

FORESTRY COMMISSION

THIRTIETH
ANNUAL REPORT OF THE
FORESTRY COMMISSIONERS
FOR THE YEAR ENDING
SEPTEMBER 30TH
1949

*Presented pursuant to Section 7 (3) of the Forestry
Act, 1945 (8 & 9 Geo. VI Ch. 35)*

*Ordered by The House of Commons to be Printed
13th November 1950*



LONDON
HIS MAJESTY'S STATIONERY OFFICE
FOUR SHILLINGS NET

FORESTRY COMMISSION,
25, SAVILE ROW,
LONDON, W.1.

19th July, 1950.

To:

THE MINISTER OF AGRICULTURE AND FISHERIES.
THE SECRETARY OF STATE FOR SCOTLAND.

Gentlemen,

In pursuance of Section 7 (3) of the Forestry Act, 1945, I have the honour to transmit the 30th Annual Report of the Forestry Commissioners covering the Forest Year ended 30th September, 1949.

I am,

Gentlemen,

Your obedient Servant,

(Sd.) ROBINSON,
Chairman.

CONTENTS

	Page
REVIEW OF THE FIRST THIRTY YEARS WORK 1919-1949	7
Forest Policy and Legislation	7
Personnel of the Commission	9
Administrative Staff	10
Organisation	11
Finance	12
Forestry Operations	20
State Forest Operations...	20
First Twenty Years ...	20
Acquisition of Land and Planting	20
Thinning	21
Roads	21
Housing	21
The War Period (1940-1946)	23
Timber Supply	23
Forestry Operations during the War Period	25
Acquisition and Planting	25
Timber Supply	25
Roads and Housing	26
Preparation for Post-War Forestry Operations...	26
Post-War Developments	27
Acquisition and Planting 1947-49	27
Acquisition	27
Planting	28
Thinning	28
Housing	30
Roads	30
Private Forestry	31
The First Twenty Years	31
The War Years	33
Private Planting during the War Years	33
Preparations to meet the Post-War Situation	33
Progress in the Post-War Years 1947-1949	34
The Dedication Scheme...	34
Progress of Dedication	35
Thinning Subsidy	35
Planting Grants	36
Progress of Private Planting since 1946	36
The Commissioners' Estates	37
Property other than Forest	37
The Forests	38
Species Planted	39
Progress of the Plantations	40
Establishment	40
Rate of Growth	41
Effects of the War	41
Census of Woodlands	44
Area of Woodland	45

	Page
Suitability for Economic Management	48
Estimation of Volume	48
Seed Supply	48
Developments in Forest Technique	49
Nursery Work	49
Planting Methods	52
Choice of Species	53
Brushing	57
Thinning	57
Pruning	58
The Weather in relation to the Formation and Protection of Plantations	58
Diseases and Pests	59
Damage by Animals	61
Deer	61
Rabbits	62
Squirrels	62
Voles	63
Fire Protection	64
Damage by Fire	65
Utilisation of Home-grown Timber	67
Labour, Forest Workers Holdings, and Housing	70
Labour	70
Forest Workers Holdings	71
Housing	72
Education	73
Forest Officers	73
Imperial Forestry Institute	74
Forester Training Schools	75
Short Courses for Estate Woodmen	76
Notherwood House	76
Forest Workers' Training Scheme	77
Exhibits at Agricultural Shows	77
Research and Experiment	77
Silvicultural Research	79
Pathology and Entomology—General	82
Pathology	83
Entomology	83
Soil Research	84
Mycorrhiza Research	85
Miscellaneous Investigations	85
Mechanisation	85
Publications	86
The Library	86
Publicity and Public Relations	87
National Forest Parks	87
The Benmore Gardens	88
The National Pinetum	89
British Empire Forestry Conferences	89
European Commission on Forestry and Forest Products	90
The World Forestry Congress	91
Tribute to Staff	91

	Page
THE FOREST YEAR 1948-49 ...	92
Summary of the Year's Work ...	92
The National Committees ...	94
The Regional Advisory Committees ...	95
The Forestry Fund ...	96
Progress of Work ...	97
Acquisition and Utilisation of Land ...	97
Forest Units ...	98
Land Acquired to date by Lease or Purchase ...	98
Acquisition of Land during the Year ...	99
Cultural Operations ...	100
Plantations ...	100
Planting Progress to date ...	101
Nurseries ...	102
Area ...	102
Seed Supply ...	103
Stocks of Transplants and Seedlings ...	105
Forest Protection ...	106
Forest Fires ...	106
Preparation and Sale of Produce ...	107
Thinnings and Clear Fellings ...	107
Roads ...	103
Holdings and Estate Management ...	109
Technical Supervision ...	110
Labour Employed in State Forests ...	110
Private Forestry ...	110
Planting... ...	110
The Dedication Scheme ...	111
Thinning Grants ...	111
Education ...	112
Forester Training Schools and Short Courses ...	112
Forest Workers Training Scheme ...	112
Northerwood House ...	112
Forestry Exhibits ...	113
Grants to Educational Institutions ...	113
Research and Experiment ...	113
Sample Plots ...	113
Silviculture ...	114
Entomology ...	114
Pathology ...	114
Other Projects ...	115
The Advisory Committee on Forest Research ...	115
Utilisation ...	115
Botanical and Soil Research ...	115
Census of Woodlands ...	115
Publications ...	116
Publicity and Public Relations... ..	116
National Forest Parks ...	117

APPENDICES

1	Payments and Receipts by Heads of Account	...	...	...	...	...	...	...	119
2	Expenditure and Income	...	...	...	...	...	...	...	120
3	Forestry Operations	...	...	...	...	...	...	...	121
4	Cultural Operations	...	...	...	...	...	...	...	122
5	Engineering	...	...	...	...	...	...	...	122
6	Forest Workers Holdings	...	...	...	...	...	...	...	123
7	Education	...	...	...	...	...	...	...	124
8	Research and Experiment	...	...	...	...	...	...	...	125
9	Special Services	...	...	...	...	...	...	...	125
10	Plantations made during the Year ended 30th September, 1949—Summary by Conservancies	...	...	...	...	...	...	...	126
11	Summary of Species used for Planting and Beating Up	...	...	...	...	...	...	...	128
12	Summary Area Statement of Land Use—by Conservancies	...	...	...	...	...	...	...	129
	Area Statements of Land Use—by Forests:—								
13	England	...	...	...	...	...	...	...	129
14	Scotland	...	...	...	...	...	...	...	132
15	Wales	...	...	...	...	...	...	...	135
16	Outline Maps showing Conservancy Boundaries and Distribution of Forests:—								
	England	...	...	...	...	...	...	...	136
	Scotland	...	...	...	...	...	...	...	141
	Wales	...	...	...	...	...	...	...	145
17	Publications Issued 1919–1949	...	...	...	...	...	...	...	147

THIRTIETH ANNUAL REPORT OF THE FORESTRY COMMISSIONERS

FOR THE YEAR ENDING

SEPTEMBER 30th 1949

REVIEW OF THE FIRST THIRTY YEARS WORK 1919—1949

This is the thirtieth Report prepared by the Forestry Commissioners and covers the Forest Year ending 30th September, 1949. It has been the procedure hitherto to review the Commissioners' work at five-year intervals, previous surveys being in 1924, 1929 and 1934, comprising respectively the fifth, tenth, and fifteenth Annual Reports. The series was broken, however, by the Second World War, hence a gap of fifteen years between the present review and its predecessor of 1934.

In course of the thirty years the Forestry Commissioners have acquired an estate of 1,560,000 acres, of which 971,000 acres were classified at the time of acquisition as plantable. Some 557,000 acres have been planted and are gradually becoming productive timber. In addition 57,000 acres of standing woodland have been acquired. By the aid of planting grants private owners planted 182,000 acres.

A by-product has been the establishment at negligible cost of six National Forest Parks covering 240,000 acres.

The continuity of planting operations was severely interrupted by the late war, during the earlier stages of which the Commissioners were charged with the organisation and supply of home-grown timber.

FOREST POLICY AND LEGISLATION

Before 1919 Britain had no State forest policy in any accepted sense of the term. It is true that special Commissions were appointed from time to time and various Acts were passed, mostly dealing with the management of the relatively small area of Crown Forests and the provision of oak for naval purposes but, when this requirement petered out, the country reverted to a *laissez faire* policy encouraged by an apparently infinite vista of cheap imports from overseas. It took the rude shocks of the First World War to bring home to Government the importance of timber as a raw material and the dangers of undue reliance upon imported supplies. As a result a Forestry Sub-Committee of the Reconstruction Committee was appointed in July, 1916, and reported in May, 1917. This Sub-Committee, known after its Chairman, Mr. F. D. (later Sir Francis) Acland, M.P., as the Acland Committee, proposed a large programme of conifer afforestation and the maintenance of the existing three million acres of privately-owned woodlands in a productive state. Those interested will find a detailed summary of the Acland Committee's recommendations in the introductory section to the Commissioners' Report on Post-War Forest Policy (Cmd. 6447).

The Report of the Acland Committee was accepted by the Cabinet in the latter part of 1918, and an Interim Forest Authority was set up whose main work was the drafting and introduction into Parliament of a Forestry Bill

which became law in 1919 (Forestry Act, 1919). The object of this Act was to increase the supplies of home-grown timber against another emergency such as the world war which had just ended, to provide a reserve against the time when the resources of the virgin forests of the world might be exhausted, and to lessen the drift of population from the country to the towns. The Act established the Forestry Commission with wide powers to acquire land, promote the supply and conversion of timber, establish and carry on forest industries, promote education and research in forestry, make planting grants and give advice to owners of estate woodlands, etc.

The next legislative step was the Forestry (Transfer of Woods) Act, 1923, which empowered the transfer of the majority of the existing Crown Woods, e.g. the New Forest and the Forest of Dean, to the Commission. This Act also removed certain conditions attaching to the Commissioners' powers to make grants.

Apart from the short Forestry Act of 1927 which authorised an increase in the number of Commissioners and also empowered them to make bye-laws with respect to their properties, there was a legislative lull until 1945 when the Forestry Act of that year received the Royal Assent. The passing of this Act was preceded by the issue in 1943 of a report by the Commissioners on Post-War Forest Policy (Cmd. 6447). In this report the situation likely to arise at the end of the war was discussed and proposals were submitted involving a rapid expansion in the forest area of the country as well as measures required to put the existing woodlands in order.

Government accepted the main proposals of the report but considered that it was desirable that in future there should be direct Ministerial responsibility for Forest Policy, and that in view of the large land acquisition programme envisaged there should be closer liaison between the Agricultural Departments and the Forestry Commission. Ministerial responsibility was achieved by providing in the 1945 Act that the Commissioners, in exercising their functions, should comply with such directions as may be given them by the Minister of Agriculture and Fisheries and the Secretary of State for Scotland, acting jointly, or, where matters affecting only one country were concerned, by the appropriate Minister. Land acquired under the Forestry Act, 1919, is vested in the appropriate Minister. Ministers were also authorised to place at the disposal of the Commissioners land acquired through the Forestry Fund and to manage, let or sell land not so placed. Devolution was provided for by requiring the Commissioners to appoint National Committees for England, Wales, and Scotland, respectively, and authorising the Commissioners to devolve on these National Committees such functions as they think fit.

Other clauses in the Act provided for the retention of the Forestry Fund which is to be replenished annually by Parliamentary Votes, and made Members of the House of Commons ineligible for appointment as Commissioners. The Commissioners' powers under the Forestry Act, 1919 and 1923, in respect of forestry operations, grants, education, research, etc., are unaffected by the 1945 Act.

A further measure, the Forestry Act, 1947, provided for the dedication of private woodland to forestry purposes, and dealt with such matters as the enforcement of Dedication Covenants (in England and Wales) and of Dedication Agreements (in Scotland), and empowered certain classes of owners to enter into such covenants or agreements.

Reference must also be made here to the New Forest Act, 1949, for though not passed until after the end of the year under report the Bill had gone through most of its Parliamentary stages. This Act besides amending the constitution of the Verderers gave them certain additional powers. Provision was also made to enable the Verderers to authorise the enclosure of

additional land, up to a maximum of 5,000 acres, for the purpose of growing timber, and the enclosure of a maximum of 3,000 acres for cultivation and improvement of grazing.

The long-standing problem of the ancient and ornamental woods was met by providing that the Verderers may authorise the Commissioners, subject to certain conditions, to make enclosures, individually not exceeding twenty acres in area, for the rehabilitation of these woods.

PERSONNEL OF THE COMMISSION

A list of Commissioners with dates of service attached is set out below. The present Chairman, Lord Robinson, O.B.E., is now the only original member serving on the Commission.

	<i>First Appointment</i>
Lord Lovat (First Chairman 1919 to 1927)	29th November, 1919
Lord Clinton (Second Chairman 1927 to 1930)	29th November, 1919
Sir John Stirling Maxwell (Third Chairman 1930 to 1932) ...	29th November, 1919
Lord Robinson (Fourth Chairman from 1932 to present time)* ...	29th November, 1919
Sir Francis Acland, Bt., M.P. (Died 9th June, 1939)	29th November, 1919
Col. W. Steuart-Fotheringham (Died 8th April, 1936)	29th November, 1919
Sir L. Forestier Walker (Resigned 16th January, 1929)	29th November, 1919
Mr. T. B. Ponsonby (Resigned 23rd January, 1924)	29th November, 1919
Sir Hugh Murray (Retired 28th November, 1934)	23rd January, 1924
Mr. W. R. Smith (Died 26th February, 1942)	27th February, 1925
Lord Courthope (Retired 25th July, 1948)	11th October, 1927
Major C. W. M. Price (Retired 29th November, 1929)	16th January, 1929
Mr. J. H. Alpass (Resigned 16th March, 1932)	29th November, 1929
Mr. D. R. Grenfell, M.P. (Resigned 23rd May, 1942)	29th November, 1929
Major Sir Samuel Strang Steel, Bt.* (Retired 28th November, 1949) ...	26th March, 1932
Sir Alexander Rodger (Resigned 18th November, 1942)	25th May, 1932
Sir John Sutherland (Resigned 18th November, 1942)	29th November, 1934
Col. L. Ropner, M.P. (being a Member of the House of Commons ceased to hold office on 15th June, 1945)	1st July, 1936

* Indicates Members of the Commission at 30th September, 1949.

First Appointment

Sir William Taylor* (Retired 28th November, 1949)	8th November, 1938
The Earl of Radnor *	23rd May, 1942
Mr. M. P. Price, M.P. (being a Member of the House of Commons ceased to hold office on 15th June, 1945)	23rd May, 1942
Mr. D. J. K. Quibell, M.P., now Lord Quibell (being a Member of the House of Commons ceased to hold office on 15th June, 1945) ...	23rd May, 1942
The Earl of Moray (Died 9th July, 1943)	18th November, 1942
Mr. J. M. Bannerman *	18th November, 1942
Major Sir Richard Cotterell, Bt. *	25th July, 1945
Rt. Hon. Thomas Johnston (Resigned 11th April, 1948) ...	25th July, 1945
Mr. Lloyd O. Owen *	25th July, 1945
Lt.-Col. W. J. Stirling of Keir (Resigned 25th July, 1948) ...	25th July, 1945
Mr. J. E. Hamilton *	26th July, 1948
Major John Stirling of Fairburn *	26th July, 1948
Mr. W. H. Vaughan *	26th July, 1948

Mr. A. G. Herbert, who was Secretary to the Commissioners from the commencement, retired on 31st December, 1945, and was succeeded by Mr. T. W. Cleland whose period of office was from 1st January, 1946 to 31st May, 1947. Mr. F. W. Hamilton was appointed Secretary on 1st June, 1947, and retired on 30th June, 1950.

In 1945, when National Committees for England, Scotland and Wales were set up, the following Commissioners were appointed to serve as Chairmen of the respective Committees:—

England:—The Earl of Radnor.
Scotland:—Rt. Hon. Thomas Johnston.
Wales:—Mr. Lloyd O. Owen.

The only change to report in these appointments is the resignation of the Rt. Hon. Thomas Johnston who was succeeded by Major Sir Samuel Strang Steel as Chairman of the National Committee for Scotland.

ADMINISTRATIVE STAFF

In the first years of the Forestry Commission the post of Assistant Commissioner for England and Wales was held by Mr. Hugh Murray (later Sir Hugh Murray) and that of Assistant Commissioner for Scotland by Mr. John Sutherland (now Sir John Sutherland). Subsequent appointments were as follows:—

Assistant Commissioners for England and Wales

Mr. H. A. Pritchard: 1924-1932.
Mr. W. L. Taylor (now Sir Wm. Taylor): 1932-1938.
Mr. O. J. Sangar: 1938-1939.
Mr. A. P. Long (*acting*): 1940-1945.

* Indicates Members of the Commission at 30th September, 1949.

Assistant Commissioners for Scotland

Mr. John M. Murray: 1934-1939.

Mr. A. H. Gosling: 1940-1945.

The following appointments were made in 1946 to the new posts created when the Department was reorganized:

Director-General: Held by Sir Roy Robinson (now Lord Robinson) conjointly with his post as Chairman of the Commissioners.

Deputy Director-General: Mr. W. L. Taylor.

Directors of Forestry, and of Research and Education:

England: Mr. O. J. Sangar.

Scotland: Mr. A. H. Gosling.

Wales: Mr. A. P. Long.

Research and Education: Mr. W. H. Guillebaud.

In January, 1947, Sir Roy Robinson handed over his functions as Director-General to Mr. W. L. Taylor, who was succeeded as Deputy Director-General by Mr. A. H. Gosling, the latter's post of Director of Forestry for Scotland being filled by the appointment of Mr. H. C. Beresford-Peirse (now Sir Henry Beresford-Peirse, Bart.). The retirement of Mr. Taylor in June, 1948, from the post of Director-General resulted in the following promotions: Mr. A. H. Gosling to Director-General, Mr. W. H. Guillebaud to Deputy Director-General, and Mr. J. Macdonald to Director of Research and Education.

ORGANISATION

Under the Forestry Act of 1919 executive control was entrusted to two Assistant Commissioners, one for England and Wales and one for Scotland. Functions reserved to the headquarters of the Forestry Commission included, in addition to policy, matters of finance and establishment, provision of seed, stores and equipment, education, research and publications.

A regional organisation was set up under the Assistant Commissioners dividing the country into a small number of Divisions with a technically trained forest officer called Divisional Officer in charge of each. Assistant forest officers (District Officers) were recruited from those Universities giving forestry degrees or diplomas, and an effective staff gradually built up. For local supervision Foresters were recruited, partly from private forestry but mainly from Forester Training Schools set up, by the Commissioners, in various parts of the country.

By 1930, when the organisation had got well into swing, the regional set-up was broadly as follows. England and Wales were divided into five main Divisions, to which were added the two Deputy Surveyor charges of the New Forest and the Forest of Dean, making seven Divisions in all. The two Divisions into which Wales was split, incorporated some of the adjoining English counties, the Southern Division including also the whole of the south western counties of England. Scotland was divided into three Divisions.

In 1936, largely as an outcome of the Government's Special Areas Scheme, two new Divisions were formed, one in the North-West of England, with headquarters at Carlisle, and one comprising the whole of South Wales, with headquarters at Cardiff. Two years later the large Southern Division of Scotland was split into two.

Apart from minor changes in Divisional boundaries, the organisation continued to function more or less on the above lines until the outbreak

of War in September, 1939. According to a prearranged plan the staff was then split into two sections, one for purposes of Timber Supply and one for Forest Management. The Forest Management section continued to look after the forest work and the chain of responsibility remained substantially the same as in pre-war days.

With the passing of the Forestry Act in 1945 the time was ripe for a complete re-organisation of the department. The major changes may be summarised as follows:

National Committees.—As provided in the Act, a National Committee was appointed to each of the three countries, consisting of three (or four) Forestry Commissioners, one of whom acts as Chairman, together with three non-official members. The duties devolved on the Committees by the Commissioners relates to the following matters: acquisition of land, cultural operations, estate management including housing, private forestry and National Forest Parks.

Headquarters Appointments.—The posts of Director-General and Deputy Director-General were created in order to assist the Commissioners in the execution of their policy and for administrative and technical co-ordination. Further appointments included the Director in charge of Research, Education and Publications, the Controller of Finance and an Information Officer.

