	—	—	—
Moray	—	—	—	—
Nairn	—	—	—	—
Peebles	—	—	—	—
Perth	169	3	172	—
Renfrew	—	—	—	—
Ross and Cromarty	—	—	—	—
Roxburgh	8	—	8	—
Selkirk	—	—	—	—
Stirling	—	—	—	—
Sutherland	—	—	—	—
West Lothian	7	—	7	—
Wigtown	2	—	2	—
SCOTLAND	448	39	487	—
Anglesey	14	—	14	1
Brecknock	1,536	11	1,547	5
Cardigan	3,888	—	3,888	20
Caernarvon	179	—	179	1
Carmarthen	5,263	259	5,522	15
Denbigh	142	—	142	1
Flint	125	—	125	2
Glamorgan	790	33	823	2
Merioneth	494	—	494	2
Monmouth	865	888	1,753	5
Montgomery	338	—	338	1
Pembroke	1,635	—	1,635	16
Radnor	622	—	622	4
WALES	15,891	1,191	17,082	5
GREAT BRITAIN	112,063	8,143	120,206	3

TABLE N: SCRUB, BY

County	Ownership		Total Area	Per Cent. Total Woodland
	Private	State		
	Acres	Acres	Acres	
Bedford	1,471	9	1,480	11
Berkshire	3,652	—	3,652	9
Buckingham	4,269	—	4,269	12
Cambridge	828	—	828	14
Chester	3,263	7	3,270	16
Cornwall	5,066	5	5,071	15
Cumberland	2,672	35	2,707	6
Derby	3,955	—	3,955	15
Devon	9,167	42	9,209	9
Dorset	6,337	213	6,550	14
Durham	5,724	—	5,724	17
Essex	9,378	—	9,378	30
Gloucester	4,087	73	4,160	6
Hampshire	5,208	1,242	6,450	5
,, I. of Wight	710	87	797	10
Hereford	5,186	87	5,273	11
Hertford	2,673	—	2,673	10
Huntingdon	1,402	—	1,402	24
Kent	9,669	570	10,239	10
Lancashire	5,144	61	5,205	12
Leicester	2,281	—	2,281	19
Lincoln	4,371	1,617	5,988	14
London	139	—	139	22
Middlesex	190	—	190	7
Norfolk	4,192	178	4,370	6
Northampton	4,122	255	4,377	15
Northumberland	4,766	394	5,160	6
Nottingham	4,444	255	4,699	14
Oxford	2,677	—	2,677	11
Rutland	474	—	474	14
Shropshire	7,330	83	7,413	14
Somerset	9,582	133	9,715	20
Stafford	8,931	—	8,931	23
Suffolk	2,301	486	2,787	5
Surrey	5,470	6	5,476	8
Sussex	8,420	1,347	9,767	7
Warwick	2,944	—	2,944	16
Westmorland	1,348	—	1,348	7
Wiltshire	5,777	1,097	6,874	13
Worcester	1,936	119	2,055	9
Yorkshire E.R.	1,417	—	1,417	9
,, N.R.	5,846	1,175	7,021	10
,, W.R.	11,639	6	11,645	18
ENGLAND	190,458	9,582	200,040	10

COUNTIES AND OWNERSHIP

County	Ownership		Total Area	Per Cent. Total Woodland
	Private	State		
	Acres	Acres	Acres	
Aberdeen	13,258	541	13,799	9
Angus	6,858	—	6,858	15
Argyll Mainland	35,797	2,763	38,560	33
,, Islands	8,229	256	8,485	57
Ayr	4,403	29	4,432	16
Banff	7,161	—	7,161	18
Berwick	517	6	523	4
Bute	1,871	—	1,871	36
Caithness	990	—	990	52
Clackmannan	1,071	—	1,071	30
Dunbarton	5,018	—	5,018	46
Dumfries	3,454	9	3,463	9
East Lothian	1,178	—	1,178	11
Fife	2,270	19	2,289	8
Inverness Mainland	52,051	4,237	56,288	27
,, Islands	2,915	—	2,915	46
Kincardine	2,405	128	2,533	8
Kinross	226	—	226	6
Kirkcudbright	3,963	409	4,372	14
Lanark	2,819	—	2,819	12
Midlothian	1,216	—	1,216	11
Moray	6,613	1,296	7,909	12
Nairn	4,153	331	4,484	23
Peebles	102	—	102	1
Perth	37,002	533	37,535	25
Renfrew	1,505	—	1,505	23
Ross and Cromarty	20,276	2,346	22,622	24
Roxburgh	497	7	504	3
Selkirk	376	—	376	7
Stirling	5,501	10	5,511	24
Sutherland	7,807	13	7,820	25
West Lothian	856	—	856	18
Wigtown	1,343	49	1,392	16
SCOTLAND	243,701	12,982	256,683	20
Anglesey	424	—	424	21
Brecknock	6,955	287	7,242	22
Cardigan	1,745	200	1,945	10
Caernarvon	1,217	77	1,294	7
Carmarthen	4,235	796	5,031	13
Denbigh	1,446	2	1,448	6
Flint	791	—	791	10
Glamorgan	6,069	156	6,225	16
Merioneth	2,870	254	3,124	10
Monmouth	4,459	231	4,690	12
Montgomery	3,736	70	3,806	10
Pembroke	1,694	—	1,694	17
Radnor	2,455	59	2,514	16
WALES	38,096	2,132	40,228	13
GREAT BRITAIN	472,255	24,696	496,951	15

TABLE O: AREA DEVASTATED, BY

County	Ownership		Total Area	Per Cent. Total Woodland
	Private	State		
	Acres	Acres	Acres	
Bedford	247	—	247	2
Berkshire	4,003	4	4,007	10
Buckingham	1,846	3	1,849	5
Cambridge	464	—	464	8
Chester	1,062	—	1,062	5
Cornwall	1,833	—	1,833	5
Cumberland	2,570	2	2,572	6
Derby	2,121	—	2,121	8
Devon	6,381	186	6,567	6
Dorset	2,436	71	2,507	5
Durham	1,517	—	1,517	5
Essex	3,031	—	3,031	10
Gloucester	1,507	—	1,507	3
Hampshire	8,974	543	9,517	6
,, I. of Wight	124	167	291	4
Hereford	1,879	41	1,920	4
Hertford	1,714	—	1,714	7
Huntingdon	166	—	166	3
Kent	2,521	247	2,768	3
Lancashire	4,806	39	4,845	11
Leicester	762	—	762	6
Lincoln	2,109	166	2,275	5
London	—	—	—	—
Middlesex	59	—	59	2
Norfolk	4,989	7	4,996	6
Northampton	1,296	—	1,296	5
Northumberland	1,191	143	1,334	2
Nottingham	2,104	—	2,104	6
Oxford	1,414	—	1,414	5
Rutland	141	—	141	4
Shropshire	2,989	32	3,021	6
Somerset	2,083	13	2,096	4
Stafford	2,670	—	2,670	7
Suffolk	1,432	2,244	3,676	6
Surrey	7,233	—	7,233	11
Sussex	6,851	22	6,873	5
Warwick	993	—	993	6
Westmorland	2,068	—	2,068	11
Wiltshire	3,183	906	4,089	8
Worcester	918	—	918	4
Yorkshire E.R.	752	—	752	4
,, N.R.	2,704	273	2,977	4
,, W.R.	3,163	—	3,163	5
ENGLAND	100,306	5,109	105,415	6

COUNTIES AND OWNERSHIP

County	Ownership		Total Area	Per Cent. Total Woodland
	Private	State		
	Acres	Acres	Acres	
Aberdeen	163	87	250	—
Angus	191	—	191	—
Argyll Mainland	2,823	1,139	3,962	3
,, Islands	418	—	418	3
Ayr	564	6	570	2
Banff	602	2	604	1
Berwick	173	—	173	1
Bute	80	—	80	2
Caithness	37	—	37	2
Clackmannan	6	—	6	—
Dunbarton	34	—	34	—
Dumfries	749	27	776	2
East Lothian	488	—	488	5
Fife	443	—	443	1
Inverness Mainland	13,147	1,828	14,975	7
,, Islands	495	—	495	8
Kincardine	144	3	147	—
Kinross	286	—	286	8
Kirkcudbright	89	233	322	1
Lanark	526	—	526	2
Midlothian	132	—	132	1
Moray	526	121	647	1
Nairn	30	—	30	—
Peebles	167	—	167	1
Perth	199	8	207	—
Renfrew	62	—	62	1
Ross and Cromarty	3,126	410	3,536	4
Roxburgh	7	14	21	—
Selkirk	—	—	—	—
Stirling	261	—	261	1
Sutherland	1,290	2,357	3,647	12
West Lothian	20	—	20	—
Wigtown	123	—	123	2
SCOTLAND	27,401	6,235	33,636	3
Anglesey	48	—	48	2
Brecknock	1,562	—	1,562	5
Cardigan	441	—	441	3
Caernarvon	642	209	851	4
Carmarthen	384	7	391	1
Denbigh	1,425	—	1,425	6
Flint	316	—	316	4
Glamorgan	833	30	863	2
Merioneth	1,030	—	1,030	3
Monmouth	1,949	15	1,964	5
Montgomery	2,068	—	2,068	5
Pembroke	267	—	267	3
Radnor	783	4	787	5
WALES	11,748	265	12,013	4
GREAT BRITAIN	139,455	11,609	151,064	4

TABLE P: AREA FELLED, BY

County	Ownership		Total Area	Per Cent. Total Woodland
	Private	State		
	Acres	Acres	Acres	
Bedford	1,045	5	1,050	8
Berkshire	2,097	18	2,115	5
Buckingham	2,886	130	3,016	9
Cambridge	334	—	334	6
Chester	2,632	229	2,861	14
Cornwall	3,435	9	3,444	10
Cumberland	8,955	148	9,103	19
Derby	4,738	—	4,738	18
Devon	12,059	23	12,082	12
Dorset	3,951	522	4,473	9
Durham	7,219	164	7,383	22
Essex	763	—	763	2
Gloucester	4,930	2,778	7,708	12
Hampshire	5,523	1,487	7,010	5
,, I. of Wight	123	19	142	2
Hereford	4,979	319	5,298	12
Hertford	2,461	—	2,461	9
Huntingdon	534	—	534	9
Kent	1,549	330	1,879	2
Lancashire	4,081	1,119	5,200	12
Leicester	2,296	—	2,296	19
Lincoln	6,368	199	6,567	15
London	—	—	—	—
Middlesex	20	—	20	1
Norfolk	7,050	1,103	8,153	10
Northampton	1,047	477	1,524	5
Northumberland	11,621	192	11,813	14
Nottingham	6,971	660	7,631	22
Oxford	1,452	—	1,452	6
Rutland	248	—	248	8
Shropshire	9,977	220	10,197	19
Somerset	5,209	—	5,209	11
Stafford	7,069	104	7,173	15
Suffolk	3,137	1,301	4,438	8
Surrey	3,092	12	3,104	4
Sussex	7,544	734	8,278	6
Warwick	1,733	—	1,733	9
Westmorland	2,963	—	2,963	15
Wiltshire	3,585	622	4,207	8
Worcester	2,208	66	2,274	10
Yorkshire E.R.	4,421	—	4,421	26
,, N.R.	15,328	395	15,723	22
,, W.R.	8,952	4	8,956	14
ENGLAND	186,585	13,389	199,974	11

COUNTIES AND OWNERSHIP

County	Ownership		Total Area	Per Cent. Total Woodland
	Private	State		
	Acres	Acres	Acres	
Aberdeen	63,198	7,844	71,042	49
Angus	21,601	—	21,601	47
Argyll Mainland	10,493	1,209	11,702	10
,, Islands	1,270	—	1,270	9
Ayr	9,025	1	9,026	33
Banff	15,262	1,350	16,612	41
Berwick	4,092	76	4,168	27
Bute	1,208	—	1,208	23
Caithness	196	—	196	10
Clackmannan	1,146	24	1,170	33
Dunbarton	2,474	—	2,474	22
Dumfries	8,529	66	8,595	23
East Lothian	2,346	—	2,346	23
Fife	10,313	75	10,388	34
Inverness Mainland	65,655	2,267	67,922	33
,, Islands	901	—	901	14
Kincardine	11,532	1,306	12,838	40
Kinross	1,625	—	1,625	45
Kirkcudbright	4,500	1,103	5,603	18
Lanark	7,960	—	7,960	34
Midlothian	2,940	—	2,940	26
Moray	16,288	3,694	19,982	31
Nairn	7,683	763	8,446	42
Peebles	4,885	67	4,952	39
Perth	46,324	1,925	48,249	32
Renfrew	1,912	—	1,912	29
Ross and Cromarty	29,705	4,687	34,392	36
Roxburgh	4,442	22	4,464	22
Selkirk	1,472	5	1,477	29
Stirling	3,606	—	3,606	16
Sutherland	10,592	—	10,592	34
West Lothian	1,074	—	1,074	24
Wigtown	1,873	1	1,874	21
SCOTLAND	376,122	26,485	402,607	32
Anglesey	208	—	208	10
Brecknock	3,796	105	3,901	12
Cardigan	3,847	254	4,101	22
Caernarvon	2,380	19	2,399	12
Carmarthen	6,789	69	6,858	19
Denbigh	6,535	25	6,560	24
Flint	1,943	—	1,943	25
Glamorgan	7,829	503	8,332	21
Merioneth	4,448	116	4,564	15
Monmouth	6,005	809	6,814	18
Montgomery	6,905	86	6,991	18
Pembroke	2,736	—	2,736	27
Radnor	3,411	155	3,566	22
WALES	56,832	2,141	58,973	18
GREAT BRITAIN	619,539	42,015	661,554	19

TABLE Q: AREA FELLED BEFORE SEPTEMBER,

County	Ownership		Total Area	Per Cent. Total Woodland
	Private	State		
	Acres	Acres	Acres	
Bedford	252	—	252	2
Berkshire	153	—	153	—
Buckingham	227	—	227	1
Cambridge	14	—	14	—
Chester	272	—	272	1
Cornwall	620	—	620	2
Cumberland	829	—	829	2
Derby	1,127	—	1,127	4
Devon	2,629	—	2,629	3
Dorset	1,876	—	1,876	4
Durham	2,275	—	2,275	7
Essex	35	—	35	—
Gloucester	793	41	834	1
Hampshire	929	251	1,180	1
,, I. of Wight	23	—	23	—
Hereford	1,004	45	1,049	2
Hertford	98	—	98	—
Huntingdon	5	—	5	—
Kent	244	—	244	—
Lancashire	398	—	398	1
Leicester	95	—	95	1
Lincoln	1,278	150	1,428	3
London	—	—	—	—
Middlesex	—	—	—	—
Norfolk	1,224	16	1,240	2
Northampton	224	—	224	1
Northumberland	927	9	936	1
Nottingham	232	—	232	1
Oxford	77	—	77	—
Rutland	20	—	20	1
Shropshire	3,330	107	3,437	6
Somerset	891	—	891	2
Stafford	862	—	862	2
Suffolk	312	34	346	1
Surrey	233	—	233	—
Sussex	1,244	37	1,281	1
Warwick	132	—	132	1
Westmorland	858	—	858	4
Wiltshire	595	—	595	1
Worcester	214	—	214	1
Yorkshire E.R.	544	—	544	3
,, N.R.	4,330	36	4,366	6
,, W.R.	1,341	—	1,341	2
ENGLAND	32,766	726	33,492	2

1939, BY COUNTIES AND OWNERSHIP

County	Ownership		Total Area	Per Cent. Total Woodland
	Private	State		
	Acres	Acres	Acres	
Aberdeen	39,539	4,712	44,251	31
Angus	13,091	—	13,091	28
Argyll Mainland	6,889	188	7,077	6
,, Islands	1,015	—	1,015	7
Ayr	5,912	1	5,913	22
Banff	7,482	398	7,880	19
Berwick	1,804	54	1,858	12
Bute	711	—	711	13
Caithness	95	—	95	5
Clackmannan	913	18	931	26
Dunbarton	1,310	—	1,310	12
Dumfries	3,223	30	3,253	9
East Lothian	785	—	785	8
Fife	6,708	—	6,708	22
Inverness Mainland	37,435	911	38,346	19
,, Islands	763	—	763	12
Kincardine	4,722	932	5,654	18
Kinross	1,259	—	1,259	35
Kirkcudbright	2,539	52	2,591	8
Lanark	5,838	—	5,838	25
Midlothian	1,468	—	1,468	13
Moray	7,557	551	8,108	13
Nairn	3,026	62	3,088	15
Peebles	2,063	6	2,069	16
Perth	33,758	1,247	35,005	23
Renfrew	1,274	—	1,274	20
Ross and Cromarty	19,663	3,198	22,861	24
Roxburgh	1,747	—	1,747	9
Selkirk	168	—	168	3
Stirling	1,457	—	1,457	7
Sutherland	5,800	—	5,800	19
West Lothian	763	—	763	17
Wigtown	296	—	296	3
SCOTLAND	221,073	12,360	233,433	18
Anglesey	7	—	7	—
Brecknock	1,752	5	1,757	5
Cardigan	1,955	153	2,108	11
Caernarvon	743	16	759	4
Carmarthen	2,110	48	2,158	6
Denbigh	1,905	—	1,905	7
Flint	504	—	504	6
Glamorgan	3,063	44	3,107	8
Merioneth	2,130	3	2,133	7
Monmouth	2,463	—	2,463	6
Montgomery	2,624	39	2,663	7
Pembroke	1,224	—	1,224	12
Radnor	785	5	790	5
WALES	21,265	313	21,578	7
GREAT BRITAIN	275,104	13,399	288,503	8