Regional Appointments.—Directors of Forestry were appointed in charge of the Commissioners' operations in England, Scotland, and Wales respectively. These officers took over in large measure the functions previously exercised by the two Assistant Commissioners provided for under the 1919 Act, but much additional responsibility has been devolved upon them. The technical staff at Directors' headquarters in England and in Scotland now comprises three officers of Conservator rank responsible respectively for State Forests, for Private Forestry and Acquisitions, and for Estate Management, Housing, etc., also a Directorate Engineer and other specialist officers of junior rank. In Wales there is one headquarters Conservator and a Directorate Engineer.

Conservancies.—The thirteen Divisions into which the Country was divided before the 1939-45 War have been reorganised into eleven Conservancies with a Conservator of Forests in charge of each. The New Forest and Forest of Dean continue to be managed separately under the charge of Deputy Surveyors. Attached to each Conservancy are—or will be when the complement is complete—Divisional Officers in charge of State Forestry and Private Forestry respectively, also a Conservancy Engineer. Each Conservancy is responsible for compiling its own accounts.

In the field the Conservators are assisted by District Officers in charge of groups of forests, local supervision being entrusted to Foresters and Foremen.

FINANCE

The Forestry Fund was established by the Forestry Act, 1919. From it is paid all the expenditure of the Commissioners, and into it are paid all their receipts from sales of forest produce, rentals, etc., together with such sums as are voted annually by Parliament. The amount required from Parliament each year is provided in the form of a grant-in-aid which is voted in respect of the Financial Year ending 31st March, and drawn upon through the year as and when required to replenish the Forestry Fund. It has been the practice, up to and including the Financial Year ending 31st March, 1949, to draw the full amount of the grant-in-aid before the close of the Financial Year and to carry forward any unexpended balance

to the following year. For the Financial Year ending 31st March, 1950, however, and for future years, any balance of the grant-in-aid not required during the Financial Year will be surrendered to the Exchequer.

Exchequer contributions for the ten years ending 31st March, 1929, amounted to £3,500,000, of which the sum of £430,000 was voted for the Relief of Unemployment. For the next decade from 1st April, 1929, the Government undertook to ask Parliament to vote, as grants-in-aid of the Fund, sums not exceeding approximately £9,000,000. In view, however, of the necessity for reduction of national expenditure, a revised scheme was adopted for the financial years 1932-36, providing for grants-in-aid of £450,000 per annum. A further revision was made in 1936 when the Government agreed that the annual grant-in-aid for the five financial years 1936-40 should be increased to £500,000. The Commissioners were also authorised to proceed with a first instalment of an afforestation and forest holdings scheme in or near the Special Areas, estimated to require additional grants-in-aid of approximately £1,650,000 over the ten years 1936-45. On the approach of war, this scheme fell into abeyance, and for the six Financial Years beginning 1st April, 1940, annual grants-in-aid were made, amounting in the aggregate to £3,475,000.

In November, 1945, the Government announced their intention to provide £20,000,000 in the five Financial Years beginning 1st April, 1946, for the purpose of carrying out the forestry programmes set out in the Commissioners' Report on Post-War Forest Policy (Cmd. 6447). Owing to the great rise in wage rates, cost of materials, etc., the Commissioners' net expenditure has in fact been at a higher annual rate than was foreseen when the Report was prepared, and the amounts actually voted by Parliament in the four Financial Years 1946-49 have totalled £18,501,000.

Movements on the Forestry Fund Account since the establishment of the Commission are shown in Table 1. The balance carried forward at the beginning of each Forest Year on 1st October includes the undrawn balance of the grant-in-aid, available for the remainder of the Financial Year to 31st March following. In this table the whole amount of the annual grant-in-aid voted by Parliament is shown as a receipt in the Forest Year.

FORESTRY FUND ACCOUNT

Table 1

£

	1920-1939	1940-1945	1946-1949	Total 1920-1949
Balance brought forward from previous period	—	372,025	703,729	—
RECEIPTS:				
Parliamentary Votes	10,126,800	3,475,000	18,501,000	32,102,800
Forestry Operations, etc.	2,673,336	3,784,038	3,653,339	10,110,713
Total	12,800,136	7,259,038	22,154,339	42,213,513
PAYMENTS	12,428,111	6,927,334	19,323,054	38,678,499
Balance carried forward to succeeding period	372,025	703,729	3,535,014	3,535,014

Note: As the Financial Year ends on 31st March, in the middle of the planting season, the Commissioners have found it convenient for internal accounting purposes to use the Forest Year ending 30th September.

As will be seen in the table above, the total grants-in-aid voted by Parliament since the establishment of the Commission amount to £32,102,800.

The total receipts from the Commissioners' operations during the thirty years under review, amounted to £10,110,713 and total payments to £38,678,499. The latter figure is analysed by Heads of Account in Table 2, which shows separately the figures for each of the following three periods:

- A. 1920-39: The first twenty years.
- B. 1940-45: The six war years.
- C. 1946-49: The first four years of the post-war period.

PAYMENTS—1920-1949

Table 2

	1920-1939		1940-1945		1946-1949		Total 1920-1949	
	£	%	£	%	£	%	£	%
Salaries, Wages and Allowances ...	1,208,500	9.7	550,592	7.9	1,390,456	7.2	3,149,548	8.1
Headquarters Charges ...	75,679	0.6	31,164	0.5	63,764	0.3	170,607	0.4
Charges of Directors of Forestry ...	80,071	0.7	36,705	0.5	92,488	0.5	208,264	0.6
Charges of Conservators ...	181,685	1.5	91,559	1.3	271,044	1.4	544,288	1.4
Forestry Operations ...	9,351,754	75.2	5,976,639	86.3	16,017,280	82.5	31,345,673	81.1
Forest Workers Holdings ...	793,761	6.4	71,849	1.1	112,298	0.6	977,908	2.5
Private Forestry (including Agency and Advisory Services)...	428,253	3.4	69,079	1.0	219,257	1.1	716,589	1.9
Education ...	149,542	1.2	39,813	0.6	892,236	4.6	1,081,591	2.8
Research and Experiment ...	121,843	1.0	58,463	0.8	173,557	0.9	353,863	0.9
Special Services ...	37,023	0.3	1,471	—	90,674	0.5	129,168	0.3
Total ...	12,428,111	100.0	6,927,334	100.0	19,323,054	100.0	38,678,499	100.0
Annual Average of Payments ...	621,406	—	1,154,556	—	4,830,763	—	1,289,283	—

Dealing first with Payments, it will be seen that the total in the first twenty years amounted to £12,428,111, or on the average £621,406 yearly. For 1940-45, total Payments were £6,927,334, giving a yearly average of £1,154,556. In 1946-49, the total was £19,323,054 and the yearly average £4,830,763.

It will be observed that, although Payments have increased rapidly, especially in the post-war period, the proportion of the total spent on administration has steadily fallen. If Salaries and Office Charges (the first four Heads of Account) are taken together, it will be seen that they aggregated 12.5 per cent. of the total expenditure in 1920-39, as compared with 10.2 per cent. in 1940-45 and 9.4 per cent. in 1946-49.

In Appendix 1 on page 119, these overhead expenses have been distributed over the other Heads of Account, amounts due to or by the Commissioners at the end of each Forest Year have been brought to account, and adjustments have been made between Heads of Account for such internal transactions as produce used for forest purposes, value of work done by trainees and students, etc. The figures thus obtained give a better view of the distribution of the Commissioners' total expenditure over its different objects.

The percentage distribution in each of the three periods is set out in Table 3:

DISTRIBUTION OF EXPENDITURE

Table 3

Percentages

	1920-1939	1940-1945	1946-1949	Total 1920-1949
	%	%	%	%
Forestry Operations	84.2	95.0	90.1	89.0
Forest Workers Holdings	7.6	1.6	.7	3.1
Private Forestry	4.1	1.1	1.8	2.4
Education	1.6	.7	5.2	3.3
Research and Experiment	1.7	1.5	1.6	1.6
Special Services ... ..	.8	.1	.6	.6
Total	100	100	100	100

It will be seen that expenditure on Forestry Operations and Forest Workers Holdings, taken together, accounted for 91.8 per cent. of the total in the period 1920-39. In 1940-45, the corresponding percentage was 96.6, and in 1946-49, 90.8.

Expenditure on Forest Workers Holdings, which was 7.6 per cent. of the total in 1920-39, has fallen away to a negligible amount in the post-war period. Work on new holdings was suspended during the War, and since the War the housing situation has been such that the Commissioners have had to concentrate on building new houses for their local supervisors and, in some cases, for whole-time forest workers.

Grants to Private Forestry, which accounted for 4.1 per cent. of the total in 1920-39, fell to 1.1 per cent. in 1940-45 and rose again to 1.8 per cent. in 1946-49. In the years 1922-24 considerable sums were paid to private owners for scrub clearing and similar work in relief of unemployment, and these payments account for the higher percentage spent on Private Forestry in the earlier period. Since the close of the War the percentage has begun to increase again, and as the Dedication scheme progresses, is likely to increase still further.

Education, which accounted for only 1.6 per cent. of the total expenditure in 1920-39, fell to .7 per cent. in the War years, but since the close of the War, has risen to 5.2 per cent. This recent increase is mainly due to expenditure on the Forest Workers Training Scheme, started after the War in conjunction with the Ministry of Labour, to provide vocational training for ex-Service men. Expenditure on this scheme was particularly heavy in 1947 and 1948, but had begun to fall off in 1949.

The cost of Forester Training Schools has also increased considerably since the War, owing to the re-opening of the school at Parkend in 1946 and the addition of three new schools at Glentress, Lynford and Gwydyr. (See page 75.)

Expenditure on Forestry Operations.—Since Forestry Operations form by far the greatest part of the total expenditure, an analysis of expenditure under that sub-head is given in Table 4.

DISTRIBUTION OF EXPENDITURE ON FORESTRY OPERATIONS

Table 4

Percentages

	1920-1939	1940-1945	1946-1949	Total 1920-1949
	%	%	%	%
Overhead Charges, Superior Supervision and Local Supervision ...	16.5	17.2	13.6	15.7
Acquisition of Land, etc. ...	22.0	10.5	3.5	11.0
Cultural Operations ...	43.3	48.2	34.9	42.1
Preparation and Sale of Produce ...	4.6	7.5	10.1	8.3
Roads ...	0.9	1.0	9.7	2.8
Buildings ...	2.5	1.7	9.3	6.0
Stores ...	1.2	3.2	9.1	4.9
Miscellaneous ...	9.0	10.7	9.8	9.2
Total ...	100	100	100	100

It will be seen that the significant changes between one period and another in the distribution of expenditure, are the decrease in the proportion spent on acquisition of land, and the increase in the figures for preparation and sale of produce, roads, buildings, and stores.

Expenditure on preparation of produce increases of course with the quantity of produce obtained, and is more than offset by the corresponding increase in receipts (see page 18).

Expenditure on roads, which was only .9 per cent. of the total in 1920-39, increased to 9.7 per cent. in 1946-49. Included in this latter figure is expenditure on roads constructed during 1947 and 1948 by the special Engineering Branch formed at the end of 1946 to provide work for unemployed and Polish labour. Some part of the cost of this work is not properly a charge to forestry operations: when it has been possible to arrive at a fair apportionment, the proportion chargeable to unemployment relief will be transferred to Special Services.

The greatly increased expenditure on buildings in the post-war period is mainly due to the high cost of labour and materials. Increased expenditure on stores reflects the increasing mechanisation of the Commissioners' operations in recent years; this applies particularly to road construction. After April, 1948, when unemployment relief was no longer a factor in planning road construction, and the Engineer Branch was merged in the general

organisation of the Commission, road construction work was mechanised to a much greater extent than had been possible earlier.

Receipts.—Receipts during the 20 years 1920-39 amounted to £2,673,336, of which only £981,079 or 36.7 per cent. represented Sales of Forest Produce. £1,208,987 or 45.2 per cent. represented Rents and Royalties received. (See Table 5, page 19.)

In the six War years 1940-45, Sales of Forest Produce accounted for £2,703,361 or 71.4 per cent. of the total Receipts, which amounted to £3,784,038. This was due to the abnormally heavy war fellings, particularly in the New and Dean Forests. Rents and Royalties were only 17.4 per cent. of the total receipts, although the average yearly income from this source rose to over £100,000.

In the four post-war years, total receipts amounted to £3,653,339 of which £2,602,617 or 71.2 per cent. represented Sales of Forest Produce. These sales were almost entirely produce from thinnings which are now increasing very rapidly. For the four years in question, the annual receipts from Sales of Forest Produce have been as follows:—

	£
1946	383,679
1947	419,033
1948	780,828
1949	1,019,077
	<hr/>
Total	£2,602,617
	<hr/>

Gross receipts from rents and royalties continued to increase annually during the post-war period, but the percentage of total receipts obtained from this source has fallen, owing to the much more rapid increase in Sales of Forest Produce.

On the other hand the percentage of receipts contributed by Education has increased from 1.7 in 1920-39 and 1.3 in the War years, to 6.3 in the post-war period. This is mainly due to receipts under the Forest Workers Training Schemes—from employers, in payment for work done by trainees, and from trainees for board and lodging at camps and hostels.

RECEIPTS 1920-1949

Table 5

	1920-1939		1940-1945		1946-1949		Total 1920-1949	
	£	%	£	%	£	%	£	%
Sale of Land and Buildings	128,858	4.8	126,461	3.3	16,991	0.5	272,310	2.7
Rents and Royalties (including Forest Workers Holdings) ...	1,208,987	45.2	657,585	17.4	462,516	12.7	2,329,088	23.0
Sales of Forest Produce	981,079	36.7	2,703,361	71.4	2,602,617	71.2	6,287,057	62.2
Miscellaneous Forest Receipts (Sales of livestock, rabbits, farm produce, surplus stores, &c.)	309,041	11.6	248,041	6.6	339,008	9.3	896,090	8.9
Education, Research, &c. (Contributions from employers in respect of work done by F.W.T.S. trainees, payments by trainees for board and lodging at hostels, agency fees, &c.)	45,371	1.7	48,590	1.3	232,207	6.3	326,168	3.2
Total	2,673,336	100.0	3,784,038	100.0	3,653,339	100.0	10,110,713	100.0
Annual Average of Receipts	133,667	—	630,673	—	913,335	—	337,024	—

FORESTRY OPERATIONS

STATE FOREST OPERATIONS

The First Twenty Years

ACQUISITION OF LAND AND PLANTING.—The accepted basis of Policy, which formed the standard of reference during the first two decades of the Commission's existence, was that propounded by the Acland Committee in 1917. Viewing the position as a whole that Committee found that it would be necessary to maintain in a productive state the three million acres of existing woodland (virtually all privately owned) and to add 1,770,000 acres of conifer afforestation of which 493,000 acres were to be planted in the first twenty years. The Committee's report proposed also the acquisition during the first decade of 20,000 acres of devastated woodland to be replanted with hardwoods, though the rate at which this planting was to proceed was not specified.

Tables 6 and 7 below give in parallel columns the Acland programmes for acquisition and planting and the overall progress achieved to the end of 1939.

ACQUISITION OF PLANTABLE LAND, 1919-1939

Table 6

	Acland Proposals (a)	Acquired by Forestry Commission (b)	(b) as percentage of (a)
Total (1919-39)	acres 745,000	acres 655,000	88
First Decade (1919-29)	402,000	310,240	77
Second Decade (1930-39)	343,000	344,760	101

TOTAL PLANTING, 1919-1939

Table 7

	Acland Proposals (a)	Planted by Forestry Commission (b)	(b) as percentage of (a)
Total (1919-39)	acres 493,000	acres 368,900	75
First Decade (1919-29)	150,000	138,270	92
Second Decade (1930-39)	343,000	230,630	67

Table 6 shows a total acquisition of 655,000 plantable acres over the two decades, equivalent to 88 per cent. of the Acland programme. Planting progress, shown in Table 7, has lagged somewhat behind acquisitions; the area of new planting including replacements amounted to 368,900 acres or 75 per cent. of the Acland programme. It is apparent that planting progress in the second decade showed a marked drop in the percentage achievement as compared with the first decade, whereas in the case of acquisitions the trend was reversed. It must also be observed that the comparison between the planting programme and the results achieved is not as clear cut as appears from Table 7 because, whereas the Acland proposals envisaged

practically the whole effort going into the afforestation with conifers of bare land, i.e. non-woodland ground, the figure of 368,900 acres given in the table as the total planting in the two decades includes, apart from replacements, the replanting of felled woodlands together with an appreciable area of hardwood afforestation—mainly with oak and beech. Of the total of 368,900 acres it is estimated that about 264,000 acres (roughly two-thirds) consisted of conifer afforestation in the strict sense of the term.

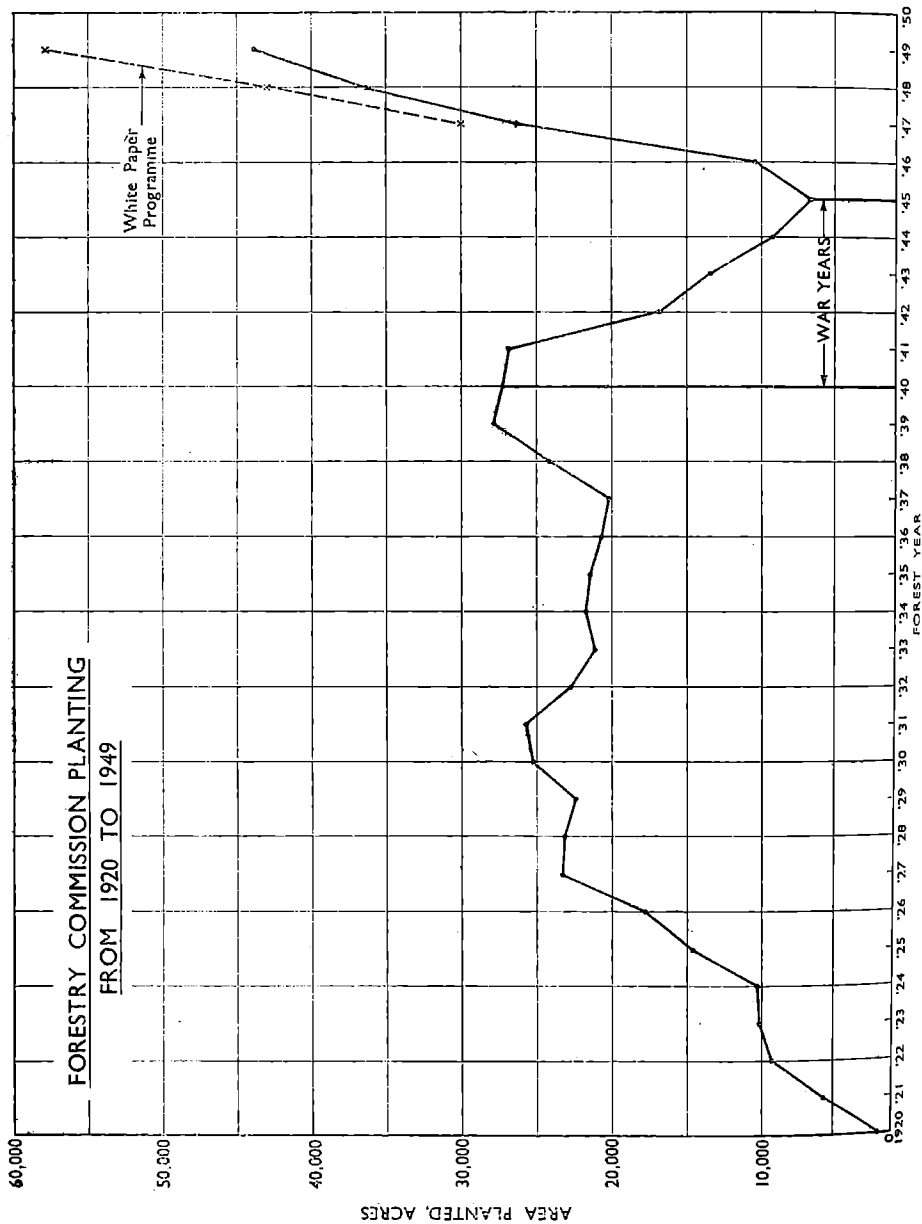
In previous Annual Reports the Commissioners have repeatedly drawn attention to the difficulties resulting from the lack of a sustained financial policy towards their operations. On two separate occasions (1922 and 1931) reports of Committees on National Expenditure resulted in drastic cuts in the Commission's budget. The necessary economies involved reductions in staff and destruction of plant stocks built up to meet the previously approved programme. After each of these cuts the programme was again expanded, but the emphasis tended to be placed on the relief of rural unemployment in specially affected areas rather than on implementing a scheme of planned development for the country as a whole. The fluctuations in the acreage planted annually are shown in the graph on page 22.

THINNING.—During the first few years of the Commissioners' operations, opportunities for thinning were limited to the few older plantations included in some of the purchases or leases of plantable land. But when the Forestry Act, 1923, transferred some 60,000 acres of former Crown woodlands to the control of the Commissioners, including a considerable area under young plantations, the scope for thinning was substantially enlarged. The produce was disposed of partly as fence posts, large numbers of which were needed in the afforestation areas, and partly as pit props, hedge stakes, etc. There are no precise figures as to the areas thinned annually until 1934 when an acreage of 3,264 acres was returned. The area probably fluctuated between 2,000 and 3,000 acres per annum. From 1934 onwards the areas thinned are given in the Commissioners' Annual Reports. It will probably be not far from the mark to estimate that a total area of 53,000 acres was thinned during the first 20 years, and that almost all of this was in transferred or acquired woodlands.

ROADS.—During 1921 and 1922, when there was severe unemployment in certain areas, the Commissioners were instructed to prepare schemes of relief work. Employment was provided at a large number of centres, the most important of which were the Crown Forests of the Dean and Tintern. In these forests the labour was mainly employed on road construction, a total length of approximately thirty miles being completed.

The next period of activity in road construction began in 1934 when a number of Instructional Centres and Camps were established in Commission forests by the Ministry of Labour. The object of these centres was to improve the physical fitness of men who had undergone a long period of unemployment, and at some of the centres the work consisted chiefly in the construction of forest roads. The work was not easy to control as the personnel was continually changing, but by the end of September, 1939, a total of thirty-three miles of road had been constructed in twenty forests, along with forty-eight miles of unmetalled tracks.

HOUSING.—With many of the properties acquired, the Commissioners took over cottages and other buildings which served to house the nucleus of a forest staff. In some cases much of the property was derelict, but by adaptation and reconstruction, buildings were often made habitable at comparatively small cost. By such means, augmented by the recruitment of labour living in the district, the Commissioners were able for a time to meet their



labour requirements. As acquisitions continued, the need for additional houses, especially in the more remote areas, became increasingly felt. The position was met partly by building new houses to accommodate foresters and other key workers, and partly by the introduction of the Forest Workers Holding Scheme, to which reference is made in a later page (p. 71). By the end of 1939 housing had been provided for 186 foresters, the number of Forest Workers Holdings established totalled 1,471, and there were, in addition, 582 cottages mostly tenanted by Commission employees.

The War Period (1940-1946)

The Commissioners' activities during this period cover three phases, namely, active participation in the work of timber supply, normal forestry operations on a reduced scale, and preparation for the resumption, on a large scale at the end of the war, of the normal work of timber growing.

TIMBER SUPPLY

Preliminary steps.—During the two years prior to the war the Commission, in collaboration with the Board of Trade, was engaged in planning Home Timber Supply in the event of war. Broadly, the general agreement then reached provided for the Commission acting as a Department of Timber Control and that, to begin with, the Commission should concentrate on the production of mining timber (pit props) while the production of sawn timber should be left mainly to the Home Timber Trade.

The Commission accordingly worked out detailed administrative plans which could be put into operation at short notice and set on foot enquiries into certain matters on which better data were required.

Administratively the Commission was divided into two Departments, namely, Timber Supply covering all aspects of utilising home timber resources, and Forest Management dealing with growing forests. The staff, administrative and executive, was allocated and the re-organisation brought to an advanced stage so that it took place on the day war was declared.

Early in 1939 the Commission set up a Committee known as the Home Grown Timber Advisory Committee, representative of the Home Timber Trade, woodland owners, the Board of Trade and the Commission itself. One of the first duties of the Committee related to maximum prices for standing timber, round timber in the log, sawn timber and mining timber. These were agreed and the schedule was with the printers at the outbreak of war.

Other important administrative steps were the drafting of orders relating to the licensing of standing timber for felling, and discussions with the Ministry of Labour on the Schedule of Reserved Occupations.

As regards enquiries, the most important was probably the detailed Census of Woodlands which was begun in 1938. Its object was to determine the quantities, categories and distribution of standing timber in the country. Though not completed by September, 1939, sufficient progress had been made for the data collected to serve as a good basis for subsequent estimates made on a sample basis.

A census was also made of saw-milling capacity, and the probable requirements in transport and tools. Arrangements were made with the Ministry of Agriculture to draw some 300 Fordson tractors from their reserve pool.

Authority was also received to build up stocks of peeled pit-props from thinnings in private woodlands, though the scheme was put into operation too late to be of practical value.

Supply work of the Commission, September, 1939, to February, 1941.—The Commission took charge of Home Timber Supply at the outbreak of war and remained so until 1st February, 1941, when it handed over responsibility to the Timber Production Department of the Ministry of Supply. There follows a very brief account of what was accomplished in the seventeen months.

Timber made available.—Including twenty-eight million cubic feet from the Commissioners' woods, eighty-two million cubic feet purchased from private owners and 189 million cubic feet licensed to the timber trade, the total volume made available for utilisation amounted to 299 million cubic feet. The acquisition of further large quantities was in various stages of negotiation. Arrangements had also been made for placing the Canadian Forestry Corps in various forest sites and keeping it supplied with timber.

Labour.—From an estimated total employment of 14,000 in August, 1939, numbers had increased by February, 1941, to 30,100 in the timber trade, 11,500 employed by the Commissioners, and 2,700 military, a grand total of 44,300.

These numbers included the Newfoundland Forestry Detachment, a number of forestry companies from the British Army, Australian and New Zealand military foresters, and the advance guard of the Canadian Forestry Corps.

Equipment.—By February, 1941, in the face of many difficulties and disappointments, orders on behalf of the Commission and timber trade to the value of approximately £1,337,000 had been placed. A great number of items was included, ranging from tractors to small tools.

Production.—For the whole period of seventeen months the most substantial items of production were:

Pitprops and Pitwood—66 million cubic feet. (Trade 40 million, Commission 26 million.)

Sawn Mining Timber—18 million cubic feet.

Sawn Timber—61 million cubic feet.

By far the greatest part of the sawn production was by the timber trade. On the other hand, the Commission production of round timber was considerable and includes, in addition to the twenty-six million cubic feet of pitprops mentioned above, approximately two million cubic feet of Army pickets and obstruction poles supplied at very short notice after the fall of France; fifteen million cubic feet of round timber; 60,000 telegraph poles; and a number of miscellaneous items such as 3,200 tons of selected material for wood wool, 509 tons of alder buckthorn, and 3,600 tons of charcoal.

In surveying the prospects for 1941 the Chairman of the Commission reported to the Timber Control Board that the total number employed should rise to 50,000, and that if full effect were given to plans already made the total production would be 5.7 million tons made up as shown below:—

	<i>Tons</i>	<i>Tons</i>
Round Mining Timber	3,190,000 (green)	
Sawn Mining Timber ...	695,000	
	<hr/>	3,885,000
Sawn Softwoods ...	1,183,000	
Sawn Hardwoods ...	610,000	
	<hr/>	1,793,000
Telegraph and Other Poles ...		41,000
		<hr/>
Total		5,719,000
		<hr/>

Forestry Commission Staff.—When home-grown timber supply was transferred to the Board of Trade in February, 1941, the Commissioners' timber supply staff was transferred with it. They had adapted themselves with energy and efficiency to aspects of forest work which were comparatively novel to them, and they continued at home throughout the war and later abroad under the North German Timber Control to give first-class service in timber production.

FORESTRY OPERATIONS DURING THE WAR PERIOD

Acquisition and Planting.—Table 8 depicts the progress of acquisition and planting during the war years.

ACQUISITION AND PLANTING—1940-1946

Table 8

Acres

	Acquisition of Plantable Land	Planting		
		Total Planting	Afforestation	Replanting
Total, 1940-46	150,709	110,476	77,616	32,860
1940	31,634	27,288	21,569	5,719
1941	12,450	26,867	19,627	7,240
1942	8,149	16,746	12,733	4,013
1943	12,419	13,412	9,301	4,111
1944	10,345	9,205	5,477	3,728
1945	42,531	6,510	3,025	3,485
1946	33,181	10,448	5,884	4,564

(For convenience sake the Forest Year 1945-46 has been included in the table although this was actually the first of the post-war years. But conditions then were still far from normal; there was a serious lack of labour pending demobilisation, as well as a shortage of equipment of all sorts, notably wire netting for the exclusion of rabbits.)

The slow momentum of the early stages of the War was a fortunate circumstance for the Commissioners because it enabled them to put to good use the large stocks of plants standing in their nurseries in October, 1939. During 1940 and 1941 planting continued virtually at the same level as in 1939, thereby adding slightly over 54,000 acres to the previous total. But from 1942 onward the effect of the diversion of labour to the Forces and to essential industry became increasingly apparent, and as will be seen from Table 8, the annual area planted dropped steadily until it reached its lowest level of 6,500 acres in 1945. In the following year, 1946, there was a modest rise to 10,448 acres. The total area planted during the 7 years was 110,476 acres, of which 77,616 acres were afforestation, and 32,860 acres replanting of felled woodland.

As regards acquisition, although no special efforts could be made in war-time to acquire land, advantage was taken of such offers as came along, a total of 150,700 acres of plantable ground being acquired during the period.

Taking into account the difficulties with which the Commissioners were faced during the War years, the fact that they were able to acquire 150,700 acres and to plant 110,500 acres reflects great credit on the staff concerned.

Timber Supply.—At the outbreak of the War practically all the plantations established by the Commissioners were under 20 years of age and so contained little produce of merchantable size. Though some of the most

advanced plantations were clear felled for pitwood, the general policy adopted was to thin the young plantations as heavily as possible, consistent with leaving a reasonable stocking of trees on the ground to grow on to larger size.

Besides their young plantations the Commissioners held at the outbreak of War considerable areas of older forest, partly in the transferred Crown Woods such as the New Forest and the Forest of Dean, and partly in blocks of acquired woodland. Fellings in these woods were heavy—the New Forest alone produced 12½ million cubic feet of timber and almost all the conifer plantations between twenty and thirty-five years of age were cut, only crops of special silvicultural interest being conserved. Crops of forty to sixty years of age were placed in the lowest category in order of availability for felling, with the object of preserving, if possible, a stock of saw timber to tide over the lean years which were bound to follow after the War.

During the seven years 1940 to 1946 the woodlands held by the Commissioners contributed over 51 million cubic feet to the timber supply Departments, two-thirds of which were softwoods and one-third hardwoods. This output was derived in part from the clear felling of 29,530 acres of forest, and in part from thinnings which covered in all 53,100 acres during the period.

Roads and Housing.—Work of a capital nature, such as road construction and the erection of houses, was necessarily reduced to a minimum during the War period. Virtually the only permanent roads constructed were those made by the Service Departments in a small number of the forests for purposes such as ammunition dumps and aerodromes.

As already stated, the acquisition of land for planting continued, though on a somewhat reduced scale, during the War. Some of these acquisitions included house property which, together with building work in progress at September, 1939, resulted in the following additions during the seven years under review: Forest Workers Holdings increased by 30 to 1501, Foresters' houses by 41 to 227, and cottages by 164 to 746.

PREPARATION FOR POST-WAR FORESTRY OPERATIONS

After handing over Home Timber supply to the Ministry of Supply, the Commissioners were able to devote time to working out plans for post-war forestry. As a result of close consideration of all the relevant factors two White Papers were published, viz. "Post-War Forest Policy" (Cmd. 6447) and a supplementary paper, (Cmd. 6500) entitled "Post-War Forest Policy: Private Woodlands." The first covered the whole subject, while the second embodied agreements reached with representatives of private woodland owners on the policy to be adopted by the State towards private woodlands.

In their comprehensive Report (Cmd. 6447) the Commissioners proposed that the State should devote 5 million acres of land to effective timber production. Of this total, 2 million acres were to be secured from the existing area of forest and 3 million acres afforested over a period of fifty years; it was further assumed that, while virtually the whole of the afforestation task must be entrusted to the Forestry Commission, private owners should be encouraged to take a substantial part in the work of replanting.

The White Paper set out two alternative programmes—a "Desirable" Programme and an "Intermediate" Programme—of acquisition and planting work to be carried out during the first post-war decade. The Desirable Programme, which was the one recommended by the Commissioners, postulated acquisition by the State of 1,850,000 acres of land during the first decade and the planting during the same period of 900,000 acres, of which

afforestation would account for 500,000 acres and replanting for 400,000 acres. This represented the objective for State Forestry alone. Private Forestry was allotted its own task, namely the replanting of 200,000 acres during the first decade. The Intermediate Programme differed only from the above proposals in fixing somewhat lower targets for the Forestry Commissioners' share in the enterprise.

A planting programme on the scale envisaged above obviously could not be carried out effectively without corresponding developments in other branches of the undertaking. In their Report the Commissioners stressed in particular the need to enlarge the scope of their research and educational work and recommended increased expenditure on roads and housing. The Commissioners' proposals were favourably considered, and in November, 1945, the Minister of Agriculture and Fisheries, the Right Honourable Tom Williams, in a statement in the House of Commons, announced the Government's decision that the Commissioners should proceed on the basis of their Desirable Programme as regards the first five years of their scheme, and that Parliament would be asked to replenish the Forestry Fund by a total sum of twenty million pounds for that period.

The Commissioners proceeded accordingly to put their proposals into operation, but were faced with staffing difficulties owing to the absence of many experienced officers, both technical and clerical, who were still seconded to the Ministry of Supply and to North German Timber Control. There was also an acute shortage of labour pending demobilisation, and of many essential materials. Consequently it was impracticable to launch out fully on the new scheme in the Forest Year 1946, hence the Forest Year 1947 (1st October, 1946, to 30th September, 1947) is to be regarded as Year One of the Post-War programme.

Post-War Developments

ACQUISITION AND PLANTING—1947-1949

Acquisition.—The Commissioners began the first year of their post-war programme with an adequate reserve of plantable land in hand, but it is clear from Table 9 that subsequent acquisitions have fallen far short of the amounts laid down in the White Paper Programme.

ACQUISITION OF PLANTABLE LAND—POST-WAR PROGRAMME AND RESULTS TO DATE

Table 9

Acres

Year of Programme	Forest Year	Total Plantable Land		Bare Land for Afforestation		Felled Woodland, Scrub, &c. for Replanting	
		White Paper Programme	Actually Acquired	White Paper Programme	Actually Acquired	White Paper Programme	Actually Acquired
0	1946	300,000 in hand	358,900 in hand	250,000 in hand	314,000 in hand	50,000 in hand	44,900 in hand
Total	1947-49	551,000	100,800 (18%)	261,000	66,100 (25%)	290,000	34,700 (12%)
1	1947	160,000	20,800	75,000	12,500	85,000	8,300
2	1948	193,000	29,000	90,000	19,500	103,000	9,500
3	1949	198,000	51,000	96,000	34,100	102,000	16,900

The 66,100 acres of bare land acquired to date represent only 25 per cent. and the 34,700 acres of felled woodland only 12 per cent., of their respective objectives. Taking the two types of land together, barely one-fifth of the programme has been attained. The deficiency is most serious in the case of the felled woodland in the southern part of the country, because with every year that elapses these cleared areas are more overgrown with weeds and more expensive to deal with.

When considering the causes for the disappointingly slow rate of progress, it must be remembered that the position now is very different from what it was after the 1914 to 1918 war, when imports were speedily resumed and there was no special demand for home food production. There can be little doubt that one effect of such measures as the sheep subsidies and the 1946 Hill Farming Act has been to keep much land under agricultural use which otherwise would have been offered to the Commissioners. As far as felled woodland is concerned, the reluctance of owners to part with their land appears to be due partly to the general economic situation and partly to uncertainties regarding the Dedication Scheme. Hitherto the Commissioners have refrained from using their compulsory powers to acquire land, but it is essential that the derelict woodlands of the country should be speedily restocked, and the Commissioners are fully prepared to use their powers when necessary.

Planting.—Table 10 sets out in similar manner the White Paper planting programme and the results achieved to date.

PLANTING—POST-WAR PROGRAMME AND RESULTS TO DATE

Table 10

Acres

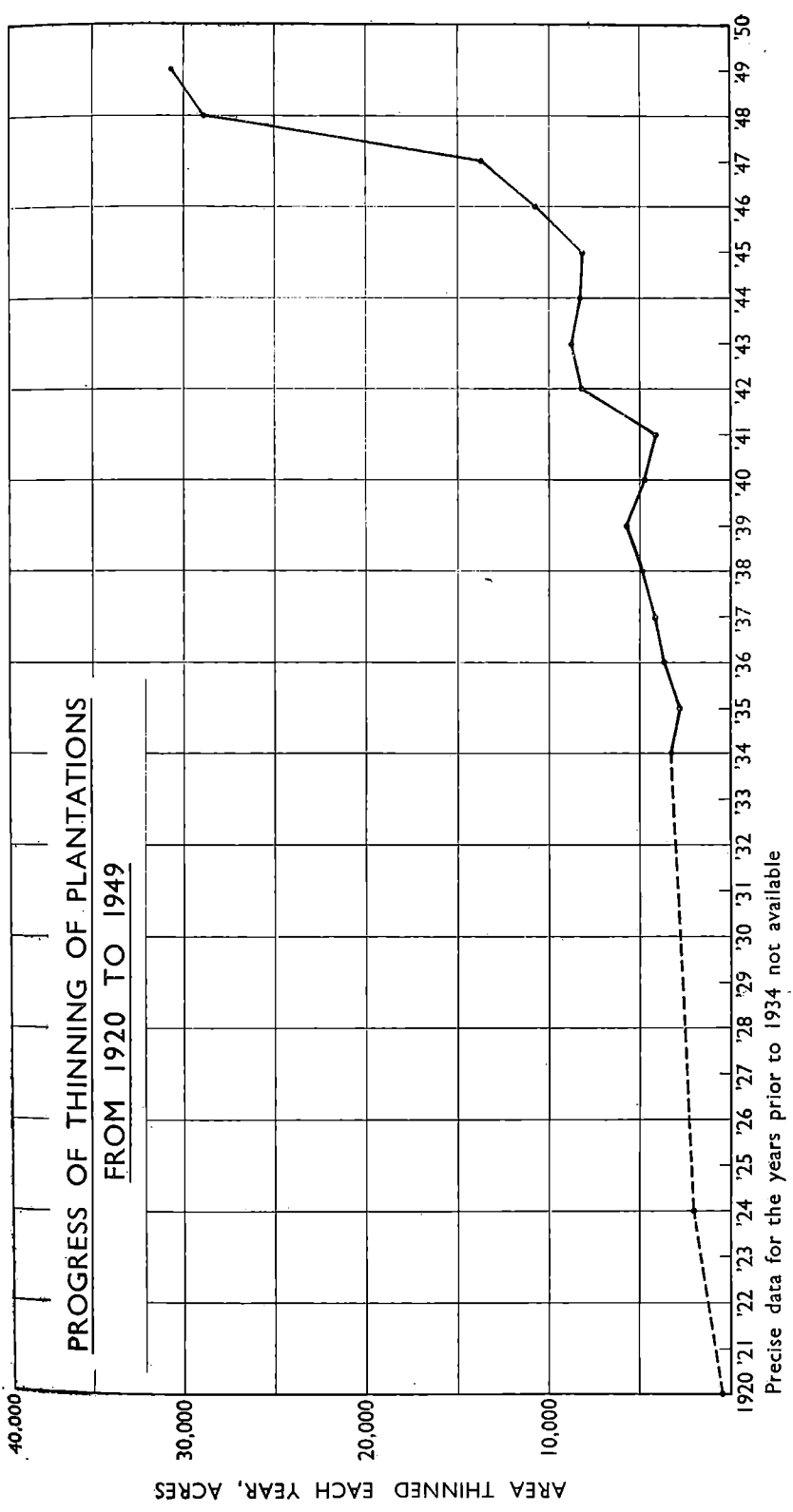
Year of Programme	Forest Year	Total Planting		Afforestation		Replanting	
		White Paper Programme	Actually Planted	White Paper Programme	Actually Planted	White Paper Programme	Actually Planted
Total 1 to 3		131,000	106,700 (81%)	91,000	72,300 (79%)	40,000	34,400 (86%)
1	1947	30,000	26,400	25,000	17,500	5,000	8,900
2	1948	43,000	36,400	30,000	23,900	13,000	12,500
3	1949	58,000	43,900	36,000	30,900	22,000	13,000

By the end of the year under report a total area of 106,700 acres had been planted, representing 81 per cent of the programme of 131,000 acres laid down for the first three years of the quinquennium. This is a better achievement relative to the programme than is the case with acquisitions, but has only been possible because of the good reserve of plantable land which the Commissioners had in hand at the start of the quinquennium. The planting done during the past three years has eaten heavily into this reserve, and it is evidently impossible to continue on an expanding programme unless the rate of acquisition can be greatly accelerated.