TABLE R: AREA FELLED SINCE SEPTEMBER,

County	Ownership		Total Area	Per Cent. Total Woodland
	Private	State		
	Acres	Acres	Acres	
Bedford	793	5	798	6
Berkshire	1,944	18	1,962	5
Buckingham	2,659	130	2,789	8
Cambridge	320	—	320	6
Chester	2,360	229	2,589	13
Cornwall	2,815	9	2,824	8
Cumberland	8,126	148	8,274	17
Derby	3,611	—	3,611	14
Devon	9,430	23	9,453	9
Dorset	2,075	522	2,597	5
Durham	4,944	164	5,108	15
Essex	728	—	728	2
Gloucester	4,137	2,737	6,874	11
Hampshire	4,594	1,236	5,830	4
,, I. of Wight	100	19	119	2
Hereford	3,975	274	4,249	10
Hertford	2,363	—	2,363	9
Huntingdon	529	—	529	9
Kent	1,305	330	1,635	2
Lancashire	3,683	1,119	4,802	11
Leicester	2,201	—	2,201	18
Lincoln	5,090	49	5,139	12
London	—	—	—	—
Middlesex	20	—	20	1
Norfolk	5,826	1,087	6,913	8
Northampton	823	477	1,300	4
Northumberland	10,694	183	10,877	13
Nottingham	6,739	660	7,399	21
Oxford	1,375	—	1,375	6
Rutland	228	—	228	7
Shropshire	6,647	113	6,760	13
Somerset	4,318	—	4,318	9
Stafford	6,207	104	6,311	16
Suffolk	2,825	1,267	4,092	7
Surrey	2,859	12	2,871	4
Sussex	6,300	697	6,997	5
Warwick	1,601	—	1,601	8
Westmorland	2,105	—	2,105	11
Wiltshire	2,990	622	3,612	7
Worcester	1,994	66	2,060	9
Yorkshire E.R.	3,877	—	3,877	23
,, N.R.	10,998	359	11,357	16
,, W.R.	7,611	4	7,615	12
ENGLAND	153,819	12,663	166,482	9

1939, BY COUNTIES AND OWNERSHIP

County	Ownership		Total Area	Per Cent. Total Woodland
	Private	State		
	Acres	Acres	Acres	
Aberdeen	23,659	3,132	26,791	18
Angus	8,510	—	8,510	19
Argyll Mainland	3,604	1,021	4,625	4
,, Islands	255	—	255	2
Ayr	3,113	—	3,113	11
Banff	7,780	952	8,732	22
Berwick	2,288	22	2,310	15
Bute	497	—	497	10
Caithness	101	—	101	5
Clackmannan	233	6	239	7
Dunbarton	1,164	—	1,164	10
Dumfries	5,306	36	5,342	14
East Lothian	1,561	—	1,561	15
Fife	3,605	75	3,680	12
Inverness Mainland	28,220	1,356	29,576	14
,, Islands	138	—	138	2
Kincardine	6,810	374	7,184	22
Kinross	366	—	366	10
Kirkcudbright	1,961	1,051	3,012	10
Lanark	2,122	—	2,122	9
Midlothian	1,472	—	1,472	13
Moray	8,731	3,143	11,874	18
Nairn	4,657	701	5,358	27
Peebles	2,822	61	2,883	23
Perth	12,566	678	13,244	9
Renfrew	638	—	638	9
Ross and Cromarty	10,042	1,489	11,531	12
Roxburgh	2,695	22	2,717	13
Selkirk	1,304	5	1,309	26
Stirling	2,149	—	2,149	9
Sutherland	4,792	—	4,792	15
West Lothian	311	—	311	7
Wigtown	1,577	1	1,578	18
SCOTLAND	155,049	14,125	169,174	14
Anglesey	201	—	201	10
Brecknock	2,044	100	2,144	7
Cardigan	1,892	101	1,993	11
Caernarvon	1,637	3	1,640	8
Carmarthen	4,679	21	4,700	13
Denbigh	4,630	25	4,655	17
Flint	1,439	—	1,439	19
Glamorgan	4,766	459	5,225	13
Merioneth	2,318	113	2,431	8
Monmouth	3,542	809	4,351	12
Montgomery	4,281	47	4,328	11
Pembroke	1,512	—	1,512	15
Radnor	2,626	150	2,776	17
WALES	35,567	1,828	37,395	11
GREAT BRITAIN	344,435	28,616	373,051	11

TABLE S: AREA DISAFFORESTED, BY

County	Ownership		Total Area	Per Cent. Area Surveyed
	Private	State		
	Acres	Acres	Acres	
Bedford	341	—	341	3
Berkshire	2,356	—	2,356	5
Buckingham	1,032	—	1,032	3
Cambridge	98	—	98	2
Chester	630	—	630	3
Cornwall	1,144	5	1,149	3
Cumberland	449	—	449	1
Derby	583	—	583	2
Devon	1,674	14	1,688	2
Dorset	580	—	580	1
Durham	1,138	—	1,138	3
Essex	967	—	967	3
Gloucester	1,042	170	1,212	2
Hampshire	3,480	683	4,163	3
,, I. of Wight	381	7	388	5
Hereford	1,081	—	1,081	2
Hertford	1,433	—	1,433	5
Huntingdon	70	—	70	1
Kent	4,884	301	5,185	5
Lancashire	350	—	350	1
Leicester	154	—	154	1
Lincoln	1,220	265	1,485	3
London	95	—	95	13
Middlesex	256	—	256	9
Norfolk	919	2,133	3,052	4
Northampton	829	38	867	3
Northumberland	244	25	269	—
Nottingham	967	313	1,280	4
Oxford	414	—	414	2
Rutland	265	20	285	1
Shropshire	1,886	—	1,886	3
Somerset	642	4	646	1
Stafford	975	48	1,023	3
Suffolk	742	539	1,281	2
Surrey	4,651	—	4,651	6
Sussex	2,644	841	3,485	2
Warwick	1,609	—	1,609	8
Westmorland	498	—	498	3
Wiltshire	1,074	91	1,165	2
Worcester	578	10	588	2
Yorkshire E.R.	728	—	728	4
,, N.R.	1,074	—	1,074	1
,, W.R.	1,857	—	1,857	3
ENGLAND	48,034	5,507	53,541	3

COUNTIES AND OWNERSHIP

County	Ownership		Total Area	Per Cent. Area Surveyed
	Private	State		
	Acres	Acres	Acres	
Aberdeen	355	15	370	—
Angus	167	—	167	—
Argyll Mainland	149	2	151	—
,, Islands	2	—	2	—
Ayr	261	4	265	—
Banff	82	—	82	—
Berwick	210	3	213	1
Bute	3	—	3	—
Caithness	—	—	—	—
Clackmannan	100	—	100	—
Dunbarton	34	—	34	—
Dumfries	64	15	79	—
East Lothian	305	—	305	3
Fife	594	241	835	3
Inverness Mainland	579	75	654	—
,, Islands	11	—	11	—
Kincardine	—	—	—	—
Kinross	75	—	75	2
Kirkcudbright	120	5	125	—
Lanark	818	—	818	3
Midlothian	113	—	113	1
Moray	560	563	1,123	2
Nairn	41	1	42	—
Peebles	17	6	23	—
Perth	769	—	769	—
Renfrew	92	—	92	1
Ross and Cromarty	161	—	161	—
Roxburgh	83	31	114	1
Selkirk	7	—	7	—
Stirling	31	—	31	—
Sutherland	43	—	43	—
West Lothian	92	—	92	2
Wigtown	9	—	9	—
SCOTLAND	5,947	961	6,908	1
Anglesey	50	—	50	2
Brecknock	1,540	—	1,540	5
Cardigan	901	—	901	5
Caernarvon	102	1	103	1
Carmarthen	755	314	1,069	3
Denbigh	298	—	298	1
Flint	196	—	196	2
Glamorgan	1,775	5	1,780	4
Merioneth	320	36	356	1
Monmouth	1,326	12	1,338	3
Montgomery	2,147	—	2,147	5
Pembroke	355	—	355	3
Radnor	607	—	607	4
WALES	10,372	368	10,740	3
GREAT BRITAIN	64,353	6,836	71,189	2

TABLE T: TOTAL LAND AREAS, ENGLAND

As at 31st December, 1948

COUNTY	AREA (ACRES)	COUNTY	AREA (ACRES)
Bedford	301,829	London	73,867
Berkshire	460,730	Middlesex	145,110
Buckingham	477,354	*Monmouth	347,486
Cambridge	553,342		
Chester	638,960	Norfolk	1,307,333
		Northampton	636,123
Cornwall	866,320	Northumberland	1,284,500
Cumberland	961,554	Nottingham	536,678
Derby	639,120	Oxford	476,617
Devon	1,666,797		
Dorset	621,282	Rutland	97,087
		Shropshire	856,622
Durham	645,739	Somerset	1,031,365
Essex	973,413	Stafford	731,490
Gloucester	800,373	Suffolk	945,414
Hampshire	957,772		
,, I. of Wight	93,931	Surrey	458,211
		Sussex	928,735
Hereford	536,071	Warwick	625,083
Hertford	402,740	Westmorland	496,464
Huntingdon	233,221	Wiltshire	857,796
Kent	972,940		
Lancashire	1,189,785	Worcester	444,609
		Yorkshire N.R.	1,356,316
Leicester	530,248	,, E.R.	748,263
Lincoln	1,699,791	,, W.R.	1,771,802

TOTAL LAND AREA	=32,380,283	acres
*LESS MONMOUTH	= 347,486	,,
AREA USED IN THIS REPORT	=32,032,797	,,

Note: Total land area excluding water.

Source: Director General, Ordnance Survey.

BY COUNTIES AND COUNTRIES

SCOTLAND

COUNTY	AREA (ACRES)	COUNTY	AREA (ACRES)
Aberdeen	1,263,300	Kirkcudbright	574,024
Angus	559,090	Lanark	574,509
Argyll Mainland	1,469,444	Midlothian	234,340
,, Islands	521,077	Moray	304,931
Ayr	724,234	Nairn	104,251
Banff	403,054	Orkney	240,848
Berwick	292,535	Peebles	222,240
Bute	139,711	Perth	1,595,804
Caithness	438,833	Renfrew	143,829
Clackmannan	34,938	Ross and Cromarty Mainland	1,572,835
Dumfries	688,112	,, ,, ,, Islands	404,413
Dunbarton	154,362	Roxburgh	425,564
East Lothian	170,971	Selkirk	171,209
Fife	322,878	Stirling	288,349
Inverness Mainland	1,916,768	Sutherland	1,297,913
,, Islands	778,327	West Lothian	76,859
Kincardine	242,460	Wigtown	311,984
Kinross	52,392	Zetland	352,337

TOTAL LAND AREA OF SCOTLAND = 19,068,725 acres

WALES

COUNTY	AREA (ACRES)	COUNTY	AREA (ACRES)
Anglesey	175,811	Flint	163,041
Brecknock	466,347	Glamorgan	516,194
Cardigan	441,237	Merioneth	418,475
Carmarthen	586,152	Montgomery	505,738
Caernarvon	360,306	Pembroke	392,384
Denbigh	426,186	Radnor	299,521

TOTAL LAND AREA	=4,751,392 acres
PLUS MONMOUTH	= 347,486 ,,
AREA USED IN THIS REPORT	=5,098,878 ,,

TOTAL LAND AREA OF GREAT BRITAIN = 56,200,400 acres

APPENDIX VII

AREAS OF WOODLAND SURVEYED IN STATE FORESTS, BY CONSERVANCIES AND FOREST UNITS

As explained in Chapter 11, page 112, the total areas of woodland surveyed in the State Forests do not, for various reasons, always agree with the areas recorded as "Under Plantations" in the *Twenty-Eighth Annual Report of the Forestry Commissioners for the Year Ending September, 30th, 1947* (H.M.S.O.). The date referred to is the same in each case, but in many instances the Census survey included Felled or Devastated areas, Coppice, or Scrub, which could not be regarded as being "Under Plantations" for *Annual Report* purposes. The areas of woodland surveyed in each State Forest and Conservancy, is therefore set out here, partly as a matter of record, and partly to enable comparisons to be drawn with the *Annual Report* figures; but mainly to show the extent and situation of the principal State Forests which, in many counties, contribute a very substantial share to the area of All Woodlands.

Space does not permit the inclusion of maps showing the referenced position of each State Forest, but such maps are to be found in the 1947 *Annual Report* referred to above, or in subsequent *Annual Reports* of the Forestry Commissioners. The general distribution of these forests is, however, shown in Map 7, page 245. For ease of reference, the Forests are here listed in the order set out in the 1947 *Annual Report*, with identical reference numbers, which apply to both Appendices II and III thereof. These Appendices show, respectively, the areas of each State Forest (classified as "Under Plantations", "Plantable", and "Agricultural, Unplantable, etc."), and its situation; Appendix II (maps) also shows Conservancy boundaries. (The reference numbers in subsequent *Annual Reports* are, in most cases, identical, and apply to the corresponding appendices.) It should be noted that the Conservancy boundaries given here are those in force at the effective date of the Census—30th September, 1947—and may differ from those adopted subsequently.

It should be also noted that the Conservancy boundaries in this Appendix are not always coincident with the county and country boundaries that apply elsewhere in this *Report*.

In the list that follows those counties that had no State Forests at 30th September, 1947, are shown in *italics*, while former Crown woods are indicated by asterisks.

WOODLAND AREAS OF STATE FORESTS—SUMMARY OF CONSERVANCIES AND DIRECTORATES

Conservancies			
England	North West	41,546	
	North East	56,164	
	East	69,388	
	South East	29,693	
	South West	30,403	
	New Forest	38,584	
	Dean Forest	21,595	
Total	England (Directorate†)		287,373
Scotland	North	73,901	
	East	78,873	
	South	32,931	
	West	57,125	
Total	Scotland		242,830
Wales	North	46,570	
	South	46,258	
Total	Wales (Directorate†)		92,828
All Conservancies, Great Britain			623,031

† At one or two points the boundary between the Forestry Directorates of England and Wales does not coincide with the geographical boundary. Only a small area of State Forest is affected.

ENGLAND

North West Conservancy: Cumberland, *Westmorland*, Lancashire, part West Riding of Yorkshire (Lune and Ribble Valleys), Cheshire, Shropshire, part Herefordshire (north west of Leominster), Staffordshire, *Warwickshire*, *Leicestershire*, Nottinghamshire (except small area near City of Lincoln) and Derbyshire.

Total Woodland Surveyed	*Acres*
1. Delamere, Ches.*	1,884
2. Thornthwaite, Cumb.	3,144
3. Cannock Chase, Staffs.	5,396
4. Mortimer, Hereford & Salop	5,748
5. Walcot, Salop	1,436
6. Clipstone, Derby & Notts.	6,002
7. Ennerdale, Cumb.	2,550
8. Hope, Derby	575
9. Bawtry, Notts.	501
10. Sherwood, Notts.	2,122
11. Kershope, Cumb.	6,492
12. Hardknott, Cumb. & Lancs.	688
13. Grizedale, Lancs.	3,803
14. Greystoke, Cumb.	907
15. Cotgrave, Notts.	298
Total	41,546

North East Conservancy: Northumberland, Durham, Yorkshire (except that part of West Riding in Lune and Ribble Valleys).

Total Woodland Surveyed	*Acres*
1. Chopwell, Durham*	780
2. Allerston, Yorks.	9,772
3. Rothbury, Northumberland	1,364
4. Selby, Yorks.	749
5. Kielder, Northumberland	19,226
6. Hamsterley, Durham	3,535
7. Ampleforth, Yorks.	1,886
8. Rosedale, Yorks.	2,345
9. Harwood, Northumberland	1,469
10. Slaley, Northumberland	1,146
11. Arkengarthdale, Yorks.	980
12. Redesdale, Northumberland	4,921
13. Langdale, Yorks.	2,398
14. Widehaugh, Northumberland (Nursery)	—
15. Warke, Northumberland	5,348
16. Scardale, Yorks.	245
Total	56,164

East Conservancy: Lincoln, Rutland, Norfolk, *Cambridge*, Northamptonshire, Bedfordshire, Oxfordshire, Buckinghamshire, *Hertfordshire*, *Essex*, Suffolk, *Huntingdonshire* and Nottinghamshire (small area near City of Lincoln).

Total Woodland Surveyed	*Acres*
1. Hazelborough, Bucks. and Northants.*	1,831
2. Salcey, Bucks. and Northants.*	1,248
3. Ampthill, Beds.	368
4. Rendlesham, Suffolk	6,062
5. Rockingham, Northants.	4,421
6. Swaffham, Norfolk....	4,742
7. Thetford Chase, Norfolk and Suffolk	31,933
8. Bourne, Lincs. and Rutland	1,946
9. Laughton, Lincs.	2,065
10. Swanton, Norfolk	1,258
11. Dunwich, Suffolk	824
12. Yardley Chase, Beds. and Northants.	1,951
13. Bardney, Lincs.	2,251
14. The King's Forest, Suffolk....	4,862
15. Wigsley, Lincs. and Northants.	1,033
16. Willingham, Lincs.....	1,073
17. Wendover, Bucks.	668
18. Hevingham, Norfolk	187
19. Shouldham, Norfolk	397
20. Watlington, Oxford	268
Total	69,388

South East Conservancy: Berkshire, *London*, *Middlesex*, Kent, Sussex, Surrey and Hampshire, (except New Forest and Isle of Wight).

Total Woodland Surveyed	*Acres*	*Total Woodland Surveyed*	*Acres*
1. Alice Holt, Hants.*	1,933	12. Challock, Kent	1,397
2. Bere, Hants.*	1,430	13. Goodwood, Sussex....	1,642
3. Woolmer, Hants.*	1,447	14. Vinehall, Sussex	865
4. Bedgebury, Kent and Sussex*	3,137	15. Gravetye, Sussex	386
5. Bramshill, Berks. and Hants.	3,354	16. Marden, Sussex	929
6. Chiddingfold, Surrey and Sussex	2,070	17. Arundel, Sussex	2,473
7. Lyminge, Kent	2,376	18. Orlestone, Kent	729
8. Friston, Sussex	672	19. Alton, Hants.	239
9. Micheldever, Hants.	1,796	20. Andover, Hants.	835
10. Buriton, Hants. and Sussex	1,422	21. Southwater, Sussex††	—
11. Westbury, Hants.	359	22. Basing, Hants.	202
		Total	29,693

South West Conservancy: Herefordshire (except part north-west of Leominster), Gloucestershire (except Dean Forest and small areas adjoining Dean Forest), Wiltshire, Worcestershire, Somerset, Devon (except small area near Axminster) and Cornwall.