Thinning.—During the period under review the following areas were thinned :

	Acres						
1947	13,803
1948	28,590
1949	30,563

making a total of 72,956 acres in the three years. The graph on page 29 illustrates clearly the steepness of the rise in the area thinned since the war :



Precise data for the years prior to 1934 not available

this has been due mainly to two factors—the greatly increased labour supply and the fact that increasingly large areas of the Commissioners' plantations, formed during the first decade, had reached the thinning stage.

As new areas come in for their first thinning, and the three to five year thinning cycle brings in areas for the second and third, etc. time, the annual thinning programme is likely to rise steeply in the near future.

Housing.—In their White Paper on Forest Policy (Cmd. 6447), the Commissioners emphasised the need for additional housing to accommodate the supervision and labour required to carry out their programme. They estimated that they would require to build some 12,000 new houses in the first post-war decade. But rural housing, especially in the remote areas in which many of the Commissioners' operations are placed, has had many difficulties to contend with, and costs have risen far higher than was anticipated. These factors have greatly retarded the rate of building construction, with the result that the number of all types of houses, both permanent and temporary, erected in the three years ending 30th September, 1949, was only 412. Of these, 248 were permanent houses and 164 temporary houses. (See photos Nos. 7, 8 and 9.)

Roads.—Before the end of the War the Commissioners had put forward a scheme for the temporary employment of men who would not be immediately reabsorbed into industry when hostilities ceased, and it was intended that forest road construction should be the principal task to which these men should be put. This scheme was given tentative approval but was not implemented. It was revived, however, in 1946 in a modified form, when the Commissioners were asked to assist in relieving unemployment which was becoming locally serious, and to provide work for the Polish Resettlement Corps. The outcome was the formation of a separate Engineer Branch of the Forestry Commission. Its role was the provision of forest roads, but its methods were largely conditioned by the unemployment relief factor.

Throughout 1947 and into 1948 this factor of unemployment relief was dominant. Consequently road projects were begun more hurriedly and with less preparation than would have been advisable had forestry needs been the sole consideration. The choice of a forest for road work depended, more often than not, upon its proximity to an area of unemployment, and virtually no selection of labour was practicable. Road construction started expensively therefore, and was not always where roads were most urgently needed.

By the summer of 1948, when unemployment relief was no longer a major consideration, the Engineer Branch was merged in the general organisation of the Commission, and the policy of road construction put on a more satisfactory basis. In the first place it was decided to mechanize the operations as speedily as possible, and secondly to employ the available resources of labour and machinery in building roads where these were essential for the immediate extraction of thinnings and other produce.

During the three years 1947 to 1949, 557 miles of roads capable of carrying motor vehicles were constructed. Of these 216 miles are in England, 269 miles in Scotland, and 72 miles in Wales. In addition many miles of roughly constructed roads—usually merely bulldozed tracks—have been made as feeders to the hard roads.

Produce is now moving rapidly along the newly built road system and great quantities of material for which there was previously no outlet have been successfully extracted. It is proposed to continue road construction to serve the new blocks of forests as they come into the thinning stage. (See photos Nos. 14 and 15.)

Private Forestry

The end of the First World War marked a turning point in the history of private forestry in Great Britain. In order to meet the War demands for timber, a large proportion of the mature timber throughout the country had had to be cut, and though the statistics are not very reliable, it is estimated that about one-seventh of the woodlands was laid low.

THE FIRST TWENTY YEARS

Reference has already been made (p. 20) to the Acland Committee Report which, in apportioning the task ahead between the State and Private Ownership, left to the latter the lion's share of the work to be done in reconstituting the devastated areas which scarred the countryside. State assistance was provided by the Forestry Commission in the form of planting grants, and, in addition, during the first few years after the war, unemployment relief grants were given for clearing up the debris of the war fellings in preparation for planting and for the clearance of scrub. With these aids approximately 10,000 acres were cleared of scrub during the first decade, 21,000 acres of felled woodland were cleaned up for planting, and 73,000 acres were actually planted. The planted area represents 66 per cent. of the 110,000 acres allotted in the Acland Report to private owners as their share in the planting programme for the first decade. Some small amount of planting was doubtless done without the aid of grants but, when allowance is made for normal annual fellings, it is more than doubtful if any real progress was made in overtaking the arrears arising from the War fellings.

During the second decade—1930-39—private planting continued on much the same modest scale; planting with the aid of grants amounted to 53,000 acres, to which must be added an unknown but probably small area planted without financial assistance from the Commissioners.

As an alternative to the planting grants, a proceeds-sharing scheme was also available; but with one exception (the Lake Vyrnwy catchment area of the Liverpool Corporation) this scheme failed to appeal to owners of woodland and afforestable land, and so has dropped out of the picture.

Although some owners took an active interest in the management of their woods the majority were apathetic, and as time went on the Commissioners became increasingly concerned as to the position.

Contact with private forestry interests was chiefly maintained through the three Consultative Committees (one for each country) set up under the Forestry Act, 1919, and in April, 1930, the Commissioners asked each of these Committees to consider what steps other than the provision of planting grants could profitably be taken by the Commissioners for the improvement of private forestry. The Committees reported separately their suggestions covering such matters as the incidence of taxation, provision of loans, creation of a forest advisory service, organised marketing, and the issue of a booklet on forestry technique.

The Commissioners, after considering the views of the Consultative Committees, felt that the question should be considered on somewhat broader lines, especially in regard to the difficulties under which private forestry was labouring. The matter was therefore referred back to a Sub-Committee consisting of Mr. Leslie S. Wood, Sir Hugh Shaw-Stewart, Bart., and Sir F. D. W. Drummond, the Chairmen of the three Consultative Committees. This Sub-Committee, which reported in December, 1931, considered that private forestry had declined during the past twenty years in spite of State encouragement and the spread of technical knowledge. Since 1909 the

encouragement given by the State had included favourable changes in respect of death duties, assessment in respect of taxation, provision of grants for planting, and the derating, in England and Wales, of woodlands. Scottish woodlands were already lightly treated in this respect. While it was impossible to assess the monetary value of such concessions, they were obviously considerable. The decline of private forestry was ascribed to many causes, including the general depression, to the increased pressure of taxation making it more difficult to devote money to replanting, and to the break-up of estates. The Sub-Committee, appreciating the urgent need for national economy which then prevailed, felt that no useful purpose would be served by recapitulating previous proposals involving additional expenditure, but considered that such recommended measures as the exemption of well-managed woodlands from income tax, the provision of loans on easy terms for planting, the modification in the terms for scrub-clearing grants, and the publication of a booklet on planting, though likely to prove helpful, might not be fully effective; in which case the Sub-Committee agreed that a change of policy might become necessary, and that it would be in the national interest for the Commissioners to take over woodland areas on fair terms in cases where, after every possible encouragement and State co-operation had been offered, the owner was unable to replant.

While these discussions were in progress the Commissioners appointed, in 1931, an inter-departmental committee on the utilisation of home timber; this committee reported in 1933, and in the same year the Commissioners published their *Bulletin on Forestry Practice*,* a booklet prepared specially for the guidance of estate forestry. Also in 1933 a staff was appointed to investigate various wood-using industries, and a number of reports was issued between 1934 and 1938 (see page 68).

In 1937 the Commissioners considered that a concerted effort was required to stimulate the interest and activities of landowners, and in February, 1938, this was initiated by a Conference on private forestry with representatives of all the interests concerned with woodlands. This Conference agreed that the first step towards the improvement of private woodlands was the enlightenment of the woodland owner, and of the public, on the whole question of forestry and timber production. With these objects in view, in 1938 a series of meetings, organised throughout the country by the Forestry Societies and the Central (now Country) Landowners' Association, was addressed by the Chairman of the Forestry Commission and Commissioners. These meetings had also the object of ascertaining by direct contact the difficulties of owners in securing good management. The meetings aroused considerable interest and many suggestions were put forward, prominent among which was the need for better trained Foresters and Foremen for local supervision. As a first step to meet this requirement the Commissioners provided a number of short courses for estate woodmen. With the assistance of the Forestry Societies arrangements were made for the courses to be held on private estates in England and Scotland, the instructors being for the most part estate foresters of long experience. The cost was borne by the Commissioners.

Another suggestion put forward at the Conference was that technical advice should be more readily available to private owners than it had been in the past. As they were in some doubts as to the best method of providing this service, the Commissioners set up, as a trial, a panel of expert advisers, including officers of the Department, to deal with the counties of Kent, Surrey and Sussex. Owing to the outbreak of war the scheme was not developed.

* H.M.S.O. 2s. 0d.

In May, 1939, a second Conference was held with representatives of interests concerned with private woodlands. At this Conference the Commissioners explored the whole position, with particular reference to the large areas of neglected and unproductive woodland throughout the country. The need for definite action was recognised, and though the outbreak of war brought discussions to an end for the time being, these were resumed later and led eventually to the formulation of the Dedication Scheme.

THE WAR YEARS

It was inevitable that the Second World War, following only twenty years after the First, should find the country with greatly depleted stocks of growing timber, especially in the older age classes. But the emergency was no less acute, and once again the private woodlands were devastated in order to supply the pitprops and other timber essential for the prosecution of the War. A particularly serious feature this time was the necessity of clear felling many thousands of acres of immature plantations in order to keep the mines supplied with pit props. On the other hand large areas of inferior hardwoods were utilised which in pre-war days were virtually unsaleable.

The 1947 Census of Woodlands now makes it possible to assess reasonably accurately the extent, not only of the losses caused by the War, but also of the great area of unstocked land carrying stumps dating, in many cases, back to the First World War. Analysis of the Census data shows that of the 2,850,000 acres of private woodland, 484,000 acres (roughly one-sixth of the whole) were classed either as "Felled since September, 1939," or as "Devastated", the latter term meaning that all the worthwhile timber had been cut, leaving behind scattered suppressed trees or occasional birch and coppice. Over and above this area are the 275,000 acres of clear felled woodland cut either in the First World War or in the inter-war period, and not restocked. Further details are given in a later section of this Report (pages 44 to 48).

Private Planting during the War Years.—During the War private owners were faced with the same sort of difficulties as the Commissioners; acute shortage of labour from 1941 onwards and the drying up of the normal sources of tools, wire netting and other necessities. In spite of these handicaps the not inconsiderable total of 27,700 acres was planted during the seven years 1940 to 1946 inclusive.

Preparations to meet the post-war situation.—When the Commissioners were drafting their report on Post-War Forest Policy (Cmd. 6447), the problems of Private Forestry naturally received much attention, and discussion in 1943 with representatives of the Royal English and Royal Scottish Forestry Societies and of the Central Landowners' Association, resulted in the dedication proposals set out in Sections 270 to 297 of the Commissioners' Report. These proposals envisaged the permanent Dedication of woodlands for the growing of timber, the owner undertaking certain obligations in return for which the State agreed to provide 25 per cent. of the net expenditure until such time as the woodlands became self-supporting. Further and more widespread discussions with the Societies and Associations directly interested led to the publication in January, 1944, of a Supplementary Report* which, while confirming the principles underlying the Dedication Scheme as set out in the main White Paper, proposed an alternative form of State assistance to owners prepared to Dedicate their woods. This was to take the form of

* Cmd. 6500. Post-War Forest Policy—Private Woodlands. Supplementary Report by H.M. Forestry Commissioners.

a Planting Grant on all areas planted in accordance with an approved plan, also a Maintenance Grant for fifteen years on all productive woodland covered by the Dedication Agreement or Covenant.

PROGRESS IN THE POST-WAR YEARS, 1947 TO 1949

The Dedication Scheme.—The proposals of the Supplementary Report (Cmd. 6500) were approved by Government in 1945, and there ensued a lengthy series of discussions with representatives of the private woodland owners and with the legal authorities as to the framing of the Dedication deeds. Much time was also devoted to devising a simple yet adequate form of working plan for the purpose of efficient management of the Dedicated woodlands. Owing to these prolonged negotiations the Commissioners' Booklet on the Dedication of Woodlands* containing copies of the deeds, together with explanatory notes and sections dealing with the Plan of Operations, was not published until January, 1948. Although 1948 was the first year of operation of this Scheme, owners had been previously circularised and asked to notify the Commissioners whether they were prepared to consider the Dedication of their woodlands. The initial response was fairly encouraging, 821 owners holding a total area of 436,000 acres of woodland having intimated, by the end of the Forest Year 1947, their willingness to consider the scheme. But subsequently the majority of these owners, with the support of their associations, decided to adopt a waiting policy, and few have actually proceeded to dedicate.

The general economic condition of the country, coupled with maximum price control on standing timber and a lack of confidence in the attitude of Government towards forestry as an industry, was partly responsible for the hesitant attitude of woodland owners, but certain clauses of the deeds were also considered unduly onerous.

Early in 1949 further discussions were held with private forestry interests, in particular with the United Kingdom Forestry Committee—a body representing associations of woodland owners in all parts of the country. The discussions culminated in the following Government statement made on 28th July, 1949, by the Rt. Hon. Tom Williams, Minister of Agriculture and Fisheries. This statement was made in reply to a Parliamentary question as to the progress being made in the rehabilitation of private woodlands:

“The Government have been much concerned at the slow progress that is being made in the rehabilitation of private woodlands, and consequently has been reconsidering the Dedication Scheme and the problems of private forestry in general. A recent Census shows that there are about 2.8 million acres of private woodlands in Great Britain, of which it is estimated that about 2.3 million acres are capable of economic management. Of these 2.3 million acres, about 1.0 million require replanting.

It is essential in the national interest that all suitable areas should be replanted with the minimum of delay, and that the management of woodlands should in the fullest sense be a joint enterprise of the State and the woodland owners. But on present indications, the owners who have Dedicated or who are preparing to Dedicate their woodlands are only a small minority of the whole. The Government have, therefore, considered further measures to secure the co-operation of private woodland owners.

It is manifestly impossible to deal with a long-term venture such as forestry in the same way as agriculture, and it is not feasible to guarantee prices for the many categories of timber which may be felled over the next fifty to one

* Forestry Commission Booklet 2—The Dedication of Woodlands. H.M. Stationery Office, 1948.

hundred years. The Government, however, recognise that a healthy and stable forest industry is an essential part of the national economy, and proposes to review the economics of British forestry at convenient intervals in consultation with woodland owners and the timber trade. The State itself has a large and rapidly increasing stake in the forest industry, and owners who are anxious about the future prosperity of the industry should keep this prominently in mind.

A subsidy of 3d. per cubic foot on thinnings was recently introduced, and at the present time the Board of Trade are considering the whole question of standing timber prices. In the meantime, the Government propose to increase the planting grant from £10 to £12 per acre and the maintenance grant (where applicable) from 3s. 4d. to 4s. per acre. These figures will operate until October 1951, when a general review will be made.

As regards the Dedication agreements, it is proposed to amend the perpetuity clause so as to permit release from Dedication in certain exceptional circumstances, and to remit the obligation to submit accounts under Basis II, but woodland owners will be invited to submit annual accounts for analysis as is now done in the case of farm accounts. In the event of a dispute arising on the question whether work has been done satisfactorily, the matter will be referred to an independent investigation committee which will report to the Commissioners, with whom the final decision, however, must rest. The Forestry Commission have also under consideration certain steps for encouraging co-operation among woodland owners and for improving the utilisation of forest produce.

The Government feel that, in total, these arrangements will be of material benefit to private woodland owners. Where woodland areas requiring rehabilitation are neither under active consideration for Dedication nor receiving adequate treatment, the Forestry Commissioners will, where necessary, have to acquire those woodlands. It is hoped, however, that the majority of owners will recognise the national need for making woodlands fully productive and will co-operate to that end with the Forestry Commission."

Since the Minister's reply the most recent developments have been the amendment of the Dedication deeds in order to incorporate the agreed alterations, the removal of maximum price control on standing timber, and the decision by the United Kingdom Forestry Committee to recommend Dedication to its constituent Associations, which the latter have recently ratified.

The Commissioners trust that these developments will mark the beginning of a new era of co-operation between the State and private forestry, and that both parties will henceforth unite in tackling the vast and urgent problems of the rehabilitation of the felled and devastated British woodlands.

Progress of Dedication.—By the end of the Forest Year under report Dedication had been completed in respect of eighteen properties covering a total woodland area of 13,273 acres, an increase of seventeen estates and 12,267 acres over the previous year. More encouraging evidence of progress is, however, provided by the fact that Plans of Operation are now in course of preparation on 248 estates covering a total woodland area of 230,000 acres.

Thinning Subsidy.—Among the subjects discussed between the Commissioners and representatives of the private woodland owners has been the question how to encourage thinning on private estates. In this matter the Board of Trade also were directly concerned because of the drain on our national resources resulting from purchases of foreign pitwood. Although there was no immediate prospect of this country becoming independent of such imports, it was clear that the home woodlands could make a substantial contribution provided there was an incentive to private owners to thin their plantations. Representatives of the private owners pressed for an increase

in the price of pitwood, but the Government decision, announced in February 1949, was that assistance should take the form of a subsidy at the rate of 3d. per cubic foot on all coniferous thinnings subject to certain conditions as regards minimum area and volume. The scheme when finally produced also included the alternative of a flat-rate payment at the rate of £3 15s. 0d. per acre, which was applicable to hardwoods as well as to conifers.

Although private owners expressed disappointment at the amount of the subsidy, they have not been backward in applying for it, and there are good reasons to believe that it has stimulated owners to thin their plantations and has had the desired effect of increasing the supply of home-grown pitwood reaching the mines.

By the end of the year under report 384 schemes, totalling 3,456,000 cubic feet of conifers and 400,000 cubic feet of hardwoods, had been provisionally approved.

Planting Grants.—Owing to the unavoidable delay involved in formulating and publishing the terms of the Dedication scheme, it was necessary, if planting was not to be held up, to continue to make grants for approved planting on private estates. So from 1946 onwards owners could apply for what was termed an Interim Planting Grant, but the grant was subject to repayment if the area concerned was considered by the Commissioners to be suitable for Dedication and if the owner elected not to Dedicate. It is proposed to discontinue this interim scheme at the end of the 1949-50 planting season. The amount of the planting grant was at first fixed at £7 10s. 0d. per acre, but in 1947, following increases which had occurred in the cost of labour and materials, the grant was raised to £10. A subsequent increase in 1949 brought the amount of the grant to the present figure of £12 per acre.

Progress of Private Planting since 1946.—There are no complete records of private planting in this country, and Table 11 below is based partly on an analysis of the records of planting grant schemes and partly on estimates provided by the Commissioners' Private Woodland Officers as to schemes still to be inspected and as to the amount of planting carried out on private estates without the aid of grants.