Total Woodland Surveyed	*Acres*	*Total Woodland Surveyed*	*Acres*
1. Dymock, Gloucester and Hereford*....	1,337	12. Dartmoor, Devon	2,408
2. Brendon, Somerset....	1,903	13. Herodsfoot, Cornwall	364
3. Eggesford, Devon	862	14. West Woods, Wilts.	853
4. Haldon, Devon	2,974	15. Lydford, Devon	559
5. Halwill, Devon	3,214	16. Collingbourne, Wilts.	1,204
6. Quantocks, Somerset	1,722	17. Hartland, Devon	1,079
7. Bodmin, Cornwall....	1,750	18. Mendip, Somerset	696
8. Haugh, Hereford	588	19. Savernake, Wilts.	3,873
9. Wyre, Worcester	2,362	20. Stanway, Gloucester	275
10. Wilsey Down, Cornwall	853	21. Braydon, Wilts.	444
11. Bruton, Somerset and Wilts.	725	22. Okehampton, Devon	358
		23. Neroche, Somerset†	—
		Total	30,403

New Forest (Deputy Surveyor's Charge): Part Hampshire (New Forest and Isle of Wight), Dorset, Devon (small area near Axminster).

Total Woodland Surveyed	*Acres*	*Total Woodland Surveyed*	*Acres*
1. New Forest, Hants.*	27,295	7. Combley, Isle of Wight	538
2. Parkhurst, Isle of Wight*	905	8. Gardiner, Dorset. and Wilts.	615
3. Wareham, Dorset	3,123	9. Osborne, Isle of Wight	140
4. Ringwood, Dorset and Hants.	3,378	10. Charmouth, Devon and Dorset	348
5. Ferndown, Dorset	1,020	11. Shalfleet, Isle of Wight	188
6. Brighstone, Isle of Wight	1,034	Total	38,584

†† Southwater Forest was included under "Private Woodlands" in the Census Survey; at the date of acquisition, 19th August, 1947, it consisted of 349 acres of Felled Woodland and Scrub.

† Neroche. Woods on this recently acquired unit were classified in the Census Survey as "Private Woodlands".

Dean Forest (Deputy Surveyor's Charge): Part Gloucester (south-west of Gloucester—Ross road), with small areas in adjacent parts of Hereford and Monmouth.

Total Woodland Surveyed	*Acres*	*Total Woodland Surveyed*	*Acres*
1. Dean Forest, Gloucester, Hereford and Monmouth*	20,392	2. Tidenham Chase, Gloucester	1,203
		Total	21,595

SCOTLAND

North Conservancy: *Caithness*, Sutherland, Ross and Cromarty, Inverness, part Argyll (Mull and areas west of Loch Linnhe), Nairn (except north-east corner) Moray (southern areas only), *Orkney*, *Shetland*.

Total Woodland Surveyed	*Acres*	*Total Woodland Surveyed*	*Acres*
1. Borgie, Sutherland	2,643	24. Dornoch, Sutherland	669
2. Inchnacardoch, Inverness	2,506	25. Inverinate, Ross.	1,044
3. Portclair, Inverness	2,343	26. Balblair, Sutherland	775
4. South Laggan, Inverness	1,116	27. Clunes, Inverness	1,418
5. Achnashellach, Ross.	1,914	28. Lael, Ross.	931
6. Ratagan, Inverness and Ross.	1,513	29. Fiunary, Argyll	2,753
7. Slattadale, Ross.	1,011	30. Glen Loy, Inverness	1,845
8. Glen Righ, Inverness	1,609	31. Glen Brittle, Isle of Skye (Inverness)	1,311
9. Glen Hurich, Argyll	3,485	32. Longart, Ross.	1,046
10. Glen Urquhart, Inverness	2,004	33. Leanachan, Inverness	1,709
11. Culloden, Inverness	709	34. Guisachan, Inverness	1,861
12. Nevis, Inverness	977	35. Ardross, Ross.	3,563
13. The Queen's Forest, Inverness	3,805	36. Inshriach, Inverness	2,010
14. Craig nan Eun, Inverness	1,411	37. Millbuie, Ross.	5,580
15. Craig Phadrig, Inverness	201	38. Assich, Nairn	375
16. Glen Shiel, Ross.	844	39. Morangie, Ross.	502
17. North Strome, Ross.	861	40. Kilcoy, Ross.	1,876
18. Salen, Isle of Mull (Argyll)....	2,267	41. Strath Nairn, Inverness	838
19. South Strome, Ross.	1,237	42. Ferness, Nairn	1,020
20. Findon, Ross.	1,193	43. Strath Conon, Ross.	1,310
21. Glen Garry, Inverness	3,259	44. Strath Dearn, Inverness	1,212
22. Kessock, Ross.	833	45. Farigaig, Inverness....	1,033
23. Eilanreach, Inverness	827	46. Urray, Ross.	652
		Total	73,901

East Conservancy: Nairn (north-east corner only), Moray (except southern areas), Banff, Aberdeen, Kincardine, Angus, Kinross, Fife (except south-west corner), part Perth (areas north and east of Crieff).

Total Woodland Surveyed	*Acres*	*Total Woodland Surveyed*	*Acre*
1. Monaughty, Moray	3,087	10. Speymouth, Moray	4,438
2. Kirkhill, Aberdeen....	1,400	11. Blairadam, Fife and Kinross	1,307
3. Montreathmont, Angus	2,052	12. Drumtochty, Kincardine	2,230
4. Culbin, Moray and Nairn	4,374	13. Kemnay, Aberdeen	1,108
5. Edensmuir, Fife	1,659	14. Midmar, Aberdeen....	609
6. Tentsmuir, Fife	3,246	15. Deer, Aberdeen	2,035
7. Drummond Hill, Perth	3,516	16. Scootmore, Moray	1,884
8. Teindland, Moray	1,215	17. Clashindarroch, Aberdeen....	5,223
9. The Bin, Aberdeen	5,075	18. Roseisle, Moray	1,859

East Conservancy—*continued*

Total Woodland Surveyed		*Acres*
19.	Blackcraig, Perth	1,430
20.	Carden, Fife	463
21.	Inglismaldie, Kincardine	1,077
22.	Durris, Kincardine	3,421
23.	Newton, Moray (Nursery)	—
24.	Newtyle, Moray	898
25.	Alltcailleach, Aberdeen	3,704
26.	Kinfauns, Perth	599
27.	Whitehaugh, Aberdeen	1,222
28.	Craig Vinean, Perth	2,129
29.	Glen Devon, Perth	490
30.	Lossie, Moray	864
31.	Keillour, Perth	1,143
32.	Tilliefoure, Aberdeen	2,459
33.	Blackhall, Kincardine	2,041
34.	Rosarie, Banff	1,075
35.	Pitfichie, Aberdeen	3,746
36.	Fetteresso, Kincardine	703
37.	Strathord, Perth	925
38.	Allean, Perth	413
39.	Auchernach, Aberdeen	243
40.	Gartly Moor, Aberdeen	144
41.	Dallas, Moray	829
42.	Counteswells, Aberdeen	519
43.	Pitmedden, Fife§	—
44.	Rannoch, Perth	1,728
45.	Tomintoul, Banff	291
	Total	78,873

South Conservancy: *Midlothian, East Lothian, Berwick*, Roxburgh, Selkirk, Peebles, Dumfries, Kirkcudbright, Wigtown, part Ayr (south of Kilmarnock), part *Lanarkshire* (south-east) of Lanark).

Total Woodland Surveyed		*Acres*
1.	Glentress, Peebles	1,540
2.	Cairn Edward, Kirkcudbright	2,846
3.	Newcastleton, Roxburgh	3,247
4.	Dalbeattie, Kirkcudbright	3,226
5.	Forest of Ae, Dumfries	3,473
6.	Edgarhope, Berwick	1,046
7.	Greskine, Dumfries	832
8.	Auchenroddan, Dumfries	705
9.	Kirroughtree, Kirkcudbright	2,497
10.	Fleet, Kirkcudbright	1,080
11.	Kilsture, Wigtown	494
12.	Changue, Ayr	753
13.	Dundeugh, Kirkcudbright	823
14.	Tinnisburn, Dumfries and Roxburgh	1,027
15.	Corriedoo, Kirkcudbright	570
16.	Garcrogo, Kirkcudbright	541
17.	Laurieston, Kirkcudbright	549
18.	Twiglees, Dumfries	2,087
19.	Castle O'er, Dumfries	1,537
20.	Glen Trool, Kirkcudbright	321
21.	Clauchrie, Dumfries	161
22.	Shielswood, Selkirk	—
23.	Mabie, Kirkcudbright	1,408
24.	Wauchope, Roxburgh	440
25.	Carrick, Ayr	108
26.	Elibank, Peebles	306
27.	Glengap, Kirkcudbright	—
28.	Craik, Roxburgh	10
29.	Cardrona, Peebles	1,196
30.	Craigieburn, Dumfries	108
31.	Leithope, Roxburgh	—
	Total	32,931

West Conservancy: Argyll (except Mull and areas west of Loch Linnhe), part Perth (areas south and west of Crieff), Stirling, *Dunbarton, Renfrew*, Clackmannan, part Fife (south-west corner only), part Ayr (north of Kilmarnock), part *Lanarkshire* (north-west of Lanark), *West Lothian, Bute.*

Total Woodland Surveyed		*Acres*
1.	Inverliever, Argyll*	3,648
2.	Glen Duror, Argyll	2,558
3.	Glen Branter, Argyll	3,987
4.	Ardgartan, Argyll	4,548
5.	Barcaldine, Argyll	2,617
6.	Benmore, Argyll	4,390
7.	Glen Finart, Argyll	2,771
8.	Fearnoch, Argyll	1,082

§ Pitmedden is included with Edensmuir Forest.

West Conservancy—*continued*

Total Woodland Surveyed	*Acres*
9. Lennox, Stirling	517
10. Loch Ard, Perth	8,165
11. Devilla, Fife	794
12. Achaglachgach, Argyll	1,571
13. Knapdale, Argyll	4,786
14. Strathyre, Perth	4,688
15. Tulliallan, Fife (Nursery)	—
16. Garadhban, Stirling	1,020
17. Inverinan, Argyll	2,793
18. Asknish, Argyll	1,261
19. Carron Valley, Stirling	2,107
20. Carradale, Argyll	1,455
21. Minard, Argyll	849
22. Saddell, Argyll	317
23. Kilmichael, Argyll	206
24. Corlarach, Argyll	100
25. Glendaruel, Argyll	203
26. Strath Lachlan, Argyll	692
Total	57,125

WALES

North Conservancy: Anglesey, Caernarvon, Denbigh, *Flint*, Merioneth, Montgomery, Radnor, Cardigan (except small area near Lampeter).

Total Woodland Surveyed	*Acres*
1. Hafod Fawr, Merioneth*	514
2. Gwydyr, Caernarvon, and Denbigh	7,854
3. Coed y Brenin, Merioneth	6,519
4. Kerry, Mont.	2,108
5. Beddgelert, Caernarvon	1,484
6. Cynwyd, Merioneth	1,519
7. Dovey, Merioneth and Mont.	7,314
8. Radnor, Radnor.	2,876
9. Cwmeinion, Cardigan	600
10. Mathrafal, Mont.	409
11. Tarenig, Cardigan and Mont.	1,182
12. Bryn Mawr, Cardigan	664
13. Myherin, Cardigan....	3,662
14. Clocaenog, Denbigh and Merioneth....	6,005
15. Dyfnant, Mont.	657
16. Hafren, Mont.	2,429
17. Coed Sarnau, Radnor.	657
18. Newborough, Anglesey	117
Total	46,570

South Conservancy: *Pembroke*, Carmarthen, Brecknock, Glamorgan, Monmouth (except small area adjoining Dean Forest), Cardigan (small area near Lampeter).

Total Woodland Surveyed	*Acres*
1. Tintern, Mon.*	4,244
2. Margam, Glam.	1,502
3. Llanover, Mon.	2,288
4. Llantrisant, Glam.	1,060
5. Chepstow, Mon.	996
6. Rheola, Glam.	6,625
7. Brechfa, Carm.	8,712
8. Brecon, Brecon.	1,588
9. Glasfynydd, Brecon.	1,638
10. Pembrey, Carm.	1,424
11. Caio, Carm.....	2,298
12. Crychan, Brecon and Carm.	4,071
13. Mynydd Ddu, Brecon and Mon.	1,474
14. Itton, Mon.....	515
15. Hay, Brecon and Hereford....	671
16. St. Gwynno, Glam.	1,331
17. Coed y Rhaiadr, Brecon.	569
18. Cwmogwr, Glam.	606
19. Giedd, Brecon.	458
20. Michaelston, Glam.	1,372
21. Tair Onen, Glam.	36
22. Usk, Brecon.	838
23. Monmouth, Mon.	366
24. Wentwood, Mon.	925
25. Cilgwyn, Carm.	131
26. Goytre, Mon.	189
27. Derry Ormond, Card.	291
28. Taf Fechan, Brecon.	40
Total	46,258

APPENDIX VIII

MAPS SHOWING COUNTY AREAS

Map

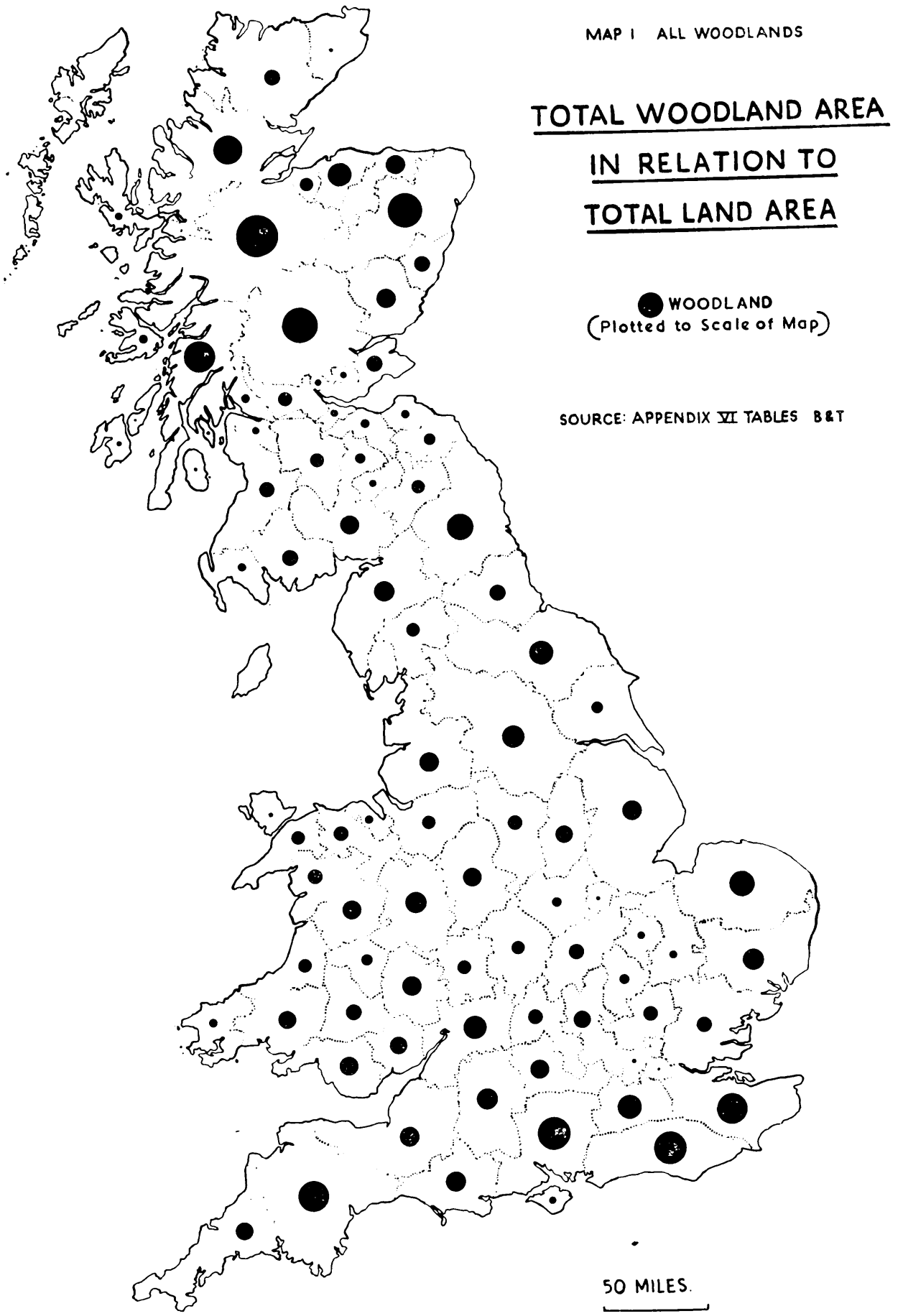
1.	All Woodlands	Total Woodland Area
2.	,, ,, ...	Productivity, 1924
3.	,, ,, ...	Productivity, 1947
4.	,, ,, ...	Ownership
5.	,, ,, ...	High Forest, Mainly Coniferous and Mainly Broadleaved
6.	,, ,, ...	Age Groups
7.	State Forests	Distribution of Forest Units, 1947
8.	Private Woodlands	Mainly Coniferous High Forest
9.	,, ,, ...	Mainly Broadleaved High Forest
10.	,, ,, ...	Coppice-with-Standards
11.	,, ,, ...	Simple Coppice
12.	,, ,, ...	Scrub
13.	,, ,, ...	Devastated Areas
14.	,, ,, ...	Areas Felled Before 1st September, 1939
15.	,, ,, ...	Areas Felled Since 1st September, 1939
16.	All Woodlands	Distribution of Scots pine, and of Corsican and Lodgepole pines
17.	,, ,, ...	Distribution of Norway Spruce and of Sitka Spruce
18.	,, ,, ...	Distribution of Oak
19.	,, ,, ...	Distribution of Beech

Notes. (1) The area symbol for each county, or part thereof, usually refers to the unit used in Appendix VI. Thus, Yorkshire is divided into three Ridings, and the Isle of Wight is distinguished from Hampshire. In Argyll, however, the units for these maps are: Mainland, Mull, Islay, and Jura. In Bute, they are Arran and the Isle of Bute. In Inverness-shire, they are: Mainland, and Skye—which includes any small woodland areas on adjacent islands. This arrangement is necessary for accurate plotting.

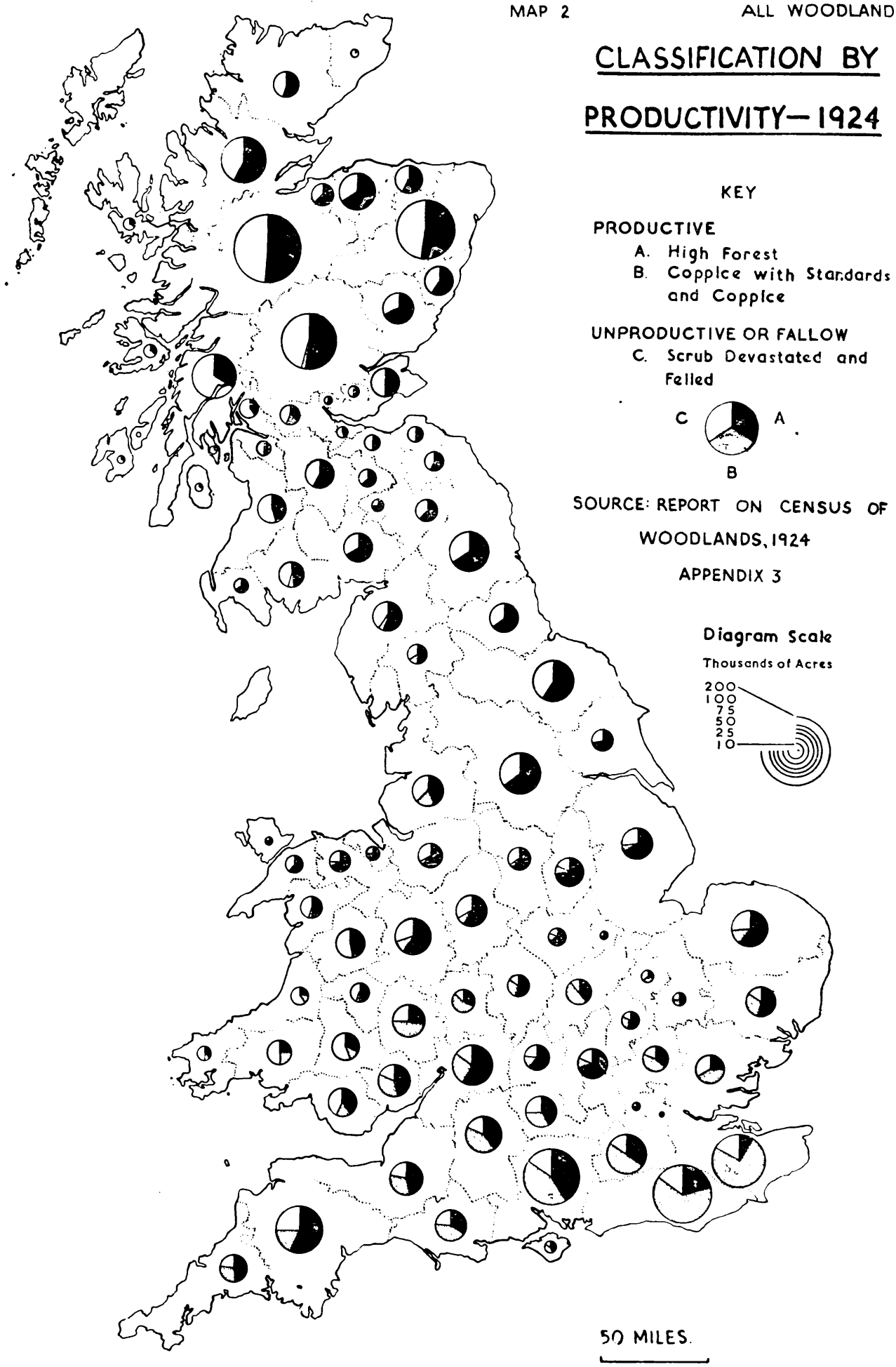
(2) Map 1 is "true to scale", *i.e.*, the woodland area is plotted to the scale of the map. An arbitrary scale is used for Maps 2-6 and 16-19. The symbols on maps 7-15 have an arbitrary value. They are placed as closely as possible to the actual situation of the woodland they represent.