PROGRESS OF PRIVATE PLANTING, 1947-1949

Table 11

Acres

Year of Programme	Forest Year	White Paper Programme	Total, Private Planting	Planted under Grant Schemes	Other Planting on Private Estates (estimated)
Total 1 to 3		30,000	33,400	26,600	6,800
1	1947	5,000	9,000	7,600	1,400
2	1948	10,000	11,100	8,800	2,300
3	1949	15,000	13,300	10,200	3,100

In the White Paper the estimated programme of planting under the Dedication Scheme for these three years was 30,000 acres. Although little of the 33,400 acres estimated to have been planted by private owners is actually Dedicated at the present time, the rate of re-planting is very encouraging and credit is due to the many owners who have contributed to this result.

THE COMMISSIONERS' ESTATES

The Commissioners' estates have been acquired partly by purchase and partly by leasing or feuing, virtually in all cases as a result of direct negotiation as between a willing buyer and a willing seller. In the course of some of these deals, especially where whole estates have had to be acquired, it has been necessary to take over assets such as standing timber and agricultural land, but the Commissioners' main objective has been to secure plantable land, and they try to avoid acquiring other subjects or, failing that, to dispose of them speedily. Some acquisitions, especially in Scotland and Wales, unavoidably include considerable areas of unplantable land, for example, mountain tops, high-lying peat bogs and so on, but as far as possible these are let for grazing.

In addition to land acquired through the Forestry Fund, 120,000 acres of Crown Forest were transferred to the Commissioners' charge under the Transfer of Woods Act, 1923. The Commissioners have also received substantial gifts of land and other property from private individuals.

The total area of land thus acquired has increased from approximately 909,000 acres at 30th September, 1934, to 1,560,000 acres in 1949. The current utilisation of this land is given in broad outline in Table 26, on page 97, which shows that at the present date approximately 949,000 acres out of the 1,560,000 acres are classified as forest land, i.e., land actually under forest or destined for planting; 2,200 acres are devoted to the raising of plants in forest nurseries and 14,100 acres are attached to Forest Workers Holdings. Of the remaining 595,000 acres, roughly two-thirds are let for grazing and other agricultural purposes while one-third consists for the most part of peaty or rocky unplantable land and land subject to common rights.

Property other than Forest

This includes, besides agricultural holdings and houses for local supervisors, cottages, sporting rentals, mines and quarries, as well as easements and permissions of many different kinds. Particulars will be found in Table 45 on page 109 which gives for the three countries the position at the 30th September, 1949.

Table 12 below gives a list, exclusive of Forest Workers Holdings, of subjects and rentals summarised for purposes of comparison at the end of 1934 and 1949.

SUBJECTS AND RENTALS

Table 12

	1934		1949	
	Number	Rental	Number	Rental
Total ...	4,559	£ 80,058	6,457	£ 91,161
Agricultural Holdings:—				
Under £20 p.a. ...	684	4,305	1,320	8,432
Over £20 p.a. ...	395	29,693	575	30,953
Foresters Houses ...	153	180	305	4,429
Cottages ...	424	3,249	1,147	14,723
Residential and Sporting ...	444	19,600	737	23,463
Mines, Quarries, Easements, Permissions, &c. ...	2,459	23,031	2,373	9,161

It should be observed that the entries are not directly comparable; thus transfers of agricultural land (including in many cases farmsteads and other

property) have been made to the Agricultural Departments ; also the rentals now shown for Foresters Houses include the value of rent free accommodation ; and since July, 1942, when all coal was vested in the Coal Commission, royalties from this source, which in 1934 were £16,800, have ceased.

The most significant increase during the past fifteen years has been in the number of Foresters Houses and Cottages. Foresters houses have increased in number from 153 to 305 and Cottages from 424 to 1,147.

The Forests

The statement of land utilisation (Table 26, page 97) shows that the total area of plantations at the 30th September, 1949, was 614,000 acres. This includes 57,000 acres of standing woods acquired by the Commissioners or transferred under the Transfer of Woods Act, 1923. The remaining 557,000 acres have been planted by the Commissioners. In addition to these woods and plantations, there are 335,000 acres, classed as suitable for forestry, still to be planted. Thus at the end of the forest year 1949 the total area of actual and potential forest, that is plantations already made and land still to be planted, was 949,000 acres ; the corresponding areas at the end of 1934, 1939 and 1945 were 544,000, 714,000 and 834,000 acres respectively. Although part of the land acquired has gone to swell existing forest units, 165 new units have been created during the past fifteen years, making a total of 351 forest units at the end of the current year.

The rate of progress in forming new forests and the districts in which they are located are shown in the series of outline maps reproduced on pages 42 and 43. These maps show the position at 1919, 1924, 1929, 1934 and 1949. It will be noted that by 1929 certain definite groupings had taken place. These groupings have developed, notably, in the Western Highlands, the Great Glen, and the coastal region of the Moray Firth. This concentration of forest areas is continued through Banffshire south-eastwards to Aberdeen. The southern uplands of Scotland and the Border country show another definite grouping. A more or less uniform distribution occurs throughout Wales and the Welsh borders, and also in the thickly-wooded southern counties of England, where a good deal of felled and devastated woodland has recently been acquired. For obvious reasons the forest units are sparsely distributed in the predominantly agricultural regions of the Midlands and east of England, and in the industrial zones on either side of the Pennine Range.

As regards size, Table 13 classifies the forests according to the area of forest land (i.e., land under forest plus land remaining to plant) in each unit at intervals in the Commission's history.

CLASSIFICATION OF FORESTS BY AREA

Table 13

	Number of Forests in			
	1934	1939	1945	1949
Total	186	241	274	351
Under 500 acres	12	17	21	40
500-1,000	36	45	52	77
1,000-2,000	58	76	81	92
2,000-4,000	45	59	66	82
4,000-8,000	25	29	35	42
8,000 and over	10	15	19	18*

* The reduction from 19 forests over 8,000 acres in 1945 to 18 forests in 1949 is due to the transfer of some of the plantable land on one forest to the Department of Agriculture for Scotland.

During the past four years, while the total number of units has increased from 274 to 351, the greatest proportional increase has been in the number of small units, under 500 acres, which have risen from 21 to 40. These are largely composed of blocks of felled woodland, towards the acquisition of which special efforts have been made.

The following is a list of the units with the largest acreage of land under forest and remaining to plant.

UNITS WITH 8,000 ACRES AND OVER OF FOREST LAND AT 30TH SEPTEMBER, 1949

<i>England</i>			<i>Scotland</i>	
Forest	Acres	Forest	Acres	
1. Kielder	43,000	1. Clashindarroch	16,000	
2. Thetford Chase	40,000	2. Loch Ard	16,000	
3. Dean Forest	20,000	3. Cairn Edward	9,000	
4. New Forest... ..	20,000	<i>Wales</i>		
5. Wark	16,000	Forest		Acres
6. Allerston	12,000	1. Gwydyr	12,000	
7. Redesdale	11,000	2. Rheola	12,000	
8. Kershope	9,000	3. Dovey	11,000	
9. Clipstone	8,000	4. Clocaenog	11,000	
		5. Brechfa	11,000	
		6. Cood y Brenin	10,000	

The greatest extension since the beginning of the forest year 1935 has been in the Border country; Kielder Forest, which then comprised 28,000 acres, now amounts to 43,000 acres, and along with the adjacent forests of Kershope (9,000 acres), Redesdale (11,000 acres [see photo. No. 12]), and Wark (16,000 acres), now makes up a forest block of some 79,000 acres. In the Eastern counties Thetford Chase has increased from 34,000 acres to 40,000 acres. In Scotland Loch Ard Forest now extends to 16,000 acres, an increase of 5,000 acres. In Wales increases in the size of individual forests have not been so remarkable, but there are now six forests each over 10,000 acres; there has also been a substantial increase in the area acquired for forestry purposes.

SPECIES PLANTED.—The 1947 Census of Woodlands provided, among other data, information as to the acreages covered by the different species in the plantations formed by the Commissioners. Where, as is often the case, two or more species occur in mixture, the area has been credited to the principal species.

REPRESENTATION OF SPECIES BY AREA AT SEPTEMBER, 1947

Table 14

Species	Acres	Percentage of Total
Total	468,468	100
Sitka spruce	140,075	30
Scots pine	101,256	21
Norway spruce	81,196	17
Corsican pine	31,367	7
European larch	28,446	6
Japanese larch	28,432	6
Hybrid larch	1,520	—
Douglas fir	22,231	5
Other conifers	6,588	1
Oak	12,948	3
Beech	7,048	2
Ash	3,195	1
Birch	1,487	—
Poplar	1,119	—
Other broadleaved species	1,560	—

A glance at Table 14 shows the outstanding place occupied by the two spruces, which together cover nearly 50 per cent. of the whole area planted by the Commissioners. This clearly reflects the salient characteristics of the majority of the land which the Commissioners have been offered for acquisition, namely sour and peaty land in the higher rainfall parts of the country, of low agricultural value and suitable in the main only for the moisture-loving spruces. The hardy Scots and Corsican pines come next in order, covering 28 per cent. of the area, but these occupy the very different habitat of the sandy lowland heaths in the east and south of the country, and the glacial sands and gravels of such Scottish rivers as the Dee and the Spey. The larches, which together cover some 58,000 acres and so occupy about 12 per cent. of the whole area, form the third major group of species; the substantial area (over 1,500 acres) under hybrid larch is a matter of some interest. Of the remaining area, 5 per cent. is under Douglas fir, 1 per cent. under other conifers such as *Pinus contorta*, *Abies grandis*, *Thuja plicata* and *Tsuga heterophylla*, and about 7 per cent. under broadleaved species, chiefly oak and beech.

PROGRESS OF THE PLANTATIONS

In their Annual Report for 1934, when the Commissioners made their last general review, plantations were classified by area into three five-year age classes as follows: 1 to 5 years old 111,900 acres (45 per cent.); 6 to 10 years old 105,500 acres (40 per cent.); and 11 to 15 years old 36,800 acres (15 per cent.).

There are now six such age groups as set out in Table 15 below. [Photos Nos. 3 to 6 show a Corsican pine plantation at successive stages.]

CLASSIFICATION OF PLANTATIONS BY AGE AND AREA

Table 15

(Based on 1947 Census of Woodlands)

Acres

	Total	Conifers	Broadleaved
Total 1-30 years old ...	550,624	515,666	34,958
1- 5 years old ...	123,483	115,082	8,401
6-10 " " ...	88,809	82,569	6,240
11-15 " " ...	109,078	100,496	8,582
16-20 " " ...	108,354	101,928	6,426
21-25 " " ...	87,941	84,083	3,858
26-30 " " ...	32,959	31,508	1,451

With well over 100,000 acres in the 21 to 30 year age group, a substantial part of the Commissioners' plantations are now reaching the productive stage.

Establishment

As a matter of general interest, as well as to provide a measure of technical efficiency, it has been the practice to make periodical surveys in order to determine what proportion of the plantations can be classed as "established," i.e. as properly stocked with growing trees and no longer in need of weeding. The most recent of these surveys was carried out in 1947 as part of the general Census of Woodlands, and showed that of the then total area of 470,000 acres (excluding acquired and transferred woodlands), only some 26,000 acres—less than 6 per cent. of the whole—were unestablished plantations occurring in the older age groups; the remainder of the 101,000 acres classified as unestablished were recently formed plantations still in the weeding stage, nearly all of which can be expected to pass into the "established" class within the next few years.

Rate of Growth

In their Fifteenth Annual Report the Commissioners gave some figures indicating the average rate of growth of thriving plantations of various conifers at ten and fifteen years of age. For the purpose of the present review, records have been obtained from the Conservancies as to the average height of the dominant trees in their fastest growing plantations of twenty, twenty-five and thirty years of age respectively. Each record relates to a single plantation of the given species and age, and the data come from districts as far afield as South Strome and Findon in Ross-shire, Eggesford in Devon, Thetford in Norfolk, and Dymock in Gloucestershire, to mention only a few of the forests concerned.

From these Conservancy records the tallest plantations of each species at the given age have been selected, and the data entered in Table 16 below:

HEIGHT OF TALLEST PLANTATION

Table 16

Feet

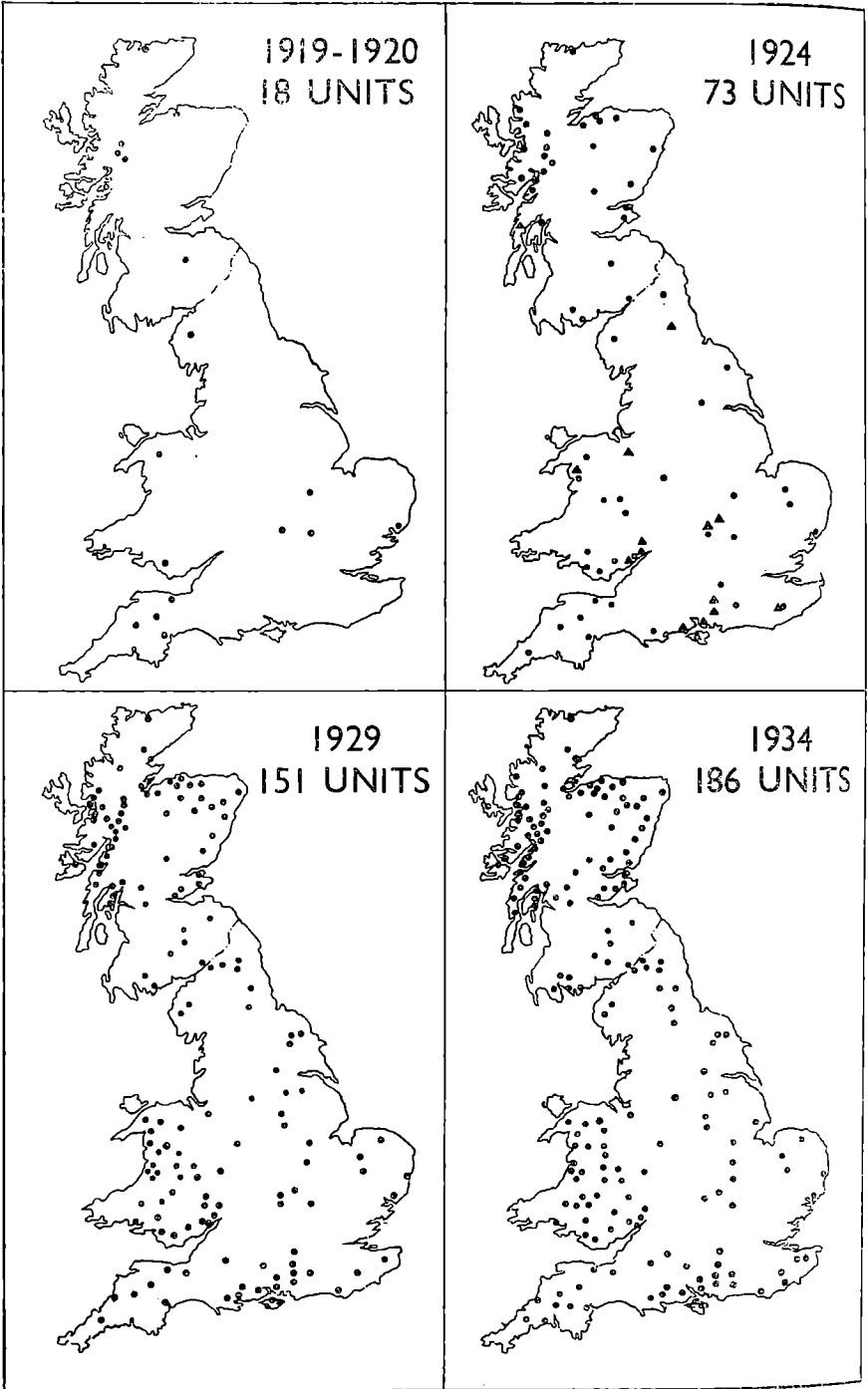
Age	Scots Pine	Corsican Pine	European larch	Japanese larch	Douglas fir	Norway spruce	Sitka spruce	Oak	Beech	Ash
<i>Years</i>										
20	40	38	51	55	—	46	59	34	36	—
25	44	46	61	67	67	45	74	35	—	—
30	54	62	—	—	78	66	73	40	38	40

The species producing the tallest plantations at 20 and 25 years of age is Sitka spruce, but at 30 years this species is displaced by Douglas fir, the plantation concerned being in the New Forest. The surprising record for Scots pine of 40 feet in 20 years comes from Glen Branter in Argyll. Another remarkable stand is the 30 year old crop of Corsican pine, height 62 feet, a product, like the Douglas fir, of the New Forest. Inverliever Forest in Argyll provides the record plantation of Japanese larch, 67 feet in height in 25 years. Of the two outstanding European larch plantations, the younger is in the Forest of Dean and the older in the New Forest. Though the traditionally slow-growing broadleaved trees may fail to compete with such conifers as Japanese larch and Sitka spruce, the 20 year old stands of oak and beech, from the New Forest and Forest of Dean respectively, are not far behind the records for pine at the same age.

Effects of the War

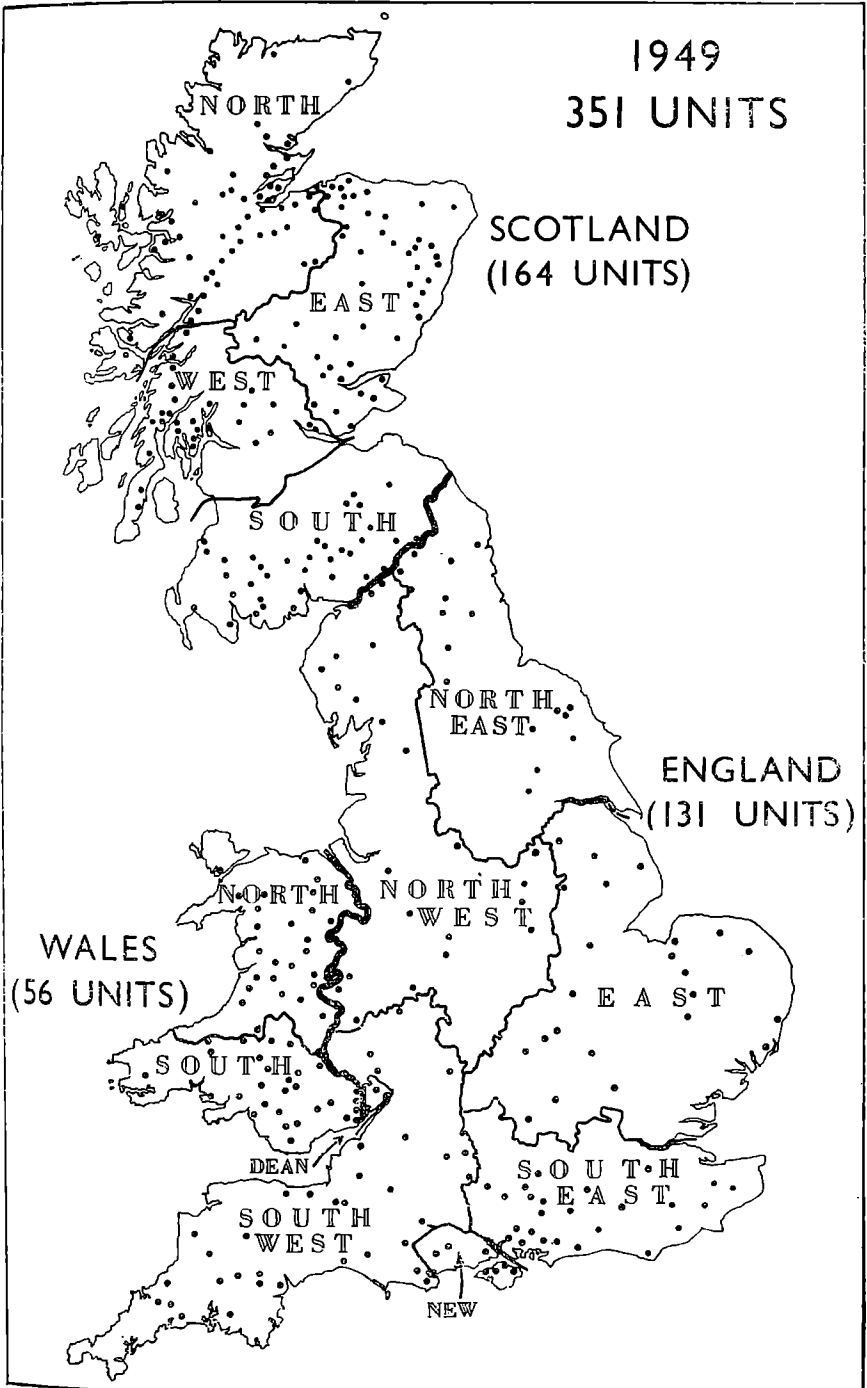
Although bombs fell in almost every forest in the south of England and in many forests elsewhere, the total amount of damage caused was not excessive. In all, the loss of some 2,000 acres was ascribed to enemy action—mostly as a result of incendiary bombs. In addition 2,030 acres were destroyed by fires resulting from military training operations, while 1,700 acres had to be cleared for aerodromes and other service requirements.