APPENDIX VIII: MAPS SHOWING COUNTY AREAS

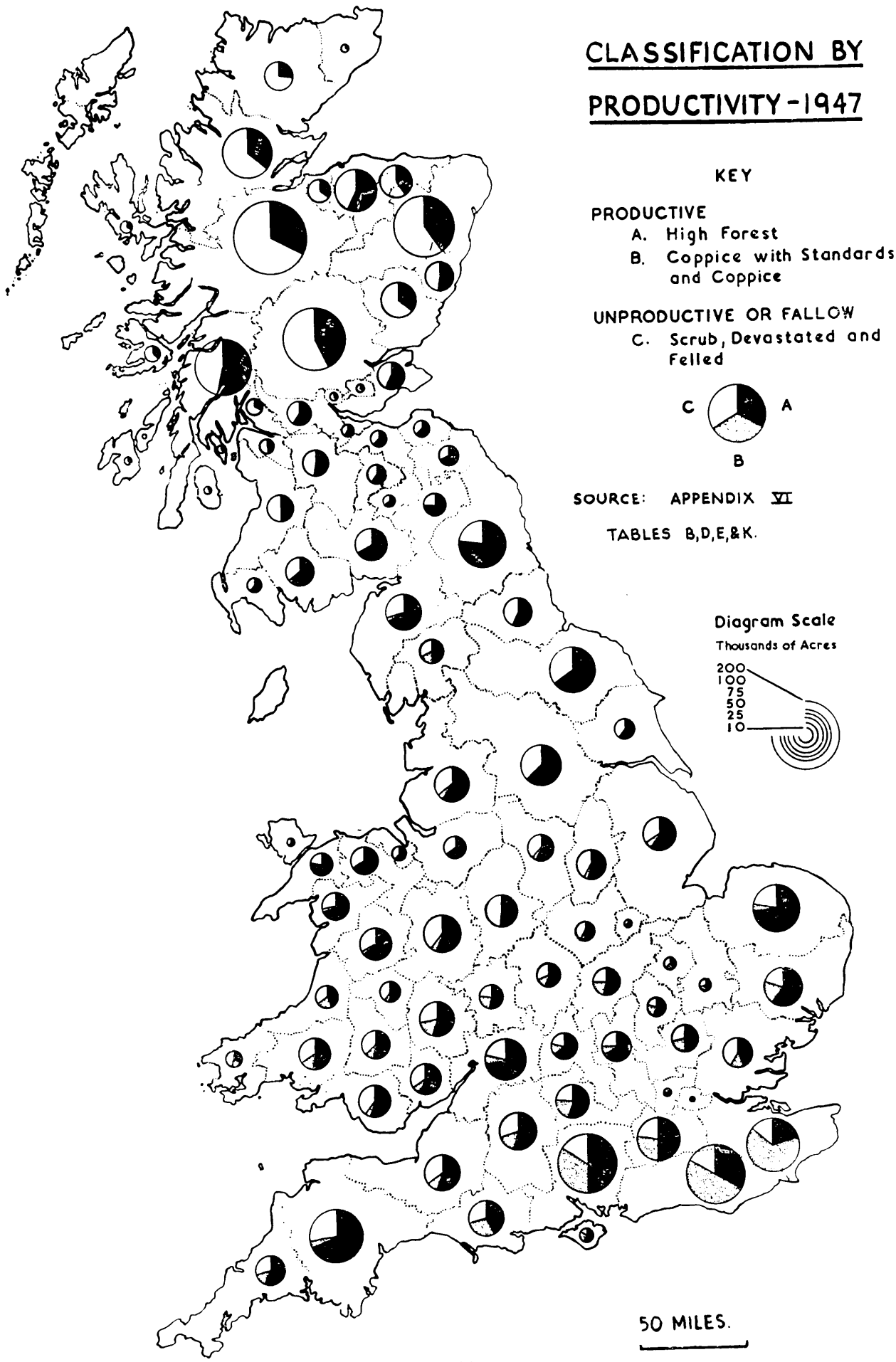
MAP I ALL WOODLANDS



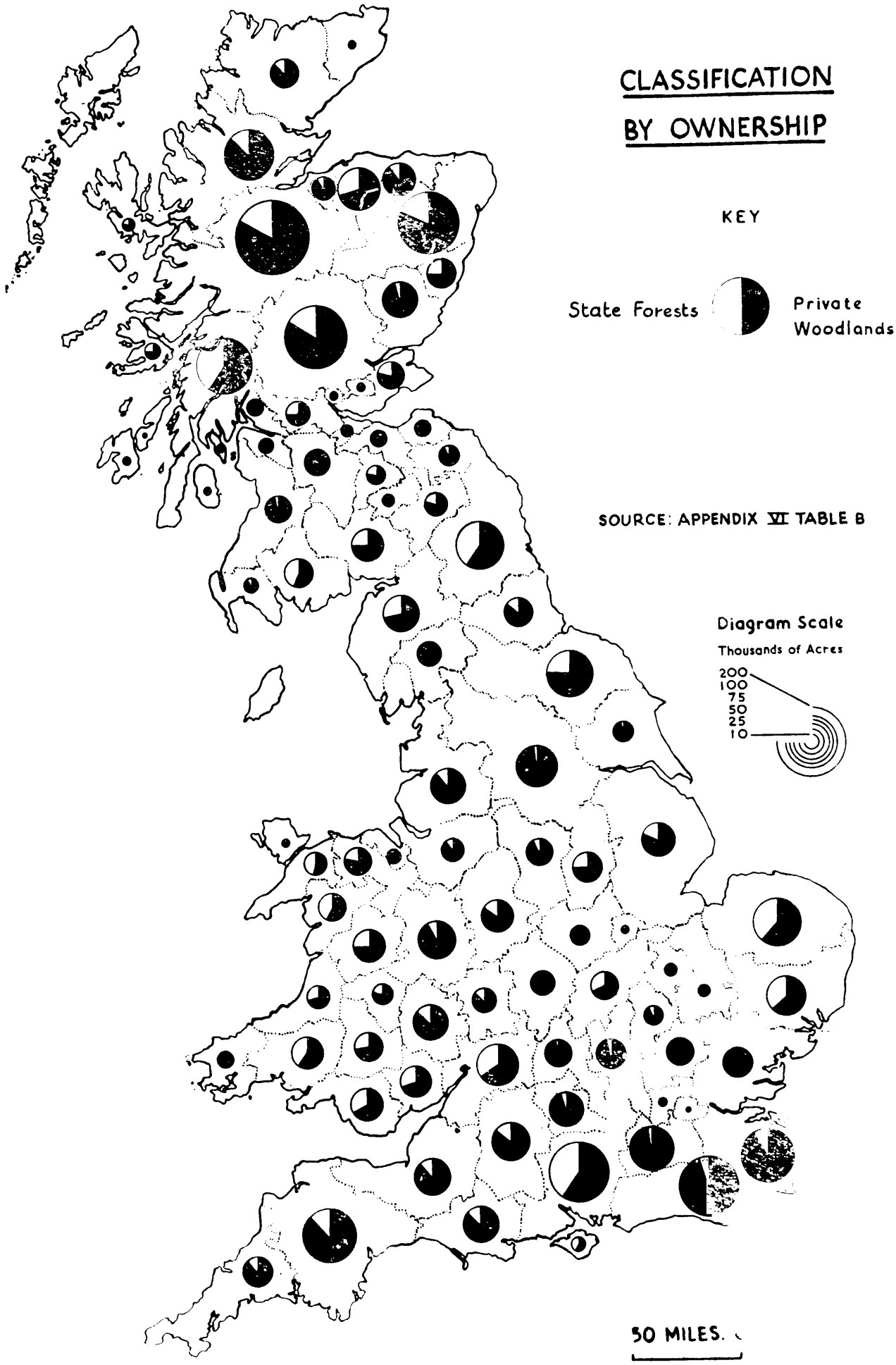
MAP 2 ALL WOODLANDS



MAP 3 ALL WOODLANDS

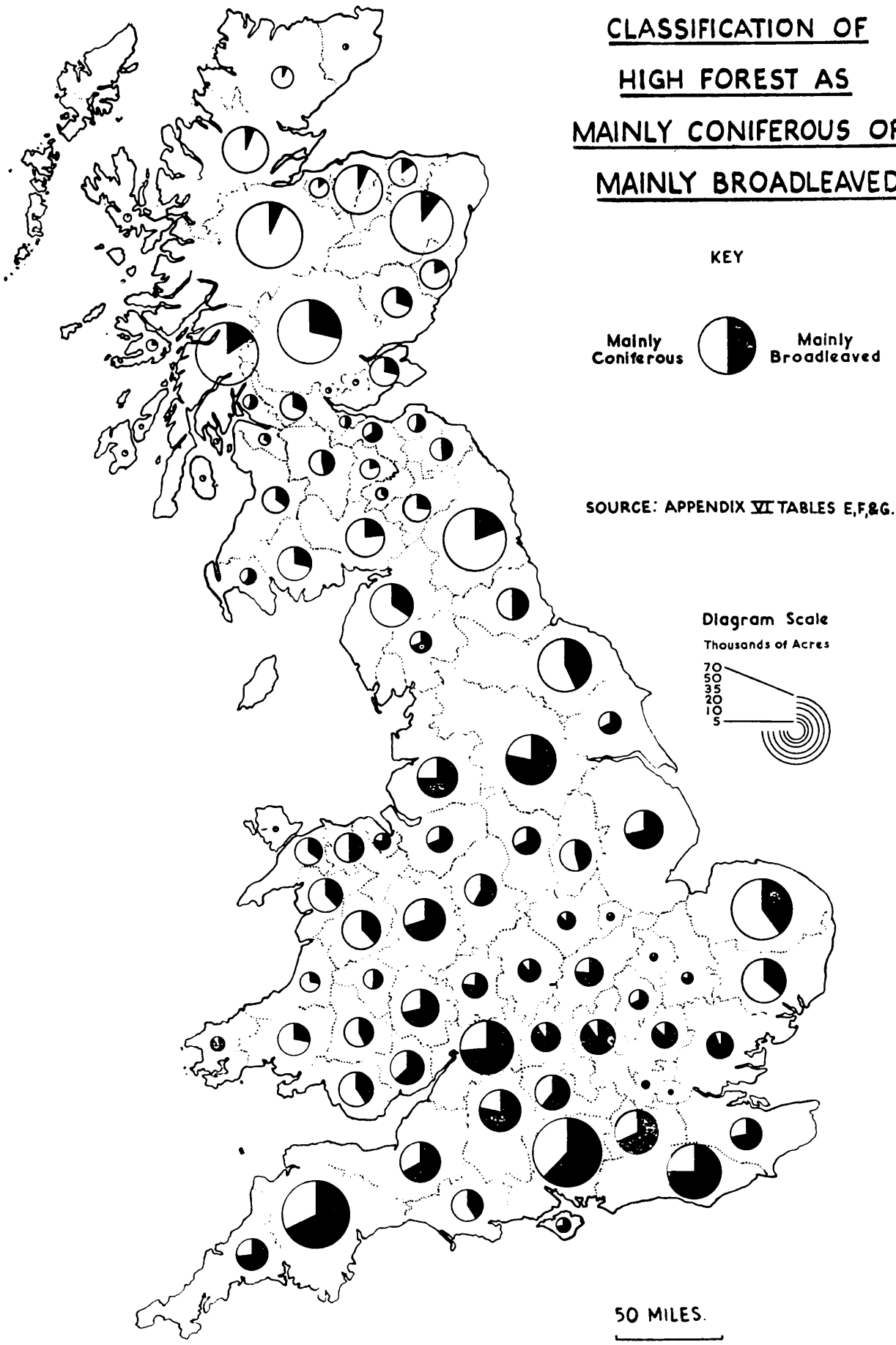


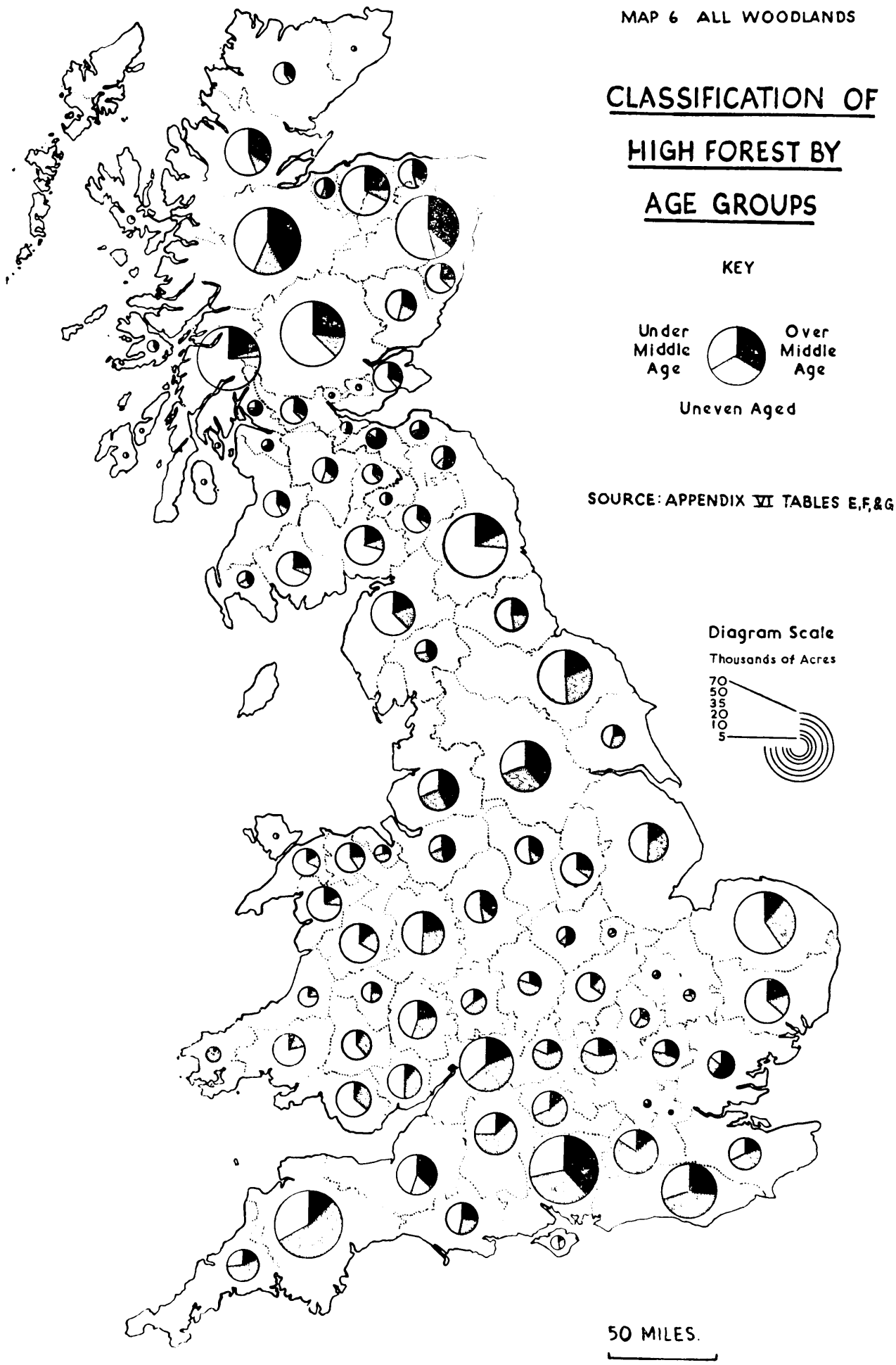
MAP 4 ALL WOODLANDS



MAP 5 ALL WOODLANDS

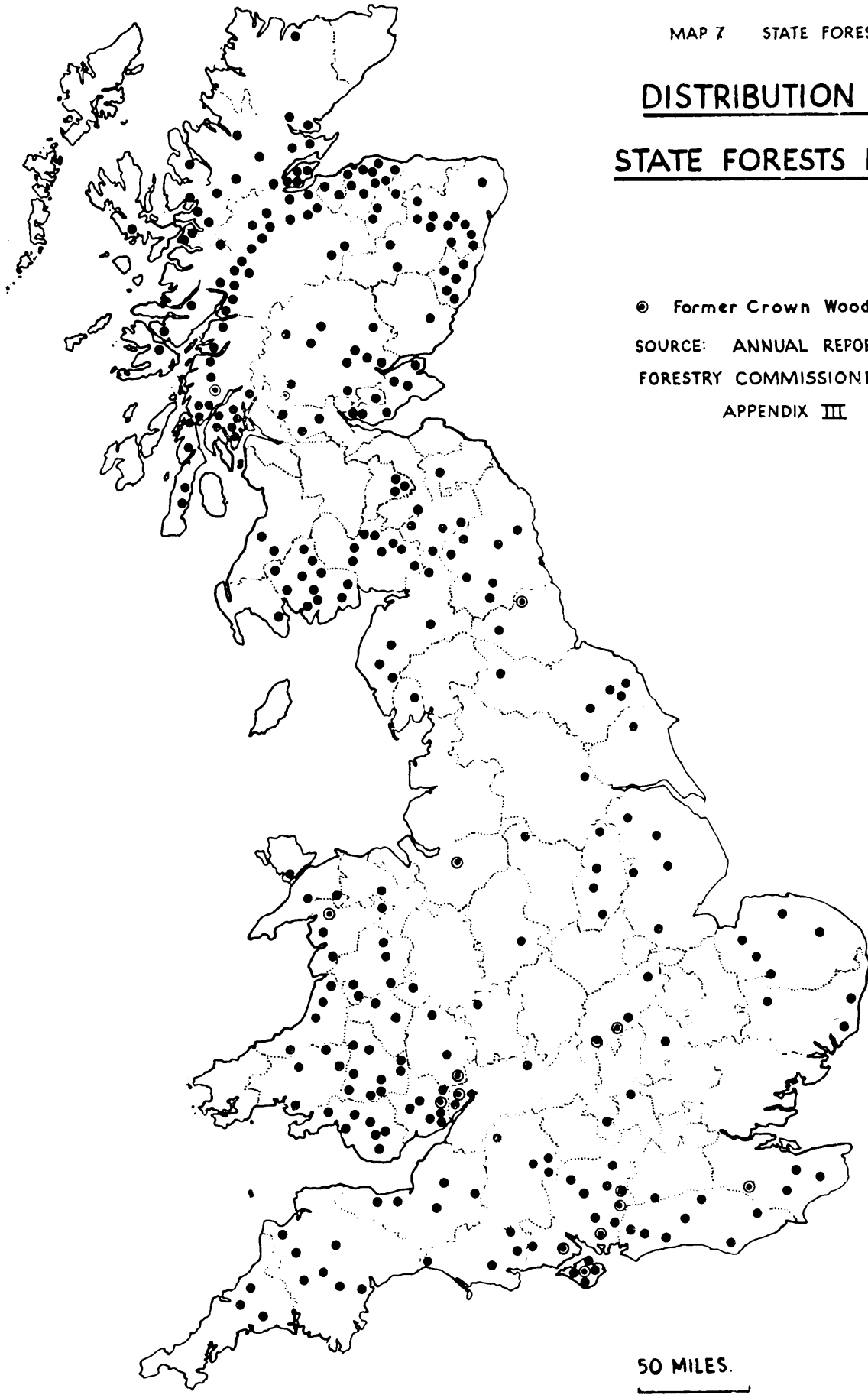
CLASSIFICATION OF HIGH FOREST AS MAINLY CONIFEROUS OR MAINLY BROADLEAVED




MAP 6 ALL WOODLANDS
CLASSIFICATION OF HIGH FOREST BY AGE GROUPS
KEY
Under Middle Age
Over Middle Age
Uneven Aged
SOURCE: APPENDIX VI TABLES E,F,&G
Diagram Scale
Thousands of Acres
70
50
35
20
10
5
50 MILES.

MAP 7 STATE FORESTS

DISTRIBUTION OF STATE FORESTS 1947

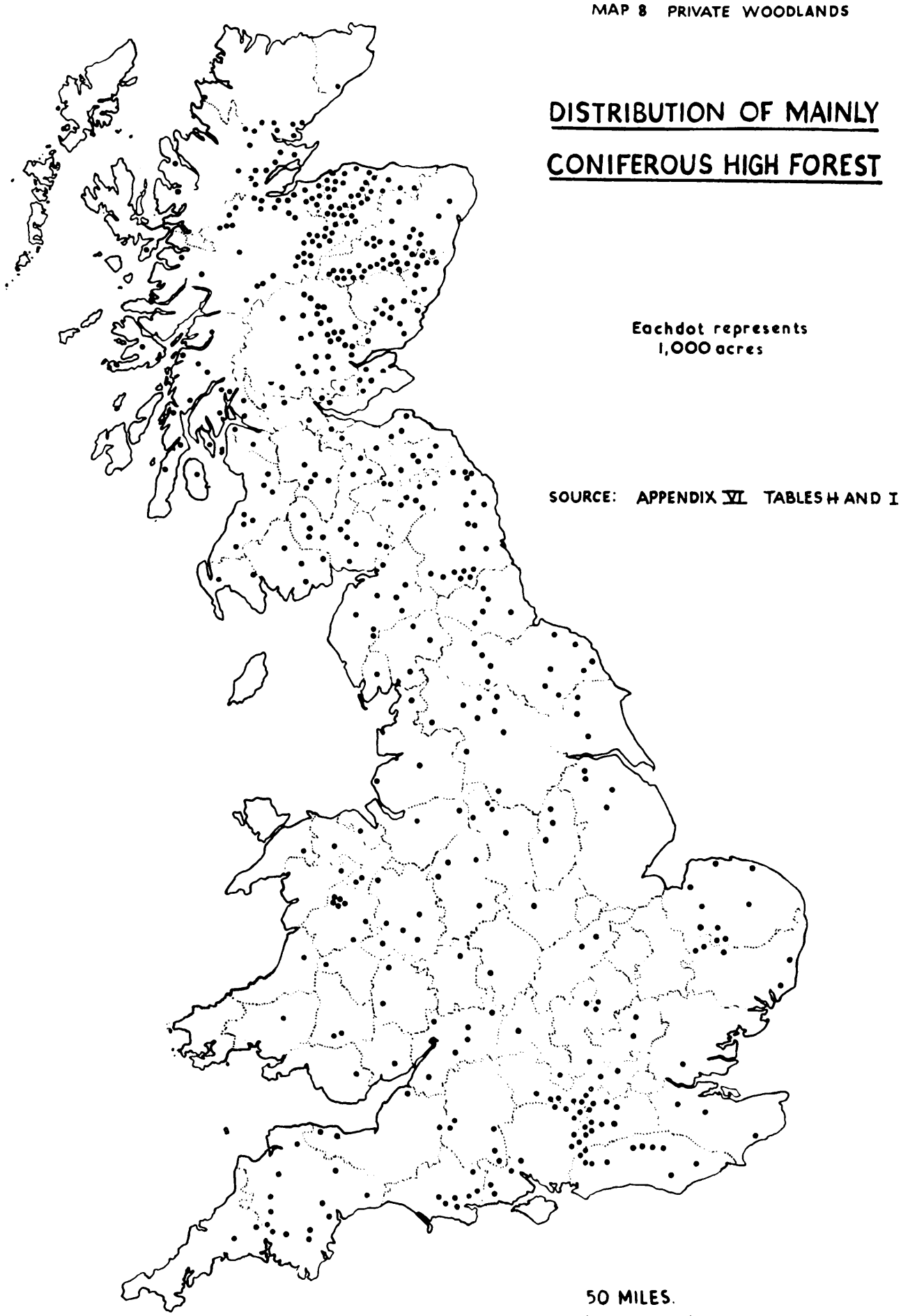


◉ Former Crown Woods

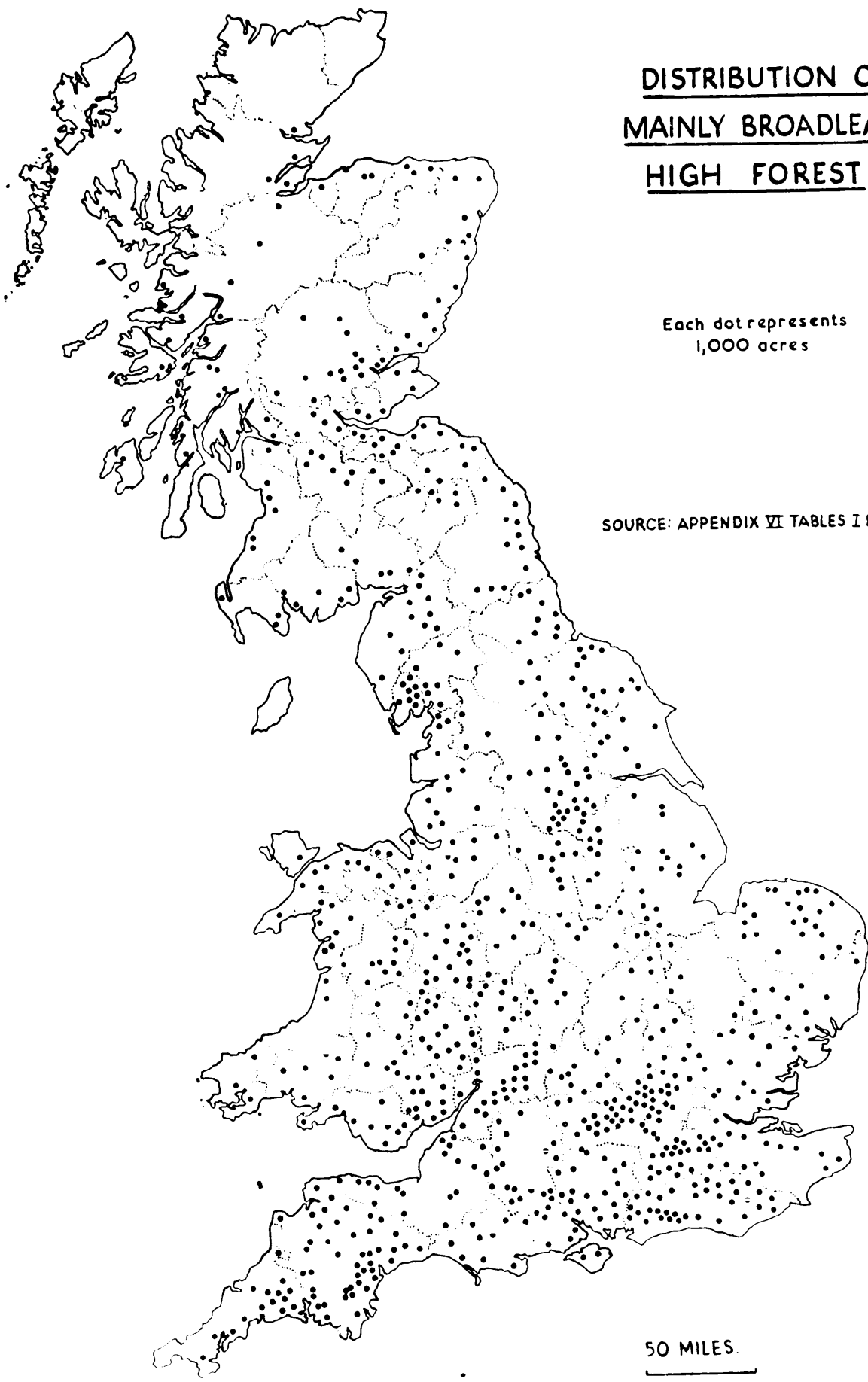
SOURCE: ANNUAL REPORT OF THE FORESTRY COMMISSIONERS, 1947, APPENDIX III

50 MILES.

MAP 8 PRIVATE WOODLANDS

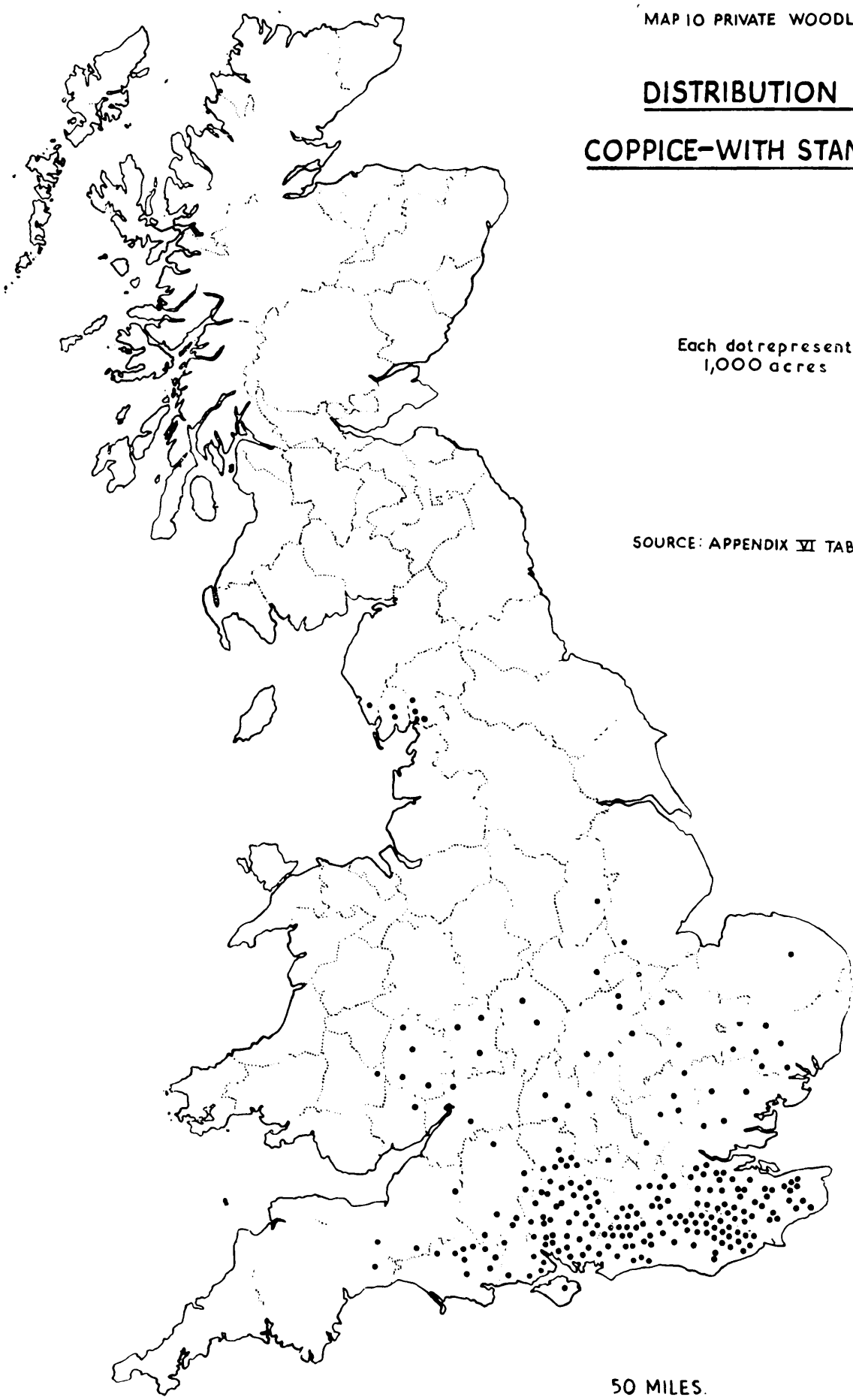


MAP 9 PRIVATE WOODLANDS



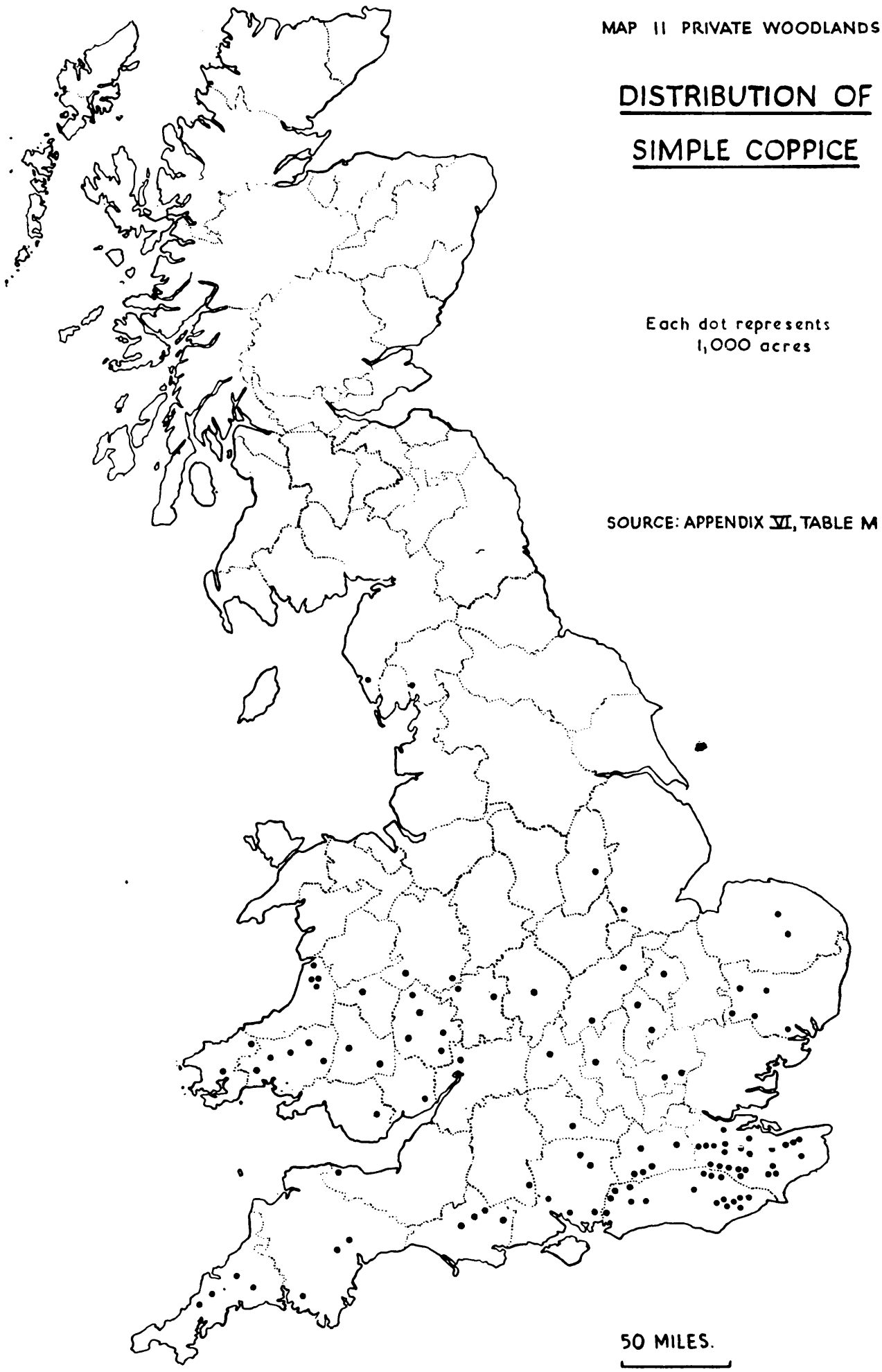
MAP 10 PRIVATE WOODLANDS

DISTRIBUTION OF COPPICE-WITH STANDARDS



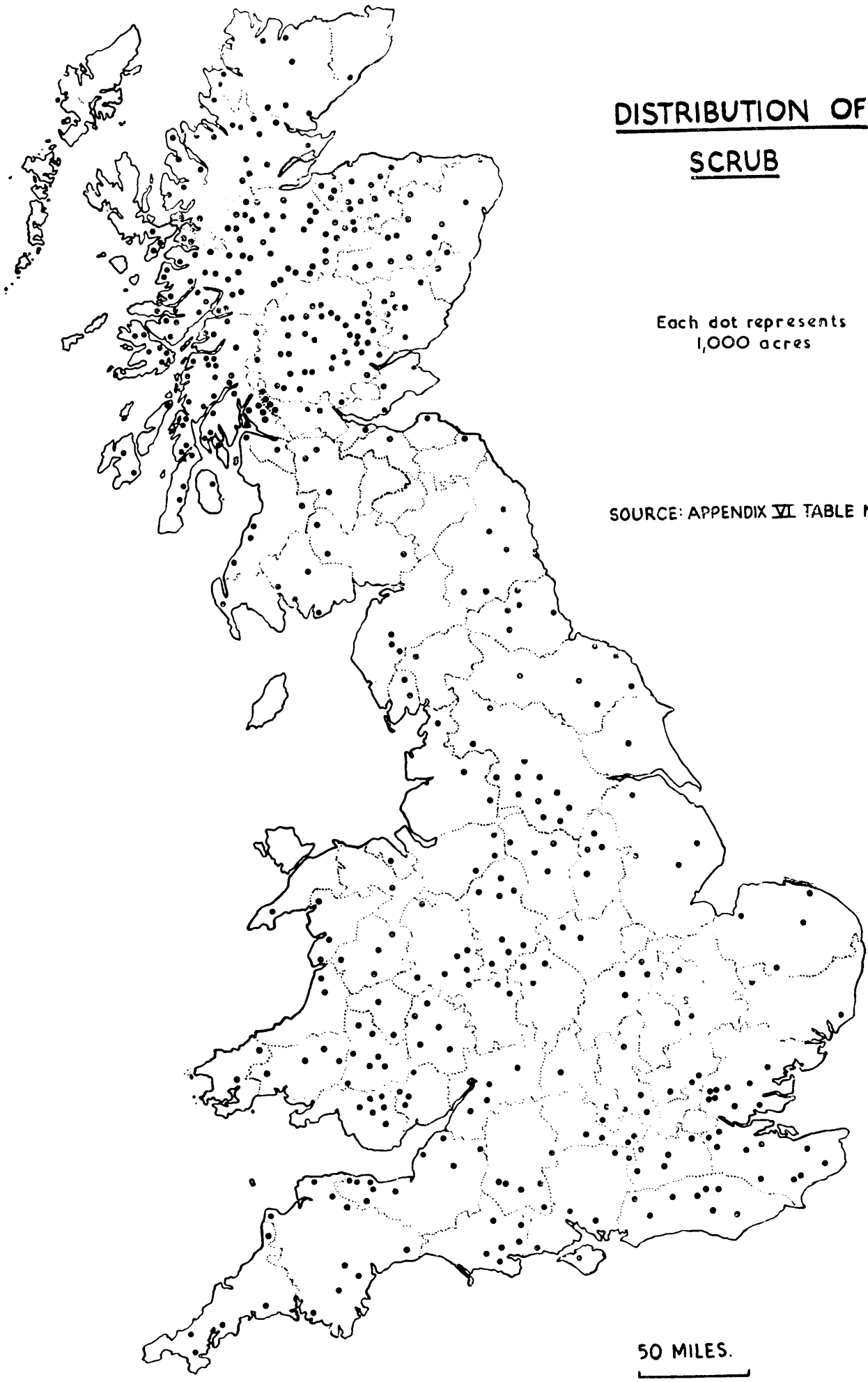
MAP II PRIVATE WOODLANDS

DISTRIBUTION OF SIMPLE COPPICE



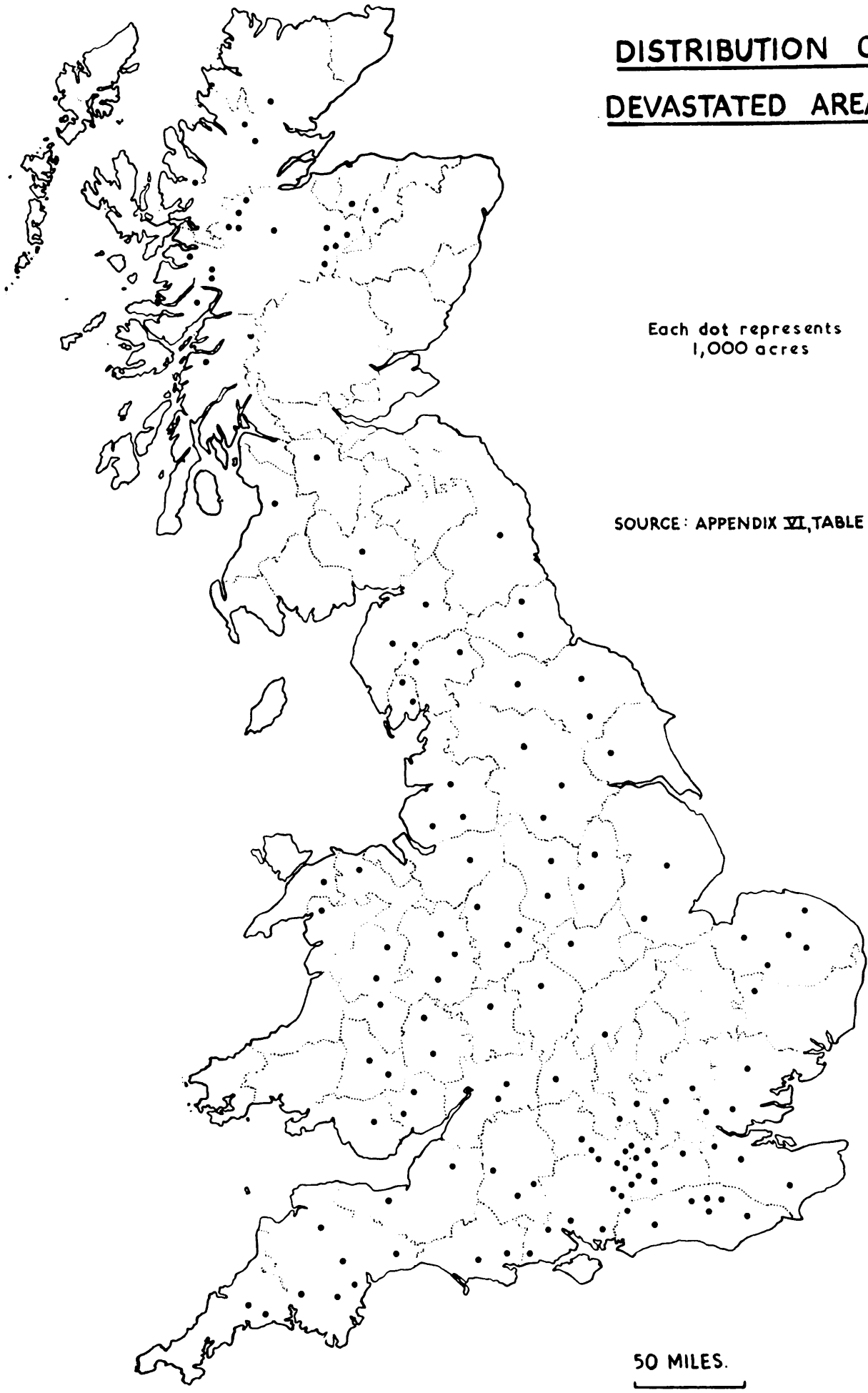
SOURCE: APPENDIX VI, TABLE M

MAP 12 PRIVATE WOODLANDS



MAP 13 PRIVATE WOODLANDS

DISTRIBUTION OF DEVASTATED AREAS

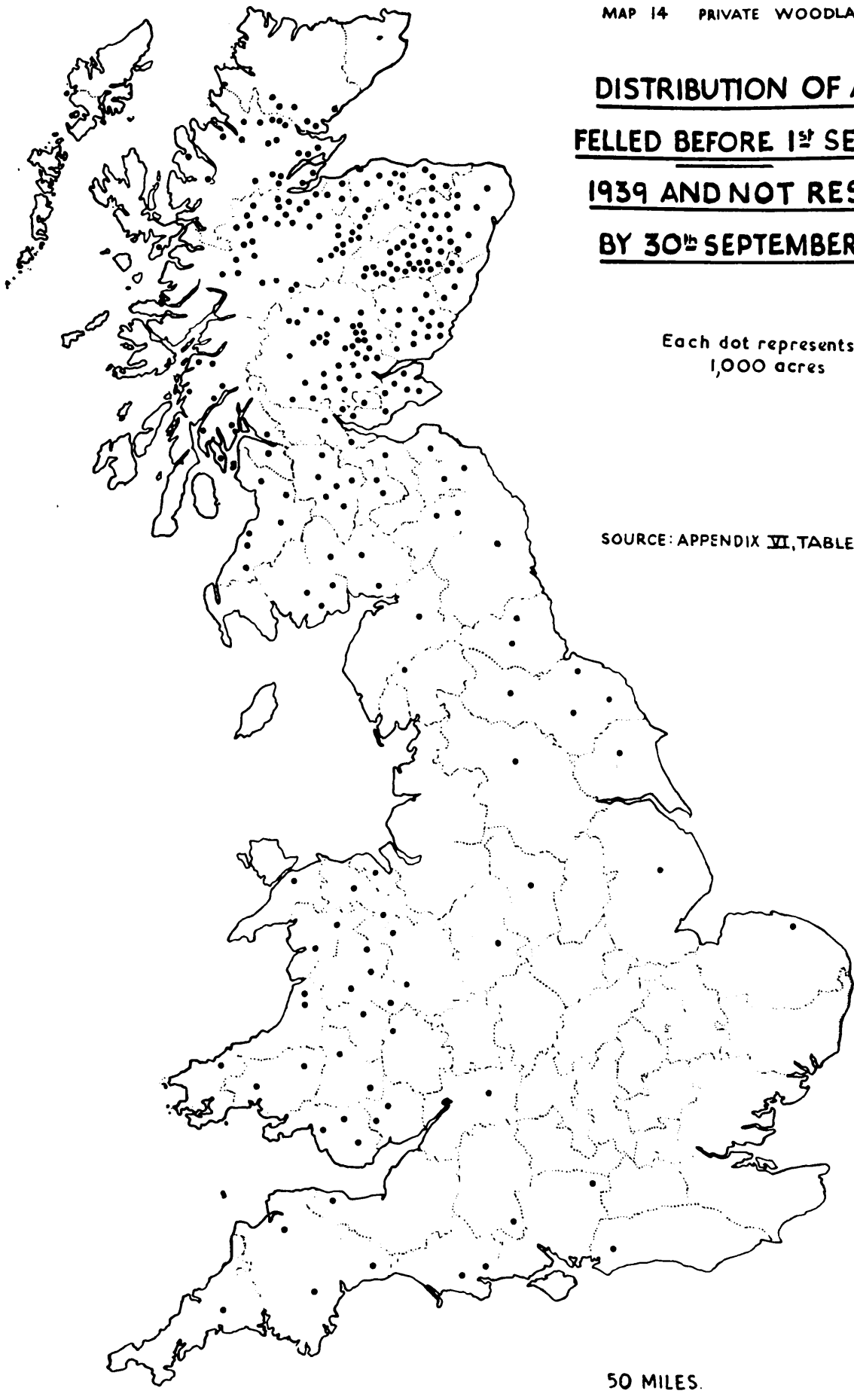


MAP 14 PRIVATE WOODLANDS

DISTRIBUTION OF AREAS FELLED BEFORE 1st SEPTEMBER 1939 AND NOT RESTOCKED BY 30th SEPTEMBER 1947

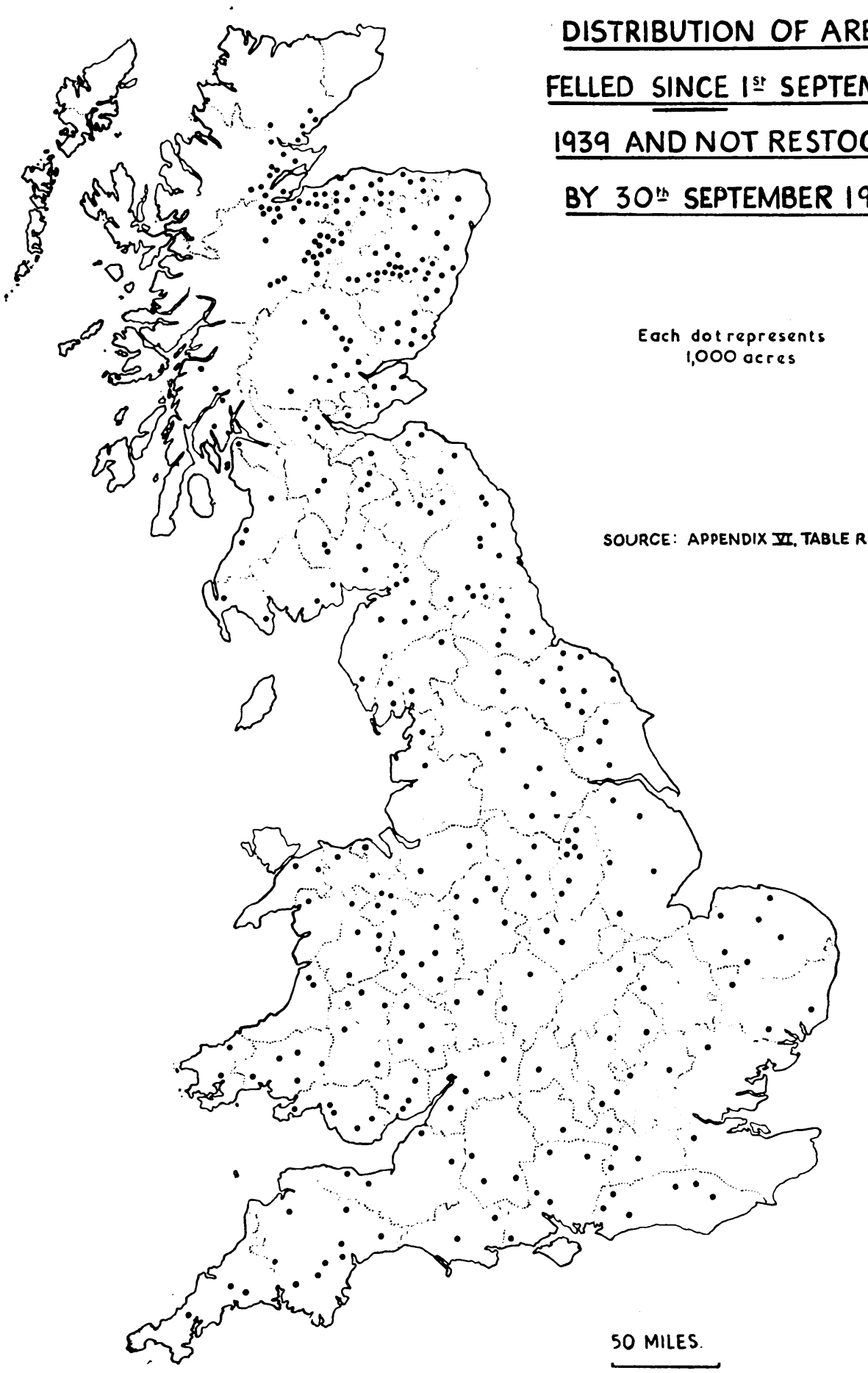
Each dot represents 1,000 acres

SOURCE: APPENDIX VI, TABLE Q



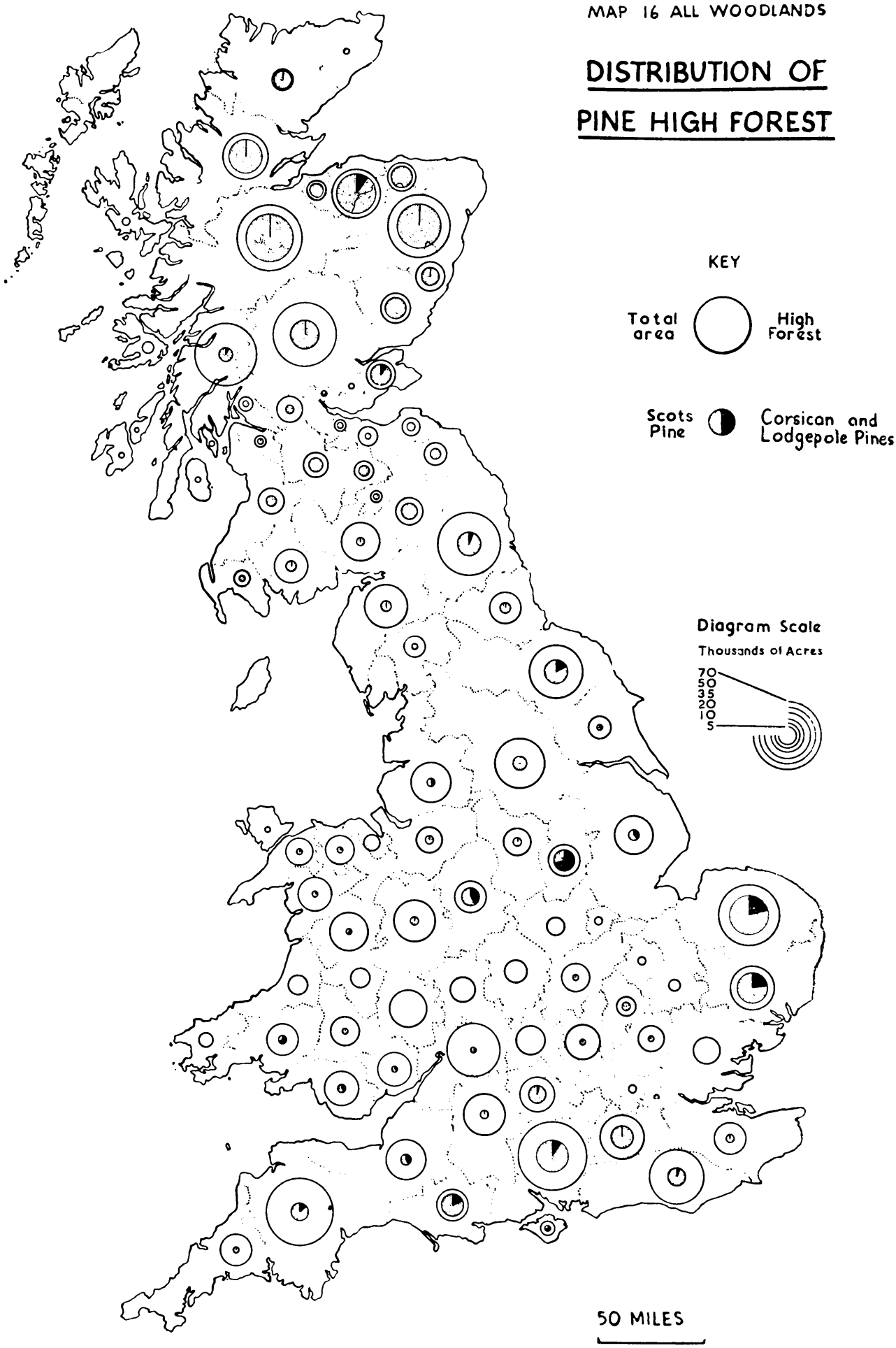
MAP 15 PRIVATE WOODLANDS

DISTRIBUTION OF AREAS FELLED SINCE 1st SEPTEMBER 1939 AND NOT RESTOCKED BY 30th SEPTEMBER 1947

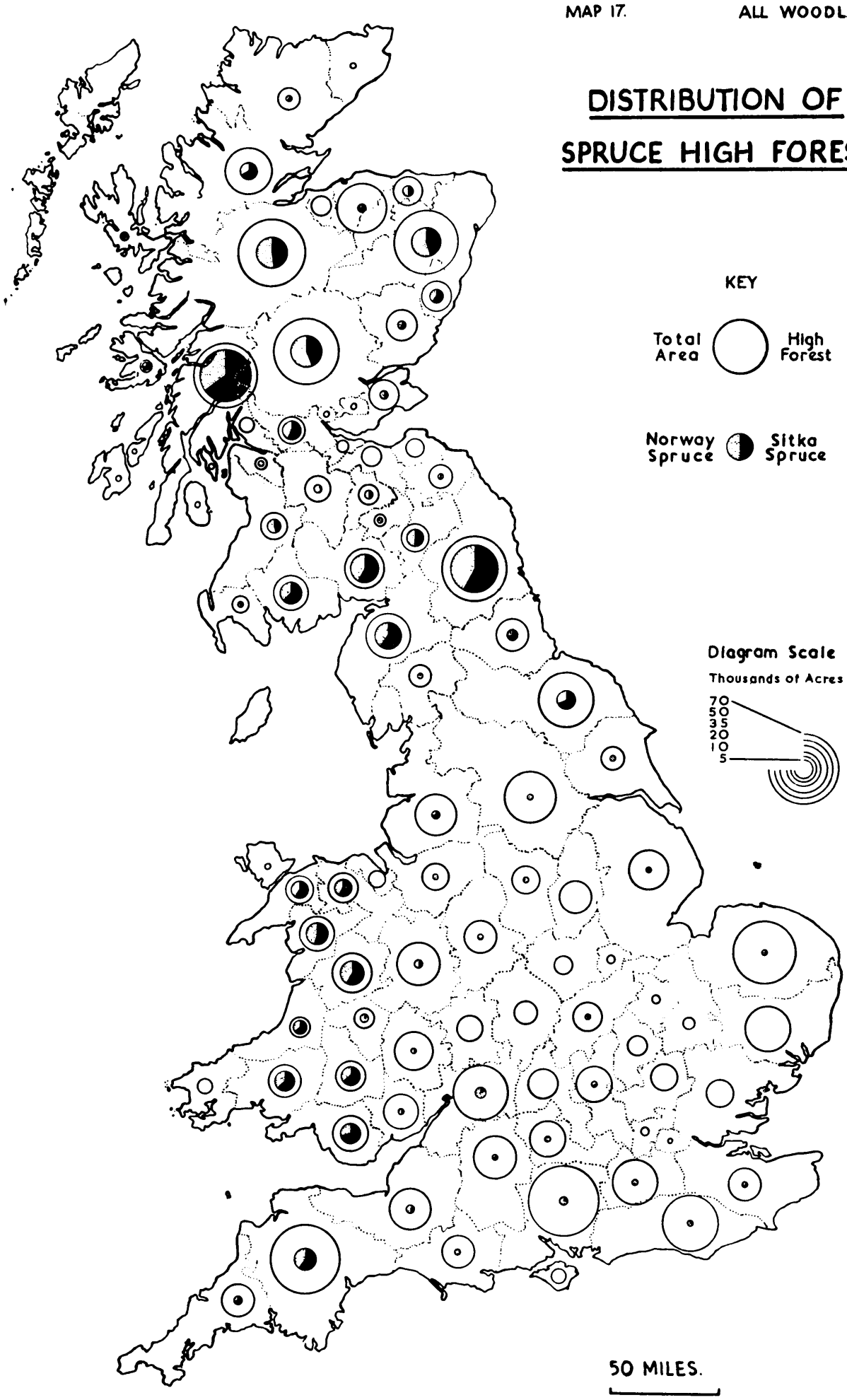


MAP 16 ALL WOODLANDS

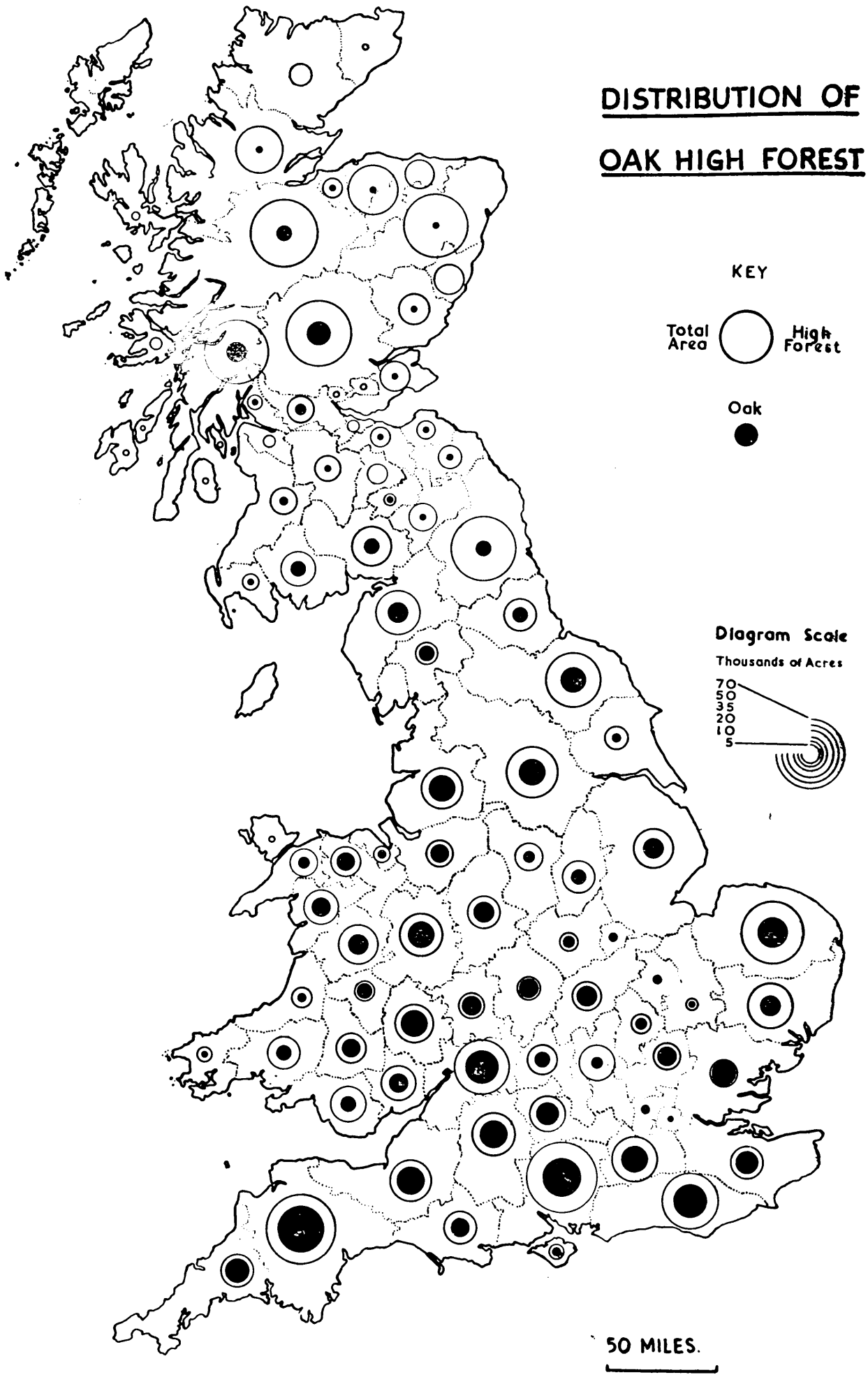
DISTRIBUTION OF PINE HIGH FOREST



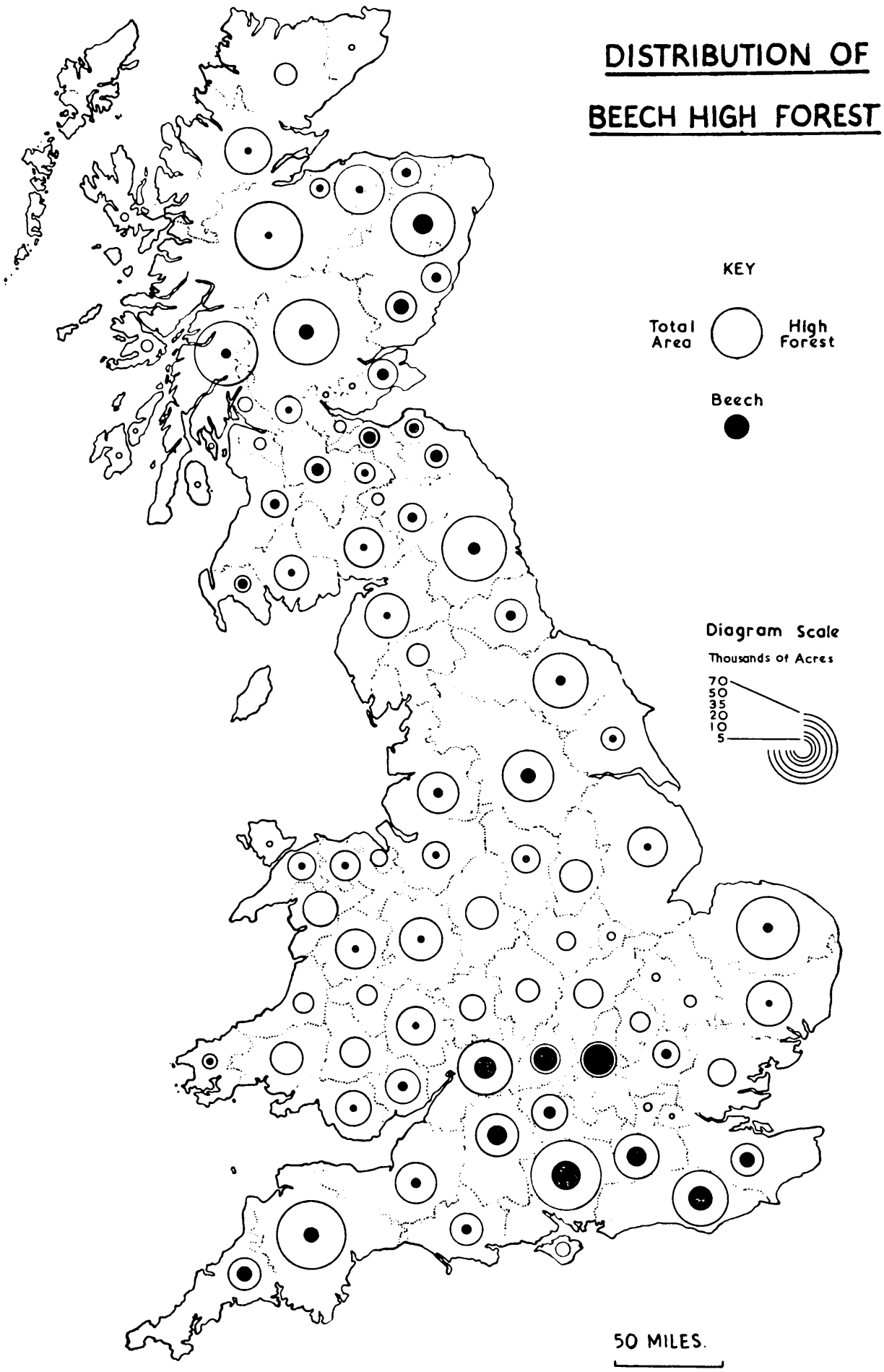
MAP 17. ALL WOODLANDS



MAP 18 ALL WOODLANDS



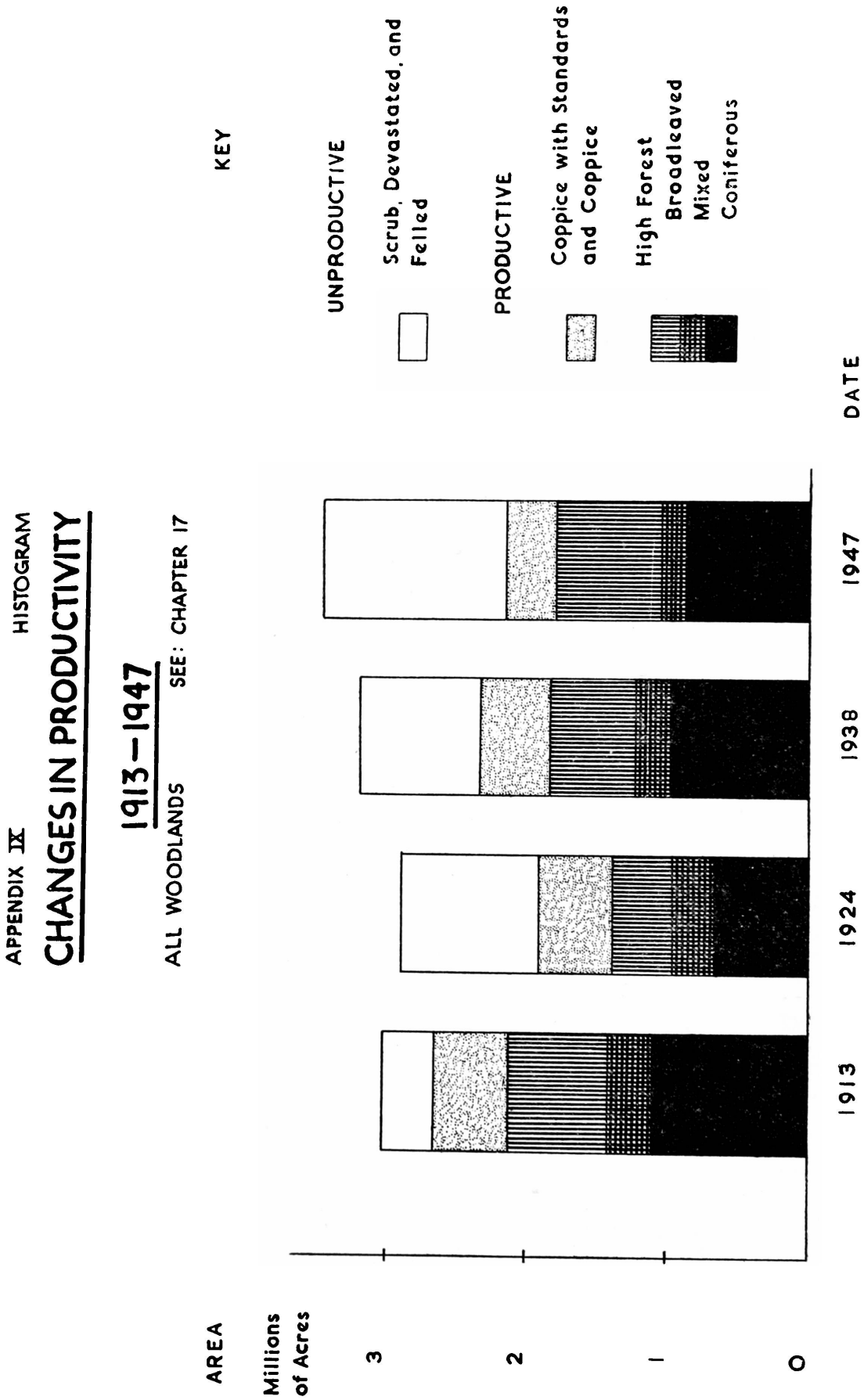
MAP 19 ALL WOODLANDS



APPENDIX IX

CHANGES IN PRODUCTIVITY, 1913-1947—ALL WOODLANDS

The text relating to this Appendix will be found in Chapter 17, page 155.



APPENDIX X

SPECIAL SURVEY OF STATE FORESTS

Although the main survey of State Forests followed precisely the same lines as that for Private Woodlands, it was found possible to carry out, at the same time and with the same field staff, a more detailed survey of the State Forest areas. This was effected by the use of an additional field form, illustrated in Figure 9 overleaf. Following a simple code, the surveyor placed a cross in the appropriate squares of the grid, and this information was later tabulated by the office staff, so that totals of the areas requiring, for example, certain treatments in certain years, could rapidly be obtained.

The most important feature which was assessed by this special survey was the proportion of the young plantations in the State Forests that could be regarded as "established", that is, properly stocked with growing trees and no longer in need of weeding, beating up, or similar treatment in order to ensure the success of the crop. This proportion is naturally higher in the old age-classes, and lower in the younger ones, and the following statement shows the position:—

Age-class	*Percentage established*	*Percentage not yet established*
1 to 10 years	54	46
11 to 20 ,, ...	93	7
21 to 30 ,, ...	96	4
Over 30 years and uneven-aged	95	5

The form and instructions issued to the field parties concerned, are appended overleaf

INSTRUCTIONS FOR FIELD PARTIES—FORESTRY COMMISSION AREAS

1. Stands

(a) Each block of five acres or over, whether on one map or several, which is now woodland, or is shown on the six-inch Ordnance Survey map as having been woodland, or which is known from Forestry Commission records to have been planted as woodland, must be visited and demarcated into stands. Each of these stands must be entered up on both a standard (white) field form* and on one or more Forestry Commission (pink) forms (see Fig. 9 overleaf).

(b) Detached blocks of less than five acres, and strips of woodland less than one chain wide, are to be excluded from the sequence of Stand numbers and from all returns sent to Census Branch. Returns covering such cases are to be dealt with separately and sent direct to Director's office. These separate returns should be numbered so as not to break the sequence of the serial numbers of the forms sent to Census Branch.

A minimum distance of 1½ chains is to constitute a division between blocks for this purpose.

(c) Stands are to be numbered consecutively from "1" upwards. A fresh sequence of numbers must be begun for each six-inch Ordnance Survey quarter-sheet or for each part of each county shown thereon. Two or more forests on one quarter-sheet must show one sequence of stand numbers.

(d) Stands normally are to be stopped at the edge of the Ordnance Survey quarter sheet. Where a wood extends on to adjacent quarter-sheets, field parties must see that description and data agree for each sheet. Overlaps of less than four acres may be included on the map showing the major portion of the stand.

(e) (i) Each stand is to comprise an area which is uniform as regards the particulars recorded on the white Stand Data Form. All stands one acre or more in area (within each block inspected) must be differentiated. Stands below one acre are to be recorded only when important changes in description are involved since Census Branch will record the area as one full acre. Stand boundaries must not cross the compartment boundaries.

*This is the Stand Data Form described in Appendix I, page 165.

CENSUS OF WOODLANDS, 1947-1949

Forest (and Beat or Section)

Compt.	Stand	Sub-Stand	
		Number	Acres

P. Year:—

	ESTAB-LISHED	NOT ESTABLISHED				
		For N.T	For Special Consideration			
			F. or S.	Growth	Disease	Other
Category	1	2	3	4	5	6

ESTABLISHED CROPS (Condition Code 1):—

Treatments proposed by F.Y's	Brash	Clean	1st Th.	2nd Th.	Subqt. Th.	Cl. Fellg.	N.R. Fellg.	Group or Seln. Fellg.	U.P.
F.Y. 48	1	2	3	4	5	6	7	8	9
F.Y. 49	1	2	3	4	5	6	7	8	9
F.Y. 50	1	2	3	4	5	6	7	8	9
F.Y. 51	1	2	3	4	5	6	7	8	9
F.Y. 52	1	2	3	4	5	6	7	8	9

NON-ESTABLISHED AREAS (Category Codes 3-6):—

Causes of Non-Estbt.	Protection		Climatic		Ptg. etc. Technique				Uncertain
	Fire	Vermin	Frost	Expos.	D. or P.	Weeds	Sps.	Other	
	1	2	3	4	5	6	7	8	9

Treatment suggested	Prot'n	B.U.	R.P.	D. or P.	Weed	S.A.	Abandon
	1	2	3	4	5	6	7

Fig. 9. Additional Form used in the Area Survey—State Forests only (Pink Form).