The occupation of planted areas by the forces for training grounds, artillery and bombing ranges and camps and aerodromes, which at its peak covered 72,000 acres, presented the Commissioners with a number of awkward problems. When the land was handed back, fences had to be repaired, rabbits destroyed, and many gaps in the plantations made good. The proportion of the area which had to be completely restocked was, however, surprisingly small.



SKETCH MAPS ILLUSTRATING THE PROGRESS OF

Forests transferred under the Forestry (Transfer of Woods) Act, 1923, are shown by means of triangles in the map for 1924.



ACQUISITION OF FOREST UNITS

CENSUS OF WOODLANDS

An accurate and reasonably up-to-date knowledge of the extent and condition of existing forest resources is the cornerstone of forest policy. The recognition of this fact led the Commissioners, shortly after the First World War, to organise the first systematic Census of the British Woodlands, the results of which were published in 1928.* Much of the survey was done by voluntary workers and, though it was fairly accurate as regards the total area, the classification according to type of woodland left a good deal to be desired.

The next Census was planned in 1938-39 as part of the precautionary measures taken in view of a possible emergency (see page 23 under Timber Supply). Although war broke out before this could be completed, the private woodlands in three counties in England, twelve in Scotland and six in Wales were completely mapped and classified by specially trained surveyors. The remaining counties were partially surveyed during the War, using a method of sampling devised by Dr. F. Yates, head of the Statistical Section of Rothamsted Experimental Station. This Census proved invaluable to the Commissioners and subsequently to the Board of Trade for organizing home timber production during the War.

Useful though it was for this purpose, the war-time Census did not give a complete picture of the woodlands of the country, and one of the first steps taken after the War was to organise a new survey as the basis for the work of reconstruction. The Census started in 1947 and the field work was completed about the middle of 1949; a full report will be published in due course, but the following is a brief summary of the objectives and methods of the Census and of the results obtained.

The Census had two main objectives:—Firstly, to map and classify all the woodlands of the country which are in blocks of five acres and over (to have included under-five-acre blocks would have prolonged the work unduly). Secondly, to obtain an estimate of the timber volume and increment of the woods remaining at the time of the survey, information which is essential for the purpose of regulating future felling.

The Private Woodlands of the country were surveyed by men and women specially recruited for the purpose; the numbers of surveyors varied, but averaged forty over the period of the Census. Every block of woodland was visited, sub-divided as necessary into its component stands of uniform type as regards age, species, etc., the stand boundaries mapped, and the particulars recorded on field forms devised so as to involve the minimum of writing. The data from the field forms were subsequently coded and transferred to punched cards for mechanical sorting and tabulation. Much of the tabulation work was carried out for the Commissioners by the War Office.

The Commissioners' woodlands were surveyed by members of their own staff. The same basic information was recorded as for Private Woodlands, but the opportunity was taken to record certain additional information for which separate field forms were used.

Some idea of the magnitude of the task can be gained from the fact that the number of separate stand cards used in the tabulations amounted to just over 308,000.

* Report of Census of Woodlands and Census of Production of Home Grown Timber 1924. H.M. Stationery Office, Out of print.

Area of Woodland

The Census disclosed a total area of actual and potential woodland in Great Britain (in blocks of five acres and over) of 3,448,362 acres. Small woods of under five acres are estimated to amount to about 187,000 acres, bringing the grand total up to 3.64 million acres. This is equivalent to about 6.5 per cent. of the land surface of Great Britain. It should be noted that the above woodland acreage includes, besides felled areas in which only the stumps of the previous crop remain, a large area of birch and other scrub, much of which has not been enclosed.

Table 17 on page 46 summarises by countries and separately by State or private ownership the Census data for the woodlands of five acres and over.

Of the total of 3,448,362 acres, 1,865,046 acres are in England, 1,266,838 in Scotland and 316,478 in Wales. Subdividing on the basis of ownership it will be noted that while privately owned woodlands comprise 2,825,331 acres, those held by the Forestry Commission amount to 623,031 acres, or between one-fifth and one-sixth of the total area.

For descriptive purposes the woodlands of the country were classified into five main groups—High Forest, Coppice (including Coppice with Standards), Scrub, Devastated and Felled.

High Forest, which includes crops of all ages, covered 1,789,000 acres, of which 49 per cent. were coniferous, 42 per cent. broadleaved, and 9 per cent. mixed. In England only 32 per cent. of the High Forest was coniferous, whereas in Scotland conifers accounted for 77 per cent.; in Wales 52 per cent. of the High Forest was coniferous. The Commissioners' plantations, which have been predominantly coniferous, have affected those figures to a considerable degree, particularly in Wales where more than 80 per cent. of the conifer area was in State Forests. In Scotland, private owners held more coniferous forest than the Commissioners but, in England, the State Forests contained 184,000 acres of conifers as compared with 147,000 in private ownership. In all three countries, much the greater part of broadleaved and mixed high forest was privately owned.

Coppice and coppice with standards, covering approximately 350,000 acres, were almost completely confined to England and Wales, occurring chiefly in the south-eastern counties of England. These categories generally occupy land which is potentially highly productive.

The remarkably large areas of scrub, totalling almost half a million acres, which were found in all three countries, are worthy of notice. The existence of this large extent of non-productive woodland, represents a serious loss of production, even allowing for the use as shelter to which some of it is put in the upland districts.

Devastated woodlands, the result of exploitation, amounted to 151,000 acres, of which two-thirds were in England. Most of these were originally High Forest of the broadleaved type, and in their existing condition they are difficult and costly to restore to productive use.

A measure of the consequences of two great wars is the great extent of felled woodland, amounting to 662,000 acres, or 19 per cent. of the total woodland of the country. Almost two-thirds of this was in Scotland. In the survey these areas were classified into woodlands felled before September, 1939, and those felled subsequently, a subdivision which showed that between 1939 and 1947 more than 10 per cent. of the total woodland area was clear

CENSUS OF WOODLANDS, 1947-1949: AREA CLASSIFICATION BY TYPE

Table 17

As at 30th September, 1947.

Acres

	TOTAL WOODLANDS				PRIVATE WOODLANDS				STATE FORESTS			
	Great Britain	England	Scotland	Wales	Great Britain	England	Scotland	Wales	Great Britain	England	Scotland	Wales
	...	3,448,362	1,865,046	1,266,838	316,478	2,825,331	1,577,115	1,024,008	224,208	623,031	287,931	242,830	92,270
GRAND TOTAL	...	1,788,799	1,029,557	185,906	1,254,308	778,613	376,247	99,448	534,491	250,944	197,089	86,458
HIGH FOREST	...	867,797	439,084	97,438	412,464	147,441	247,453	17,570	455,333	183,834	191,631	79,868
Total High Forest	...	166,066	117,996	10,835	142,650	100,140	34,686	7,824	23,416	17,856	2,549	3,011
Coniferous	...	754,936	580,286	77,633	699,194	531,032	94,108	74,954	55,742	49,254	2,909	3,579
Mixed	...	349,994	330,060	576	339,774	321,153	537	18,084	10,220	8,907	39	1,274
Broadleaved	...	229,788	227,423	89	227,711	225,429	89	2,193	2,077	1,994	—	83
COPPICE	...	120,206	102,637	487	112,063	95,724	448	15,891	8,143	6,913	39	1,191
Total	...	496,951	200,040	256,683	472,255	190,458	243,701	38,096	24,696	9,582	12,982	2,132
Coppice with Standards	...	151,064	105,415	33,636	139,455	100,306	27,401	11,748	11,609	5,109	6,235	265
Coppice only	...	661,554	199,974	402,607	619,539	186,585	376,122	56,832	42,015	13,389	26,485	2,141
SCRUB	...	288,503	33,492	233,433	275,104	32,766	221,073	21,265	13,399	726	12,360	313
DEVASTATED	...	373,051	166,482	169,174	344,435	153,819	155,049	35,567	28,616	12,663	14,125	1,828
FELLED	...											
Total Felled	...											
Before September, 1939	...											
Since September, 1939...	...											

CENSUS OF WOODLANDS, 1947-1949: ESTIMATE OF VOLUME OF HIGH FOREST AND COPPICE WITH STANDARDS

Table 18

As at 30th September, 1947.

Millions of Cubic Feet
(Quarter girth measure over bark)

	TOTAL WOODLANDS				PRIVATE WOODLANDS				STATE FORESTS			
	Great Britain	England	Scotland	Wales	Great Britain	England	Scotland	Wales	Great Britain	England	Scotland	Wales
	GRAND TOTAL	2,658.4	1,535.2	935.4	187.8	2,280.3	1,309.7	821.9	148.7	378.1	225.5	113.5	39.1
HIGH FOREST												
Total	2,505.6	1,383.6	935.4	186.6	2,128.9	1,159.4	821.9	147.6	376.7	224.2	113.5	39.0
Coniferous	972.6	289.7	626.3	56.6	704.5	162.6	518.3	23.6	268.1	127.1	108.0	33.0
Mixed	284.4	173.8	90.8	19.8	261.2	154.9	88.7	17.6	23.2	18.9	2.1	2.2
Broadleaved	1,248.6	920.1	218.3	110.2	1,163.2	841.9	214.9	106.4	85.4	78.2	3.4	3.8
Coppice with Standards*	152.8	151.6	—	1.2	151.4	150.3	—	1.1	1.4	1.3	—	0.1

* Volume of standard trees only.

felled. At the same time, it brought out the relatively large area felled before September, 1939, much of it in the first war, which had not been replanted or restocked by natural means. Four-fifths of this was in Scotland. Over the country as a whole, 92 per cent. of the felled woodland was in private ownership.

Suitability for Economic Management

Among the woodlands of the country there are many small blocks in isolated positions, or with irregular and lengthy boundaries out of proportion to the area enclosed, which cannot be held to be suitable for economic management. When these areas are excluded it is found, for the country as a whole, that 83 per cent. of the total area of private woodlands can be regarded as suitable for economic management ; in England the percentage is 81 and in Scotland 89 ; but in Wales only 66 per cent. are considered suitable.

Estimation of Volume

The amount of merchantable timber contained in the Coppice, Scrub, and Devastated categories of woodland is so small that it was decided to limit the investigation to the two major categories of High Forest and Coppice with Standards. (See Table 18, page 47.)

The estimated total volume of standing timber was 2,658 million cubic feet quarter-girth over-bark, which is equivalent to an average volume of 1,317 cubic feet per acre of productive woodland, i.e., of High Forest and Coppice with Standards. The average volume per acre of the High Forest category was 1,400 cubic feet, and of the Coppice with Standards category 665 cubic feet. In the latter case the volume relates to the standards only.

Work is still in progress on the intricate problems involved in estimating the increment of the standing woodlands. When this has been done, the Commissioners will have a better basis on which to regulate fellings.

SEED SUPPLY

The provision of the forest tree seed required to raise the plants used each year for planting is an unspectacular but none the less vital part of the Commissioners' operations. Seed has to be procured and sown one or two, and for some species, four years in advance of the plants being required for forest use. Questions of origin and quality of seed must be duly considered, and storage arranged so that advantage can be taken of good seed years to tide over years when there is a crop failure. Moreover, much of the seed has to be imported from overseas owing to lack of woods of seed-bearing age in this country. Scots pine is the only conifer of which we can collect sufficient seed in this country to meet all our requirements ; for Douglas fir, Sitka spruce, Japanese larch and many other species there has been no alternative hitherto but to import from the country of origin. The position is somewhat easier in the case of the broadleaved species, and it is seldom necessary to look outside this island for supplies of oak, ash or sycamore. Beech is a somewhat erratic seeder, but a bad seed year often extends to the adjoining mainland of Europe and there may be then no alternative but to wait until the following year.

The following list shows the main sources from which seed supplies of the major species have been obtained.

<i>Country</i>	<i>Species</i>
Western Canada and U.S.A.	Douglas Fir, Sitka spruce, <i>Tsuga heterophylla</i> , <i>Thuja plicata</i> , <i>Pinus contorta</i> , <i>Abies grandis</i> .
Corsica 	Corsican pine.
Germany and Austria ...	Norway spruce.
Switzerland, Sudeten and Austria ...	European larch (in part).
Japan	Japanese larch.
Home sources	Scots pine, European larch (in part), Hybrid larch, Ash, Beech, Oak, Sycamore, Chestnut (in part).

During the War years, 1940 to 1946, it was only with great difficulty that the Commissioners were able to meet in part their seed requirements. Special steps which were taken to collect all available seed from the War fellings in progress and from standing trees met, however, with considerable success, notably in the case of Norway spruce in 1942 when a bumper crop of cones provided enough seed to meet all requirements for several years; this was a stroke of good fortune because there was no hope at that time of getting spruce seed from the continent of Europe. In spite of all difficulties the Commissioners succeeded in importing during the war years over 18,000 pounds of coniferous seed; of this quantity about half was Sitka spruce and the remainder Douglas fir, Japanese larch and Corsican pine.

As private owners and the nursery trade were in even greater difficulties than the Commission in obtaining seed from abroad, the Commissioners undertook in 1944 to act as bulk importers and to meet as far as they could the seed requirements for private forestry also. The position, however, improved sufficiently by 1946 to enable this arrangement to be relaxed, and since then the Department has undertaken the bulk purchase of only four species—Japanese larch, Corsican pine, Sitka spruce and Douglas fir. In the five years 1945 to 1949 the Commissioners sold 17,900 pounds of conifer seed, mostly to the home nursery trade and to private owners.

In their Fifteenth Annual Report the Commissioners gave a table recording the good and bad seed years for the various species collected in this country or imported from 1919 to 1933. A similar table is now given for the period 1934 to 1948 (Table 19, page 50). As far as imported seed is concerned, the records only relate to the particular areas from which supplies have been sought; it does not follow that the crop was uniform in quantity throughout the whole of its range.

An analysis of the data for the whole period indicates that the species in which a more or less complete failure of the seed crop occurs sufficiently frequently to be a serious embarrassment are Douglas fir, Sitka spruce, Japanese larch and beech. The difficulty in the case of the three conifers can be more or less met by storage, but it is not possible to hold over beech seed.

SEED SUPPLY

Table 19

a = abundant; g = good; p = poor; f = failed

	Year of Crop														
	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948
Scots pine	a	g	f	g	g	p	g	g	g	p	p	g	p	a	p
Corstican pine	p	g	p	p	p	a	—	p*	g*	p*	g	g	a	a	g
European larch: home abroad	a	g	g	f	p	a	p	g	g	p	g	p	g	p	p
Japanese larch...	a	f	p	a	g	f*	g*	p*	a*	p*	p*	p*	p	a	g
Douglas fir	g	p	g	f	g	g	—	g	g	f	g	g	p	f	p
Norway spruce	p	g	a	a	g	—	—	g*	a*	p*	p*	p*	a	a	a
Sitka spruce	p	a	g	g	f	g	g	g	g	g	p	a	p	a	f
Oak: home	g	g	g	—	p	a	p	f	a	g	g	g	p	p	a
abroad	a	a	a	a	—	—	—	—	—	—	—	—	g	p	g
Beech: home	g	g	p	f	p	p	p	p	p	f	g	f	p	p	g
abroad	p	p	p	f	p	—	—	—	—	—	g	f	g	f	g
Ash	g	p	g	g	g	g	p	p	g	a	g	f	g	a	p
Sycamore	g	—	g	g	g	g	p	p	g	g	g	f	p	g	g
Chestnut	g	—	g	g	g	g	p	p	g	g	g	f	p	a	p

* Relative to Home Crops only.

DEVELOPMENTS IN FOREST TECHNIQUE

Forestry is not a new science in Great Britain ; it has a long history behind it. Yet, when the Commissioners started their operations in 1919 it became apparent very soon that much of the experience accumulated in the past was of relatively slight application to the conditions in which modern foresters have to work. The earlier landowners and foresters were skilled in the art of introducing and acclimatising new trees, and they enormously enriched the scanty native flora, but their work, with only a few exceptions, was confined to the better quality soils, and they had thus acquired comparatively little experience in dealing with the types of land to which the Commissioners had to turn in forming their new plantations. Even where there had been earlier success in afforesting land which the Commissioners had to tackle as, for example, the chalk downs, the lack of records of the past methods meant that the experience then acquired was lost.

The programme of planting which began in 1919 involved both afforestation, that is the planting of treeless ground, and replanting, implying the planting of areas which had recently carried a crop of trees. Fundamental to both, however, is the production of planting stocks in the nursery.

Nursery Work

Nursery practice, like silviculture, had a long tradition behind it in this country, and the methods which were well established when the Commissioners started their work were generally adopted when the new enterprise began. But conditions in many ways were different because nurseries were larger ; the seed had to be handled in much greater quantities and management required the production of repeated crops of forest trees, mainly coniferous, without the alternations under other crops which are used in commercial nurseries. Photograph No. 10 shows an established nursery.

As a result of experimental work carried out by the Research Branch, a number of important modifications have been introduced into nursery technique and have become standard practice. Among these the following may be mentioned ; the use of coarse sand or grit instead of the local nursery soil for covering seed-beds sown with small-seeded species such as Sitka spruce, Norway spruce, *Tsuga heterophylla*, the larches, and birch ; the stratification of stored seed of Douglas fir and *Pinus contorta* ; and the adoption of early sowing, especially of the spruces, as an important factor in the raising of strong seedlings.

Soil deterioration in some of the older established nurseries has been a troublesome problem to which much attention has been given. The commoner coniferous species such as the pines, larches and spruces are the first to show signs of decreasing soil fertility, and in certain cases, notably where the soil is relatively basic in reaction, the only remedy is to discard these nurseries for the raising of coniferous seed-beds. Heavy manuring by itself is no remedy for soil deterioration, and the fact that great improvements have been achieved by such methods as acidification and partial sterilisation suggests that biological factors may be involved. The whole matter is still under investigation, but in the meanwhile, encouraged by the success of the Research Branch experiments with heathland nurseries (see page 80), small nurseries using the compost technique first introduced by Dr. M. C. Rayner have become an important part of the nursery practice in many of the Conservancies. Success is by no means universal, but where the method has failed it has usually been found to be due to defective technique, e.g., removal of too much of the existing humus layer, use of the wrong type of compost, late preparation and sowing, lack of shelter, etc. Some of the most successful

of these new nurseries have been on ground which just previously carried a crop of trees. Where the method has succeeded some very striking results have been obtained, for example, at Devilla Forest where 100 lb. of Sitka spruce seed sown in 1948 produced eight million one-year seedlings (80,000 per lb.) which averaged five inches in height. In England a substantial proportion of the spruce seedlings required for the planting programme are now being raised in heathland nurseries; the seedlings are usually sent to the established nurseries to be lined out, but some have been planted direct on ploughed moorland with promising results.

Apart from producing strong, well-rooted seedlings which can be lined out at the end of the first growing season, most heathland nurseries have the great merit that during the first few years they are almost weed-free. Consequently there is a great saving in labour and cost as compared with the ordinary established nursery.

Mechanisation of nursery operations proceeded slowly during the first 20 years, and development was delayed by the war, but since then substantial progress has been made in a number of directions. The use of tractors and small ploughs for cultivation is now usual in all the larger and in many of the smaller nurseries. Ploughs are being used in lining out, thus saving expensive hand labour, while experimental work is going on with machines for sowing, covering of seed beds and lining-out of seedlings.

Planting Methods

In their afforestation work the Commissioners have had to deal with large areas of peat-covered soils in the hills of the north and west of Britain. The obvious species for these soils was spruce—either Norway or Sitka—and in the early nineteen twenties these were planted in so-called “screefs”, i.e., square patches from which the surface vegetative layer had been pared off with a mattock.

The results were not encouraging, and the study of Sir John Stirling Maxwell's Belgian turf planting at Corrou in Inverness-shire, and of similar experiments at Inverliever in Argyll, led to the general adoption of turf planting. By this method the plant roots, instead of being placed in the wet peat *in situ*, are inserted in a raised block of turf cut from an adjoining drain. In standard turf planting the turf drains run herringbone fashion about twenty feet apart, the turfs cut from these drains being spread evenly over the natural surface between the drains at a spacing of about five feet. One plant is inserted in each turf.

Turf planting by hand is expensive and requires much labour, so the next development was to mechanise the process by the use of crawler tractors and ploughs. A new type of draining plough, one of the Cuthbertson series, has recently been developed, which has a double mouldboard throwing a slice of peat on either side of the drain which is being excavated. A certain amount of hand labour is still necessary to cut and distribute the turves between the drains, which are ten feet apart, but further improvements envisaged may lessen the amount of labour involved. Not all the peat turf draining work is done with the Cuthbertson plough; in some areas improved makes of the standard agricultural type of plough are used and found satisfactory. Tractor plough outfits are apt to get bogged in very soft and wet peat, but this difficulty has been largely overcome by fitting extra-wide tracks to the crawler tractors. Besides speeding up and cheapening the preparation of peaty land for planting, ploughing has resulted in the better growth of the trees and quicker establishment.

Another type of land which bulks still more largely in the Commissioners' afforestation work is the heather or grass-bracken moorland which characterises most of the hill ranges of the country. Although a layer of peat may be present this is usually quite thin, and difficulties that have been experienced in getting trees to thrive on the poorer types of land appear to be due partly to the impervious nature of the soil, and partly to the noxious character of the surface humus layer. Early experiments at Allerton Forest in Yorkshire and in various parts of Scotland showed that the unfavourable conditions could be largely remedied by cultivation, a discovery which led by gradual stages to the development of ploughs capable of tackling almost any sort of ground.

The early ploughs were of standard agricultural makes, most of the two-furrow type drawn by wheeled tractors, and their use was limited in practice to shallow ploughing in relatively loose and stone-free soils. But the advent of the crawler tractor, coupled with incessant demands from the afforestation areas for deeper ploughing, made the need for larger and stronger ploughs imperative. The two-furrow plough was discarded and attention concentrated on developing a single furrow plough which would penetrate to a depth of twenty inches or more, and would turn out such a large furrow slice that, with ploughing at five feet intervals, virtually the whole of the natural surface would be covered with soil. The plough must also be strong enough to cope with soils containing boulders of up to eighteen inches in diameter. Such a plough, named after the Chairman of the Commissioners the R.L.R. Plough, was designed along lines prescribed by Lord Robinson, and the prototype built by a Yorkshire firm of agricultural engineers in 1943. Since then many of these ploughs have been brought into service and used for breaking up the hardest and most stony types of land which have to be dealt with. Typical examples are the Middle Oolite soils of the Yorkshire moors, west of Scarborough, and the glacial drifts of the Black Isle in the North of Scotland. For ploughing in such soils with the R.L.R. Plough, a size 4 crawler tractor, which is about 35 draw-bar horsepower, is generally used. Where soil conditions are easier smaller and lighter ploughs and tractors can be employed.

With the aid of one or other of the ploughing outfits available, the Commissioners are now able to plough a large proportion of the area to be planted each year. Even the steep slopes of the chalk downs have been successfully ploughed, and it may fairly be claimed that the potential area of land suitable for afforestation has been substantially increased by the use of the deep ploughing technique. (See photo No. 11.)

Choice of Species

Experience has shown that there are certain difficult types of ground, notably some of the flat or gently sloping moorlands with a dense cover of heather and *Scirpus caespitosus*, where even deep ploughing is not a complete answer to the problem of getting such species as Sitka spruce or Norway spruce quickly established. There is often a tendency for the furrow slices to become rapidly reinvaded by *Calluna*, and the trees after making a good start turn yellow and go into check. In some cases the use of a phosphatic manure, such as basic slag or ground mineral phosphate, suffices to give the necessary impetus to the growth of the trees to enable them to form canopy before the heather returns, but on the poorer soils the effect of manuring is often only temporary, and the check is then merely postponed for a year or two. On soils of this type it has come to be recognised that the spruces are not satisfactory pioneer species capable of being established

as a pure crop on virgin land, but behave rather as the so-called "successor species" which, in virgin forests, follow on a previous crop of some other tree species.

The hardy pines, such as Scots pine and *Pinus contorta*, are true pioneer species although for various reasons, e.g., liability to snowbreak, they are often inferior to the spruces as timber-producing trees on the sites in question. As a result of much experiment it has been found that on these poor soils the establishment of spruce can be greatly accelerated by planting an admixture of one of the pines. The pines grow rapidly and, when their lower branches have spread sufficiently to smother or weaken the heather and to provide shelter, the spruce begin to grow also and eventually take over the lead. The planting of pine in mixture with spruce is now general practice on all soils on which spruce behaves as a non-pioneer (or so-called "successor") species.

In earlier years the two species were planted in alternate rows, but such mixtures were found troublesome and costly to manage and the present practice is to plant two rows of each species alternately. On ploughed ground the species rows run at right angles to the line of the plough furrows, i.e., the spruce and pine alternate along the furrow slices.

There are certain other species besides the spruces which behave as "successor" species on the less favourable afforestation sites, and for which the use of an admixture of pine has been found clearly beneficial. Examples are beech on shallow soils over the chalk, and Douglas fir when planted on dry grass heath.

With the single exception of European larch, there have been no great changes over the past thirty years in the use of the major tree species planted in the Commissioners' forests. Owing to the appearance of a die-back disease affecting European larch plantations in many parts of the country, together with the discovery that larch raised from seed collected in the Swiss or Austrian Alps is much more susceptible to the disease than is the Scottish strain of larch, the Commissioners are now virtually restricting their use of this species to such plants as can be raised from home-collected seed. Sites also are now selected with greater care to avoid risk of damage by unseasonable frosts, as these play an important part in causing the disease. The place of European larch in our new plantations is largely being taken by the Japanese larch, *Larix leptolepis*, which does not suffer from die-back, produces almost equally durable timber and grows faster in early youth. On the other hand Japanese larch is more susceptible to drought than the European species, and its optimum range is more or less restricted to the western half of this country. An interesting use for Japanese larch, which has developed considerably during the last ten years, is as a fire protection belt round plantations of spruce or pine. Even narrow belts have proved very effective in stopping plantation fires.

Use of the two spruces, Norway spruce and Sitka spruce, has increased considerably over the past fifteen years; these are species of high volume production, and are well adapted for the conditions prevailing in the hill country in which most of the land for planting is acquired. In the earliest years of the Commissioners' operations the general practice was to plant Norway spruce on the upper and Sitka spruce on the lower slopes, but this mistake was soon rectified. Norway spruce is now reserved for the better soils and less exposed sites, and the far less exigent American species used on the more difficult heathery sites and on the higher ground where severe exposure is liable to dwarf the growth of the Norway. Two other types of ground may be mentioned on which Norway spruce is generally used in preference to Sitka spruce; these are the low lying flats which are subject

to late frosts, and land formerly carrying birch or oak scrub. With regard to the latter, our experience has proved that Norway spruce is much less susceptible to attack by honey fungus than is Sitka spruce when planted on felled scrub woodland.

Scots pine remains a reliable stand-by species for use under a great range of conditions, being planted both as a pure crop on the lighter soils and in the lower rainfall regions of the country, and as a "pioneer" or "nurse" tree in mixture with more exacting species such as Sitka spruce and Douglas fir. In the warmer southern half of the country there is an increasing tendency to plant Corsican pine in preference to Scots pine, in view of the faster growth, higher volume production, and greater immunity to insect attack of the Mediterranean species. Corsican pine has also proved more resistant to exposure, especially to salt winds, hence its use on sand dune areas such as those of Culbin and Pembrey Forests. Corsican has the further merit of tolerating industrial fumes better than Scots pine, and so is a most valuable species for planting on some of the poor sandy Triassic soils in the Midlands of England. On the other hand Corsican pine appears to ripen its new wood only with difficulty at the higher elevations in the west and north of Britain, and is there liable to sudden attack by various disorders. It is in general less frost-hardy than Scots pine. Corsican pine is now coming into favour as a pioneer nurse species for mixing with beech on chalk or limestone soils, being less subject than Scots pine to the sudden die-back which often attacks the latter species when planted on these basic rocks. Photographs Nos. 2 to 6 show the development of a typical Corsican pine plantation at Rendlesham Forest, Suffolk.

Douglas fir is a fast growing and highly productive species which was extensively planted in the early years of the Commission, typical sites being the well sheltered, and often bracken-clad, lower slopes of the hills in the west of the country. The soils on such sites are apt, however, to be soft, and a great deal of trouble resulted from early windblow which necessitated repeated staking of the young trees. Douglas fir was also much planted on loamy soils after the felling of a crop of coppice of oak, ash and other hardwoods, but experience of these plantations has not been very favourable. The Douglas fir were often slow in getting away and weeding costs were correspondingly high. As a result of these experiences, opinion has tended to swing away from Douglas fir, and latterly this species has occupied a relatively small place in the planting programmes. Present practice is to avoid the softer fertile soils in the west, choosing in preference drier types of ground, such as grassy heaths, and often planting the Douglas fir in mixture with Scots pine.

There are a number of other conifers which continue to play a minor though useful part in the Commissioners' planting operations. *Pinus contorta* is one of the most important of these owing to its ability to thrive on the infertile *Scirpus caespitosus* peats in the west of Scotland; it is usually planted on such soils in mixture with Sitka spruce. Of the two regional strains of this tree, the coastal form is the more vigorous in this country, though not as straight-growing as the inland type. When *Pinus contorta* is planted on the better mineral soils, though growth is usually rapid, trouble with windsway has often developed. Roe-deer also have a remarkable liking for the tree, and have caused much damage in some localities.

The Western hemlock, *Tsuga heterophylla*, is a species which has come increasingly into favour as a species for underplanting open larch or pine plantations, birch scrub and the like; it appears to tolerate a wide range of soils, and its soft flexible leader is less subject to damage by the whipping of the branches of the over-crop than any other conifer. Growth is usually rapid and volume production high.

Other species used for much the same purposes as *Tsuga* include *Abies grandis*, *Thuja plicata* and *Chamaecyparis lawsoniana*. These are seldom used as pioneer trees except on the richest soils.

Of the broadleaved trees planted in the Commissioners' forests, oak and beech take the leading place. In the early years ash was planted on a considerable scale on the most fertile of the soils available, but experience with this species has been most discouraging, and has led to the conclusion that sites on which ash will thrive are few and far between; consequently it is not a species adapted for large-scale planting operations. Much the same remarks apply to sycamore, which also is a tree of very restricted use for pioneer planting.

The Commissioners' policy has been to plant oak (*Quercus pedunculata*=*Q. robur*) wherever the conditions appear suitable for the production of oak timber of good quality. In the earlier years the view was widely held that oak required the shelter of some faster-growing species to promote its growth, and in consequence mixtures of oak and larch were frequently formed. General experience, supported by carefully planned experimental work, has shown that this view was incorrect, and modern practice is to plant—or sow—the oak pure in blocks of moderate size. Attention to weeding has been found essential, especially in areas of strong bracken.

Beech has always played an important role in the afforestation of chalk down areas and on the limestone soils generally. Though it is a difficult tree to establish on the drier sites, the position has improved in recent years with the development of ploughing and the use of an admixture of one of the pines, either Corsican, Austrian, or Scots pine. As a shade-bearing species, thriving on a very wide range of soils, beech is playing an important part in the rehabilitation of many of the broadleaved woodlands which have been left in a derelict condition owing to the war-time fellings. Beech timber seems likely to continue in good demand, and there is good justification for extending the planting of this useful species in our British woodlands.

Although relatively little birch has been planted by the Commissioners, on many of the recently felled woodlands birch has sprung up, and these thickets, where of good quality, are being tended in the hope of producing ultimately timber suitable for plywood.

Of the less common hardwoods, increasing attention is being given to the red oak (*Quercus rubra*), both for its ornamental qualities and for its good growth on the poorer soils which are not suitable for the common oak. Attempts to establish blocks of either the common or the black walnut have mostly failed on account of damage by unseasonable frosts. The two Chilean species of *Nothofagus*, *N. procera* and *N. obliqua*, appear promising in a few localities, but seed of these trees is difficult to obtain.

Although the Commissioners have relatively little land suitable for the growth of poplar, their research staff has given much time to the problem of selecting varieties suitable for planting in this country. Resistance to poplar canker, and straight and rapid growth, are among the chief requirements. The following varieties are among those now recommended for planting: *Populus serotina* and its variety *erecta*, *P. robusta* and *P. gelvica*. The Commissioners have established stool beds of these poplars and are distributing cuttings to nurserymen and private owners to enable them to propagate the varieties on a larger scale. Quite recently a desirable strain of *Populus eugenei* has been discovered which grows particularly straight and appears to be immune to canker.

Brashing

Where conifer plantations have become established and canopy has formed, one of the first operations necessary is brashing, i.e., the clean removal of the branches from the lower part of the stems. Before the 1939 to 1945 war the general practice was to brash a large proportion, if not the whole of the trees, and during the war years complete brashing became the rule for reasons of fire precaution. It is still usual to brash completely the outer rows of plantations adjoining roads and railways, and at other points where there is special fire risk, but elsewhere, as a measure of economy, partial brashing is now the general rule. Practice varies somewhat in different forests; in some only the dominant and co-dominant trees are brashed; in others all the trees in one or more rows are cleaned up, leaving intervening rows with their branches intact. The tool almost universally used for this work is a saw with six to eight teeth to the inch.

Thinning

Thinning technique has not altered materially during the period under review. The method employed may be broadly described as approximating to "low" thinning, suppressed and sub-dominant trees being removed except where required to fill a gap. Misshapen dominant trees, the so-called "wolf" trees, are removed as early as possible, often as a cleaning operation before the first regular thinning becomes due. Species which are most likely to need this attention are: Scots pine where there has been a heavy attack by the Pine Shoot Moth, Douglas fir, Japanese larch, and beech. A three year thinning cycle is usual in the faster-growing species such as Japanese larch and Sitka spruce when planted on good ground, but much depends on the labour supply available. Where labour is short there is a general tendency to lengthen the cycle to five years, and to thin more heavily to compensate for the longer interval.

The age at which the first thinning is carried out varies greatly with the species and its rate of growth. There are some Norway spruce plantations nearing thirty years of age which are not yet ready for thinning, while at the other end of the scale there are stands of Japanese larch of under twenty years of age which have already had three thinnings—the first when the trees were only eleven years old. On moderately good sites, Japanese larch is usually ready for its first thinning at fourteen or fifteen years of age; Sitka spruce and European larch at eighteen to twenty years; Scots pine, Corsican pine and Douglas fir at about twenty years, and Norway spruce at twenty-five to thirty years. Much depends, however, on initial planting distance as well as on rate of growth.

An interesting system of combining thinning with the formation of extraction routes was developed during the recent war in some of the pine plantations in East Anglia. The method was called "line thinning" and consisted in the complete removal of every third, sixth or ninth row of trees. The one-in-three row thinning provided a relatively large volume of material, and at the same time gave increased growing space to the two remaining rows of trees. Extraction was cheap, because in this flat sandy area lorries were able to use the cleared rows to traverse the plantation. The method involves some sacrifice of trees which would otherwise carry on to form part of the final crop, but investigations showed that, provided the plantation was reasonably well stocked with good trees, the loss was not likely to be serious. It should be noted that when a plantation has been line-thinned in lieu of the usual selective first thinning, subsequent thinnings follow the normal selective

process, the cleared rows serving as extraction routes throughout the remaining history of the plantation. Line thinning in the strict sense of the term has not been widely adopted outside East Anglia.

Pruning

Apart from a wide range of experiments carried out by the Research Branch, there has been little high pruning done in coniferous stands. Until recent years most of the new plantations were too young to prune, and during the past decade the scanty labour available has of necessity been employed in overtaking arrears of maintenance, thinnings in particular. Experience to date favours climbing and the use of handsaws in preference to pruning from the ground with pole saws. The great importance of early pruning is generally recognised while, as regards optimum height to which to prune, the accepted view is that this should not as a rule much exceed twenty feet.

THE WEATHER IN RELATION TO THE FORMATION AND PROTECTION OF PLANTATIONS

All forest operations are affected to a greater or lesser extent by the weather. Each year extremes of rain, frost, snow and drought, may cause interruptions to the planned programmes, but, as the Commissioners' operations are distributed over the whole country and it is seldom that weather is uniformly adverse over Great Britain, it is unusual for serious interruptions to be more than local in extent. In general the effects of the weather in curtailing the Commissioners' programmes have been relatively slight.

Normally our climate is very favourable for the growing of trees, a statement which is equally applicable to many species whose native habitat is outside the British Isles. Winter frosts, even when particularly low temperatures occur, and normal winter snow-falls have done no widespread damage. Late or spring frosts have been more damaging, particularly to trees in the young stages, but only exceptionally has the damage resulted in more than the loss of one year's growth, though frost damage may be the forerunner of certain fungus diseases. Prolonged spring and summer droughts from time to time have caused higher losses than normal among newly planted trees, and have also affected the nursery yields of seedlings and transplants; a more serious consequence is that such droughts are liable to bring about severe fire hazards in the plantations. Gales of exceptional strength have occurred from time to time, but they have not been responsible for any very extensive damage by windthrow.

It may be said of the first fifteen years of the Commissioners' operations that the chief events arising out of the vagaries of the climate were certain spells of acute fire danger particularly in the spring and early summer months. The worst fire years of this period were in 1921, 1929, 1933 and 1934, all of which had severe spring droughts.

In the second fifteen years there were several phenomena which affected the forests and forest operations. Late frosts of particular severity occurred between the middle and the end of May, 1935, and few parts of the country escaped; the regions which suffered most severely were the south of England (excepting the south-west and part of the south coast), East Anglia and the southern half of Wales. This particular frost was the subject of a special study* which added to our knowledge of how to recognize frosty sites, and provided information on the reactions of many tree species to the frost. In

* Forestry Commission Bulletin No. 18, Spring Frosts, H.M.S.O. 2s. 0d.

this frost the most susceptible of the commoner forest species were, of the conifers—*Abies grandis*, Sitka spruce, Norway spruce, Douglas fir, Japanese larch, European larch ; of the broadleaved species—ash, sweet chestnut, oak, and beech, all of which suffered severely. Moderately resistant were sycamore, *Pinus contorta*, and Corsican pine, while the species least affected were birch, hornbeam, lime, elm and Scots pine.

Gales of considerable force have occurred from time to time, notably a north-eastern in February, 1937, which caused damage of varying intensity to plantations and woodlands throughout the country ; its destructiveness was due in part to the unusual direction from which it blew, and to the snow which came with the gale.

In January, 1940, there occurred a very unusual meteorological phenomenon, a glazed frost which affected a wide belt of country running north-west from Sussex and Hampshire through Wiltshire, Gloucestershire and Herefordshire and on to central and north Wales. This frost deposited a heavy coating of ice on the twigs and branches of the trees, many of which were bent over or broken. The damage to plantations was considerable ; some 500 acres of young plantations were damaged beyond recovery, while 1,500 acres suffered severely, and a much larger area was damaged in a lesser degree. The species which suffered most severely were Japanese larch, Douglas fir, and Sitka spruce. The results of this storm are not now very noticeable ; the badly damaged plantations were felled, and in those where the damage was not so severe the trees with bent stems and broken leaders have mostly been removed in subsequent thinnings.

Beyond singling out 1941 and 1942 as years in which particularly hard winters hampered forestry operations, and 1945 when spring frosts somewhat similar to those of 1935 occurred in April and May, little need be said of the weather up to 1946 ; but in 1947 the weather was probably as adverse as in any of the years under review ; the winter was one of great severity and prolonged snowfall, followed by a spring and summer which rank among the driest and hottest recorded ; these extremes created difficulties, and in particular gave rise in the spring and summer to an extreme and prolonged fire hazard ; this apart, the effects on the nurseries and plantations were not unduly felt. The year 1949 was also particularly dry in the late spring and summer, but again beyond causing a great fire risk the effects on the trees call for no special comment.