Abbreviations used:
Compt.=Compartment P. Year=Forest Year in which crop was planted F.Y.=Forest Year wherein work prescribed should be undertaken N.T.=For Normal Treatment F. or S.=Form or Stocking Th.=Thinning Subqt.=Subsequent Cl. Fellg.=Clear Felling N.R. Fellg.=Felling for Natural Regeneration Seln. Fellg.=Selection Felling U.P.=Underplanting Ptg.=Planting Expos.=Exposure D. or P.=Drain or Plough Sps.=Choice of Species Protn.=Protection B.U.=Beating Up R.P.=Replanting S.A.=Special Attention

(ii) Where parts of a stand differ as regards those supplementary details which have to be recorded on the pink form, sub-stands will be formed; these are to be demarcated with dotted lines and numbered from "1" upwards for each stand Where no sub-stand is formed, the number frame will be marked "1". Where sub-stands are formed, the total of their acreage must agree with that entered on the standard (white) Stand Data form.

(iii) On completion, the corresponding pink Forestry Commission and white Stand Data forms are to be stapled together in the top left hand corner, the pink forms, with sub-stands in serial order, being uppermost in every case. On the *white* Stand Data form, in the blank end of the horizontal entries "Suitability for Economic Management", enter in a ring the number of these pink forms.

2. The Special (Pink) Form for Forestry Commission Areas

(a) This form is to record the position at 1st October, 1947. If an area is inspected before then, work in progress (or projected) for completion by 30th September, 1947, is to be assumed complete. For areas visited on the 1st October, 1947, or later, the pink form is to be filled in as if work during or after October, 1947, had not been done. For example, it is to be shown (where applicable) as a "Treatment proposed"; there will also be no pink forms for areas planted in the Forest Year 1948 (which begins on 1st October, 1947), unless they are carrying a crop at 1st October, 1947.

(b) Burnt areas not replanted at 1st October, 1947, are to be shown by their original planting year and Coded Category 6, clause 1 (Fire) (these will have been recorded on the white form as TYPE 7 or 8); in other respects they will be dealt with as provided at **(a)** above.

(c) Standing woods and plantations not planted by the Forestry Commission are to be entered in the planting year frame as "00", whatever their age. The age-class of these will be obtained from the (white) field form.

(d) Category-codings

Code 1—Established Crops—See (e) below.

Code 2—For Normal Treatment (N.T. on form)—includes areas for beating-up, weeding, etc. Not further classified.

Code 3—Form or Stocking (F. or S. on form).

Code 4—Areas in check after more than five growing seasons or obviously unsatisfactory as to *rate* of growth.

Code 5—Fungal or Insect attacks not yet markedly affecting growth but worthy of record.

Code 6—Not established for reasons not covered by 3-5 above.

For example, a plantation with disease causing serious losses would be Code 3; if with little or no growth, whether from disease or other cause, Code 4; with very evident disease and worthy of record, Code 5.

(e) Proposals for Established crops

On no account must more than one Code number be marked against one Forest Year.

Where two operations are planned for one Forest Year, mark the *highest* applicable Code number only.

Codes 3, 4 and 5 refer respectively to First, Second and Subsequent Thinnings *in the history of the crop. Not* First, etc., thinnings *subsequent to the Survey.*

In the case of a crop underplanted under a shelterwood, the former (underplanted crop) to be the ultimate Pure or Principal species, any removals of overwood must be shown on the pink form as Cleanings and *not* as Thinnings. Thinnings will be restricted to the pure or principal crop.

In such a case, too, the entry on the white form (Stand Data Form) for "Age-Class" will be 9, *i.e.*, uneven, with "Sub-type" 5 (*i.e.*, underplanted), and *not* according to the age-class of the principal species. This will be shown on the pink form under "P-year" (*i.e.*, Forest Year in which planted).

(f) Causes of Non-establishment

This Section applies to Codes 3 to 6 in Section (**d**) above.

Always use the *lowest* applicable Code number.

Code 1—Fire damage.

Code 2—Vermin—Includes damage by rabbits, grey squirrels, voles, deer, etc.

Code 3—(Frost), 4 (Exposure), 5 (Drains or Ploughing inadequate) or 6 (Weeds)—marking appropriate to the immediate and observed conditions is to be given *even though* it is considered that the incidence might have been affected by the use of a different species.

Code 7—Faulty Choice of Species (Sp.)—not to be used unless there is no clear indication permitting the use of Codes 2 to 6. Examples of correct use might be die-back in European larch or honey-fungus in Sitka spruce.

Code 8—Other Causes—would be particularly applicable to doubtfully successful methods of shelter (for example: group planting, coppice treatment, etc.), or to weevil, etc., damage.

(g) Treatments suggested

This Section applies to Codes 3-6 in Section (**d**) above.

Code 1—Protection—special steps necessary as to fencing and/or destruction of vermin.

Code 2—Beating-Up—not to be used for stands coded as Stocking 4 (*i.e.*, less than 50%) on white Stand Data form. This critical percentage must refer (on both pink and white forms) to the stand or sub-stand as a whole and not to part thereof.

Code 3—Re-planting—applies to a Stocking Code 4 on white Stand Data form, or when change of species is recommended.

Code 4—Drain or Plough—use instead of Code 2 or 3 if intensive draining or ploughing is necessary as a preliminary to success, with or without beating-up or re-planting.

Code 6—Special attention—applies to cases where the Surveyor is in doubt as to the best treatment needed.

Code 7—Abandon—use only for stands which it is recommended be abandoned as "unplantable" and which have been coded 3 (Unsuitable) on white Stand Data form under "Suitability for Economic Management".

In the case of Established crops for which no treatment is proposed before 1953, the "Established Crops" treatment section on the pink form is to be scored out by one diagonal line.

(h) Each form and map will, on completion, be initialled and dated by the Surveyor.

3. Maps

(a) Stand and sub-stand boundaries are to be delineated in pencil (H.B.) in the field, and given the appropriate numbers.

(b) Areas. The total area of each block must be measured by acre-grid (to nearest acre). Individual stands comprising the block will be measured, and their sum should agree with the total for the block, any necessary adjustments being made in the area of the larger stands.

4. Coding

(a) A separate code number is allotted to each Working Section, Beat, or Block of a Forest, if the compartments in that section, etc., start a new number series. Lists of such code numbers, by Conservancies, will be supplied by Census Branch. Where more than one compartment in a Working Section, Beat or Block has the same number, with or without a letter in addition, renumbering (avoiding the inclusion of letters) must be carried out before field work starts, or Working Sections or Beats must be re-adjusted.

(b) Open woodlands (*i.e.*, in New and Dean Forests and parts of Scotland) should be allotted to an adjacent Working Section, Beat or Block for purposes of coding. In such areas, and in other cases where compartmenting has not been completed, Code "O" should be inserted in compartment number Frame.

(c) Each county will be coded according to the appropriate serial number on the list provided.

(d) The four quarters of each six-inch Ordnance Survey sheet will be coded numerically as follows:—

N.W. equals 1
N.E. equals 2
S.W. equals 3
S.E. equals 4.

These numbers will follow the number of the six-inch sheet, thus quarter-sheet 23 N.E. wil be coded as "23-2". This coding should be done by District Officers, in cases where these sheets are issued to Foresters.

(e) Ordnance sheets having a letter (*e.g.*, A) prefixed to their numbers will be regarded for all purposes (numbering of stand, etc.) as part of the sheets whose numbers they bear, so the prefix will not be coded.

APPENDIX XI

NOTE ON MINOR SPECIES IN PRIVATE WOODLANDS

In the course of the survey, a good deal of information was collected concerning the minor species of trees growing as High Forest in the Private Woodlands. As a general rule, those species for which no provision had been made on the Stand Data Form (*See* Appendix I, page 165) or in the tables, occupied only small areas, usually in mixed Stands; often they were found in aboreta or similar woods. The area figures given below are based on the Principal Species occurring in each Stand; such species, considered individually, might only comprise a small proportion thereof.

Taking the conifers first, 1,005 acres were found that could not be classified in the set forms and tables. Of this, 394 acres were occupied by six species of *Pinus*, as follows:

Monterey pine	*Pinus radiata* Don.	163 acres
Mountain pine	*P. mugo* Turra	105 ,,
Maritime pine	*P. pinaster* Ait.	59 ,,
Weymouth pine	*P. strobus* L.	41 ,,
Austrian pine	*P. nigra* Arnold	19 ,,
Jack pine	*P. banksiana* Lamb.....	7 ,,
		394 ,,

The Monterey pine, *Pinus radiata*, was only reported in the southern counties of Cornwall, Devon, Hampshire, and Sussex; other pines had a more general distribution.

Spruces were represented by three minor species, as follows:—

White spruce	*Picea glauca* Voss.	44 acres
Serbian spruce	*P. omorika* Bolle	12 ,,
Oriental spruce	*P. orientalis* Carr.	3 ,,
		59 ,,

The whole of this spruce area was in Scotland.

The remaining minor conifers form a mixed assortment. Most important by area was yew, *Taxus baccata* L., with 146 acres, all in England and Wales.

The two Sequoias, the Californian redwood, *Sequoia sempervirens* Endl. and the Wellingtonia, *S. wellingtonia* Seem. occupied between them 132 acres, distributed over all three countries. Cedars of the genus *Cedrus*, chiefly *C. deodara* Loud., accounted for 64 acres, mainly in England. There were 10 acres of Chile pine, *Araucaria araucana* Koch., 9 of Monterey cypress, *Cupressus macrocarpa* Hartw., and one each of Nootka cypress, *Chamaecyparis nootkatensis* Spach., and Japanese cedar, *Cryptomeria japonica* Don. In all, seventeen minor species of conifers were differentiated in the returns; the balance of 189 acres represents, for the most part, arboreta and similar plantations wherein no principal species could be distinguished.

Certain stands of these minor conifers, such as yew and maritime pine, came under the designation of Scrub, and are therefore not shown in these High Forest acreages.

The total area of minor broadleaves recorded in High Forest was 801 acres; this included 11 different species or genera. Two species stand out as occupying fairly substantial areas. These are horse chestnut, *Aesculus hippocastanum* L., with 273 acres, and Turkey oak, *Quercus cerris* L., with 235 acres; the bulk of both is in England. Of lesser importance are: aspen, *Populus tremula* L., with 77 acres; rowan, *Sorbus aucuparia* L., and holm oak, *Quercus ilex* L., each with 35 acres; field maple, *Acer campestre* L., with 10 acres; robinia, *Robinia pseudo-acacia* L., with 24 acres; walnut, *Juglans regia* L., with 5 acres and grey alder, *Alnus incana*, Moench. with 29 acres. Trees of the genus *Eucalyptus* were the "principal species" over an area of 7 acres of High Forest in Inverness-shire, and one acre of plane, *Platanus* sp., was recorded in Fife. Only 46 acres were not assigned to any particular principal species. Certain minor native broadleaved trees or shrubs, such as hawthorn and privet, were usually classified as Scrub.

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