DISEASES AND PESTS

During the thirty years under review, the health of the great majority of the Commissioners' young plantations has been satisfactory. Minor ills to which many of our trees are heir, such as honey fungus and *Fomes*, and attacks by Pine Weevil and Pine Beetle, aphids and conifer gall-lice, have occurred from time to time and been locally or temporarily troublesome. But, by and large, most of the pine and spruce plantations, which together comprise about 75 per cent of the total area planted by the Commissioners, are free from serious pests or diseases—evidence, if such were required, of the suitability of the climate and soil of most of Great Britain, for the growth of these trees. The same statement is generally true of the plantations of Japanese larch and of the minor conifers such as Western hemlock, *Abies grandis* and Lawson cypress. Of the broadleaved species, oak and beech have as a whole suffered little from biological disorders.

There are, however, some important exceptions to the general clean bill of health. Probably the most serious of these is the peculiar die-back disease of European larch. Before the first world war European larch was generally

considered one of the most useful trees in British estate forestry. It was known that there had been failures in the past from "larch disease", but the facts had not been adequately recorded. In the earlier years of their work, the Commissioners planted a considerable amount of this species, especially on the better bracken-covered slopes in the hill country. For a time all went well, but from about 1936 onwards widespread outbreaks of a die-back type of disease have occurred. The attacks vary greatly in intensity, ranging from the complete destruction of the crop to a relatively sporadic attack from which many of the trees in time make a more or less complete recovery. The disease is very widespread, but far from universal, as there are areas in all parts of the country in which it has not made any appearance. The primary cause of the disease is still a matter of dispute, but it appears to be due to a combination of adverse factors, partly climatic—autumn and late spring frosts, and spring drought, partly due to insect attacks notably the Larch chermes (*Adelges viridis*) and the Larch Shoot Moth (*Argyresthia laevigatella*) and partly to the girdling of shoots by the larch canker fungus (*Dasyscypha*). Although none of the regional strains of larch is immune to die-back, there is evidence that the central European alpine strains are much more susceptible than either our own home-grown larch, or larch from the Sudeten hills in Czechoslovakia. As a result of the disease the Commissioners have stopped purchasing larch seed from Switzerland and northern Italy, and are restricting the further planting of this species to what can be done with plants raised from home-collected seed. The place of European larch in our silviculture is now being increasingly taken by its Japanese relative, which is immune to die-back, virtually free from canker, and as a rule faster growing than the European species.

Although in this country we are as a whole little hampered by diseases and pests, it should not be overlooked that there are certain maladies which are so virulent as to rule out more or less completely the species of trees attacked. Weymouth pine (*Pinus strobus*), for example, cannot be grown successfully in this country owing to its susceptibility to the white pine blister rust, *Peridermium strobi*. Similarly the common silver fir, *Abies pectinata*, is so liable to killing attack by *Adelges (Dreyfusia) nüsslini* that all attempts to use this productive species on a large scale have had to be abandoned.

Another disease in the same general category is the bacterial canker of poplar, to which some otherwise promising species and hybrids of poplar, e.g. *P. trichocarpa* and *P. regenerata*, are so susceptible that their use cannot be recommended. Fortunately there are some excellent varieties, such as the black Italian poplar and *Populus robusta* which are virtually immune, and which thrive admirably when planted on suitable sites.

The recent discovery in Europe of the dreaded chestnut blight disease caused by the fungus *Endothia parasitica* is now a cause for some anxiety lest it should spread to our British woodlands. Steps have been taken to prohibit the entry of *Castanea* plants into this country.

Most of the diseases and pests already mentioned are of a general character, not confined to any one locality or set of conditions. But there have been some interesting, though fortunately localised, outbreaks which deserve to be recorded. One example is the tiny needle-boring insect *Evetria purdeyi* (a near relation to the Pine Shoot Moth *Evetria buolianana*) which recently bred out in great numbers in fifteen to twenty year-old plantations of Corsican pine in Laughton Forest in Lincolnshire and Bawtry Forest in Nottinghamshire. The attack drastically reduced the current rate of growth, and appeared distinctly alarming, but it died down quickly and the plantations affected have now resumed their normal vigour of growth.

Another case is that of a common root fungus, *Fomes annosus*, which normally causes decay in the butt of many coniferous trees, but has recently adopted a different rôle, spreading from the stumps of early thinnings and causing the death of groups of Scots pine and Corsican pine on the sandy soils of Thetford Forest in East Anglia. The initial onset was rapid, and extended over a number of Compartments in different blocks of the forest, but the disease has made little progress, and few new centres of infection have been discovered.

In the west and north of the country a needle-cast fungus (*Phaeocryptopus gäumannii*) has been found commonly occurring on the needles of the Douglas fir; the disease presumably spread to this country from the continent of Europe; its attacks, combined with those of the needle-sucking bug *Adelges cooleyi*, have had the effect of reducing the growth of Douglas fir, giving the plantations a somewhat rusty appearance when in the small pole stage. In most cases, however, the plantations improve as they get older.

Within the past five or six years the attacks of the spruce aphid, *Neomyzaphis abietina*, on Sitka spruce plantations growing in the drier eastern half of the country, appear to have increased both in duration and intensity of attack. Investigation has shown that other species of aphids, among which *Neochmosis pinihabitans* and *Neochmosis vanduzeei* may be named, are often present in large numbers in addition to the common spruce aphid, and may be responsible for the greater severity of the attack. Further investigations are being actively pursued.

DAMAGE BY ANIMALS

Deer

The red, fallow and roe deer are still to be found running free in widely separated parts of England and Scotland but rarely in Wales. Although a pleasant sight in the forest, deer can be very destructive; they eat the shoots of young trees, some of which may die in consequence, or by persistent cropping they may prevent trees such as beech and ash from growing higher than the level at which they can conveniently browse. In older plantations the damage takes a different form, the deer often causing extensive wounds by stripping off portions of the stem bark with their antlers as well as with their teeth. It follows that the numbers of deer in young plantations must be strictly controlled.

In Scotland the red deer inhabit the moors of the north, west and central Highlands, and, where plantations adjoin areas they frequent, fences six to seven feet high are necessary to keep them out. In southern Scotland, red deer are found in Kirkcudbrightshire, where ultimately there will be forests of considerable extent; at present they seem to be numerous only in the vicinity of Cairn Edward Forest, but there are some round Glen Trool. In England they are frequently met with near Grizedale Forest in Furness (Lancs.), and are occasional visitors to our forests in Durham and the North Riding. The next centre is found in Somerset where the deer frequent Quantock Forest, and they are occasionally seen in Dartmoor, Haldon and Halwill Forests in Devon. The New Forest, as is well known, has always harboured red deer.

The fallow deer, which do much the same kind of damage as the red deer, appear occasionally in many of the Scottish forests, but only in the Drummond Hill district of Perthshire are they reported as numerous. They are common in many parts of England, particularly so in the Highmeadow Woods (Forest of Dean, Glos.), Mortimer Forest (Herefordshire), Quantock Forest

(Soms.), Haldon Forest (Devon), and in the New Forest. They have also been reported as numerous at Clipstone Forest in Nottinghamshire, and in some of our areas in Northamptonshire.

Roe deer are to be found in most forest areas of any extent in Scotland, and are common in England. Where they find sufficient covert, such as is provided in a very short time by young plantations, they establish themselves and increase in numbers rapidly. When numerous, this dainty creature may also cause considerable damage to young plantations, and their numbers have to be controlled.

It seems probable that deer of one or other of the common species, and also park escapes such as the Japanese deer, will find their way into most of the new forests now being created, and the local forestry staffs will have the problem of keeping their numbers under control.

Rabbits.

“The most destructive forest pest in Great Britain is undoubtedly the rabbit. Where rabbits exist, and there are few localities where they do not abound, it is impossible to raise young plantations or to practice natural regeneration. In consequence it is almost the universal practice to protect new plantations with wire netting. Rabbits, therefore, increase the cost of forestry operations from the commencement and are a powerful deterrent to good silviculture.” (Para. 449, Post-War Forest Policy (Cmd. 6447)).*

The above paragraph from the Commissioners' Report on Post-War Forest Policy states in general terms the case against the rabbit, and remains equally true to-day. A few rabbits in a newly planted area may result in the death of a large proportion of the trees, and if damaged trees recover they are usually deformed by having two or more leaders and are useless for timber.

The start of the Commission's planting operations followed close on World War I, during which the rabbit population had been severely reduced, and in many places it was then possible to plant without rabbit netting fences. In the interval between the wars the numbers of rabbits again increased, and the netting of plantations was almost universal. During the second world war the War Agricultural Executive Committees made determined efforts to reduce the stock of rabbits to safeguard field crops, and very effective reductions were made. But, except in a few areas, these efforts have not been maintained, and there is little sign of any radical improvement.

It may be of interest to mention a few districts where it is still possible to plant without rabbit netting; among these are large parts of the New Forest and Forest of Dean, some of the more industrial areas in South Wales and locally in the north of Scotland.

Squirrels.

Both red and grey squirrels can be very destructive to forest trees; red squirrels particularly favour conifers, Scots pine for choice; they eat the buds and the seeds, and also strip bark from the main shoots causing deformation and retarding height growth; the damage done in hardwood areas is almost negligible. Grey squirrels, on the other hand, inhabit broad-leaved and mixed forests, and extensive damage is caused by their habit of stripping off bark, often girdling shoots of considerable dimensions; they seem to favour sycamore, beech, ash and oak.

The red squirrels are natives and are well distributed throughout Great Britain. Some thirty to forty years ago they were very numerous, especially

* H.M.S.O. 2s. 0d.

in the North-east of Scotland where the extensive damage led to the formation of numerous squirrel clubs. Since that date the numbers have steadily declined, and at the present time they are at such a low level as to make any attempts at control superfluous.

Grey squirrels, since their introduction into this country about 1890, have spread very rapidly in England and Wales, but not to any great extent in Scotland. They were liberated at several centres in England and Scotland about the year 1905, and by 1930 were frequent in the counties round London; there was another centre in Yorkshire and a smaller one in Cheshire. In south Scotland there was apparently a liberation in the east and in the west, but the spread has not been rapid. Up till 1937 grey squirrels were not regarded as a particularly serious forest pest; possibly their numbers were few and the damage not readily noticed. They were known, however, to be destructive to orchard and fruit farms. The spread of this pest was, however, steadily proceeding, particularly westwards, and they are now abundant in a zone from Bedfordshire, through Oxfordshire, Gloucestershire and Monmouthshire, into Brecknock in Wales. They are also found in considerable numbers round the New Forest and eastwards to Arundel, and in Kent to the east of Tunbridge Wells.

At present the damage in conifer areas is not serious, but in hardwood areas the damage is such that unrelenting war must be waged against this pest. It is unlikely that the grey squirrel will be exterminated, but concerted action by farmers and foresters, and persistent shooting and destruction of their dreys, will prevent these aliens from becoming an unmitigated pest and causing serious losses to farming and forestry.

Voles

The field vole, *Microtus agrestis*, is an intermittently troublesome pest of young plantations. These rodents are normal and generally inconspicuous inhabitants of rough grazing land, but periodically their numbers increase enormously and much damage is done to ground vegetation and also to young plantations. Many factors contribute to the rise and fall of the vole population; they find very favourable conditions in young plantations because of the luxuriant cover which springs up when an area is enclosed, and grazing and burning of vegetation cease. Under this cover, screened from their natural enemies, such as birds, foxes and weasels, they may, given favourable weather conditions, multiply at a great rate, and then cause much damage to small trees by stripping them of their shoots, nibbling the bark often right round the stem, or severing the stem near the root collar and so killing the tree. All species seem liable to attack, but in some places they appear to show a preference, e.g. ash and sycamore have been gnawed more than oak, Scots pine, the spruces and larch; in another instance voles have confined their attentions to Scots pine and left spruces and larches alone.

From time to time considerable damage has been sustained in young plantations, particularly in the Cowal Peninsula of Argyll, and in the Border forests around Newcastleton. In the group of forests in the Cowal Peninsula, that is Benmore, Glen Branter, Glen Finart, and Ardgartan Forests, damage was most severe in 1926, 1929, 1932, and 1935, and sporadic outbreaks round Benmore were reported in 1937 and 1938. In the Border forests of Cardrona, Edgarhope, and Wauchope, there were sporadic outbreaks of damage from 1946 to 1948. Fortunately vole outbreaks come to an end with a surprising suddenness; in a single season the whole vole population may disappear, and it will be several years before there is any risk of a further plague. Meanwhile the conditions in the plantations are also changing, and with the spreading of the branches, the ground vegetation dies out and is no longer a harbour

for voles. Active control measures such as trapping are costly and ineffective ; reliance should rather be placed on the natural enemies of voles such as owls and weasels.

FIRE PROTECTION

There are few aspects of the Commissioners' work which have been the subject of more anxious study, or in which there have been greater developments over the past thirty years, than fire protection. In a number of respects our planting areas are peculiarly vulnerable to fire. The close net-work of roads and railways, together with the development of motor transport and mass outings from the large towns and cities in holiday seasons, form a constant source of danger, while in the more remote hill country the almost general practice of heather burning for the improvement of grazing is a prolific cause of fires spreading into the plantations from the surrounding moorland.

The Commissioners attach great importance to the education of the general public in the matter of fire prevention ; much has already been achieved by the erection of warning notices in the forests, issue of leaflets, and general publicity in the Press and on the wireless.

Publicity apart, experience has shown that the essence of effective fire protection lies in careful advance planning, the earliest possible detection of outbreaks, and prompt and well-organised fire fighting.

The need for advance planning was not at first apparent, but as the Commissioners' operations increased in size and number, it was found essential to draw up a general fire plan for each forest, prescribing the action to be taken in the event of an outbreak of fire, and defining the duties and responsibilities of the staff. In addition each forest has an annual fire plan of a more specific nature.

In the early years detection of fires was largely a matter of organising fire patrols during danger periods, augmented in some of the larger forests by look-outs posted on vantage points overlooking the forest or on wooden fire towers. In the course of time the fire tower system has been much extended and improved. The towers are equipped with telephones and special maps and instruments, enabling the observer to inform the fire control centre as to the bearing of any outbreak. In the larger forests, where there are several towers from which cross bearings can be got, the pin-pointing of a fire is a matter of only a few seconds. The higher towers of sixty feet in height and over are now being constructed of steel to a standard pattern. Although patrols are still necessary, especially where railways traverse the forest, the increasing use of fire towers has resulted in a considerable saving in man power during fire danger periods.

In recent years much attention has been given to the problem of assessing fire hazards ; the methods adopted in other countries, notably Canada and the U.S.A., have been studied and adapted to suit our local conditions. A good deal of work remains, however, to be done before a wholly satisfactory method can be adopted.

Second only in importance to the speedy detection of an outbreak, is the problem of getting a squad of men quickly to the spot. This involves careful organisation, and in the larger and more vulnerable forests special motor equipment is kept standing-by during danger periods. The new road system constructed in many of the forests during the past three years has proved a great boon by enabling lorry transport to get men quickly to the spot.

Fire lines, which are broad rides traversing the forest at intervals and kept free from inflammable vegetation, have formed part of the fire protection system in all the newly created forests. The expense of keeping these fire lines sufficiently clear has been very considerable, but latterly great improvements have been secured by the use of bulldozers and heavy ploughs drawn by crawler tractors.

It is in the actual methods of fire fighting that probably the greatest advances have been made. In the earlier years of the Commissioners' work the fire beater, whether birch, wire beater or wet sack, was the standard appliance for fire fighting. The beater is still an essential piece of equipment, but recent years have seen a great increase in the use of water applied through a jet. With the aid of water it is often possible to damp down even a fierce fire sufficiently to enable the men with the beaters to get close enough in to tackle it ; in practice many fires have been put out solely by the use of water applied before the flames had got a really strong hold.

When water was first used, it was applied from knapsack sprayers of the ordinary horticultural type, and these are still most useful items of equipment, but it was found that the necessarily limited quantities of water available were more effective when delivered at fairly high pressure. The next step was to employ light-weight motor-driven pumps, which together with a length of hose, could be carried on a motor van or lorry and manhandled to the site of the fire. In the more vulnerable areas, fully equipped fire tenders, carrying a motor pump, hose and several hundred gallons of water, are held in readiness at strategic points ; these have been used with great effect during the past few years. Static water tanks and reservoirs have been installed in many forests to replenish the hand and power driven pumps. Experiments with the use of detergents have been carried out to increase the wetting power of the water, but there are disadvantages involved, such as corrosion of the metal pumps, and it seems unlikely that detergents will come into general use.

Damage by Fire

During the thirty years ended 30th September, 1949, the number of outbreaks of fire with which the forest staff have had to deal was 14,700 ; this number includes fires on adjoining land where they threatened to cause damage to Forestry Commission property. The area of plantations burned amounted to 31,940 acres, the total damage (including the cost of extinguishing) being assessed at £612,500. Details by five-year periods are given in Table 20 below.

It will be noted from the table that 14,095 acres, nearly half the total area destroyed over the whole period, were burned during the war years 1940 to 1944. Enemy bombing, and fires attributed to our own military forces, accounted for the loss of 4,000 acres out of the 14,095 acres ; for the rest, shortage of skilled labour and supervision largely explain the abnormally heavy losses during the war. Although the number of fires was larger during the next period, 1945 to 1949, when 4,415 fire outbreaks occurred, the area of plantations burned, 4,350 acres, showed a very pronounced drop.

Bad fire years have occurred at more or less regular intervals, 1924, 1929, 1933, 1938, 1942, and 1948 standing out as years with over twenty fires per 10,000 acres of plantations at risk. These years, however, do not all correspond with those in which most damage was sustained ; there were ten years in which the area of plantations burned was above the average, the outstanding

years being 1929 with 4,575 acres, 1938 with 2,065 acres, 1941 with 3,000 acres and 1942, which was the worst year so far, in which 6,480 acres were destroyed, including 1,025 acres destroyed by enemy action and other causes directly due to the War.

During the thirty years under review, ninety-one fires causing damage in excess of £1,000 occurred in the Commissioners' forests; forty-eight of these were in England, twenty-five in Scotland and eighteen in Wales. The largest of these fires occurred at Inchnacardoch and Portclair, at Glen Hurich and at Borgie Forests in 1942, and at Kielder Forest in 1948; the individual losses were £27,000, £20,000, £18,000 and £15,000 respectively. Some forests have suffered more severely than others, and at twelve forests three or more large fires have occurred; the forests concerned were Bramshill, Cannock, Fern-down, Glen Hurich, Gwydyr, Kielder, Margam, Nevis, New Forest, Rheola, Thetford and Wareham.

The causes of all fires, as far as could be ascertained, are analysed in Table 21 below. This table gives separately those normally experienced and those attributed to the War. Of the normal causes, the greatest number of fires was due to railways (mainly sparks from engines) and comprised 53 per cent of the total; the damage done by these outbreaks, however, amounted to only 11 per cent of the assessed damage, as the danger can be more readily foreseen and guarded against than in other cases. Fires known to have been started by the general public were 13 per cent of the total number, but to this must be added most, if not all, of the fires, the causes of which are unknown, amounting to a further 15 per cent; these two heads—fires caused by the general public and those listed as unknown—amount to 28 per cent by number and 43 per cent of the total assessed damage. Fires which started on adjoining land caused damage to the extent of £153,800 and accounted for 13 per cent of the number; here again some of these are also attributable to the general public, though a considerable number were due to burning operations by farmers. Acts of incendiarism were few in number. Fires caused by employees during the course of such works as burning fire traces, clearing lop and top, etc., amounted to 2 per cent by number and 9 per cent of the loss. The damage caused by troops in training, wrecked aircraft and enemy action is given separately.

SUMMARY OF FIRES, 1920-1949

Table 20

			Number of Fires	Planted area Burnt (acres)	Damage (including cost of extinguishing) £
Total 1920-49	...	...	14,700	31,940	612,500
1920-24	...	...	220*	200*	3,000*
1925-29	...	...	970	5,570	54,000
1930-34	...	...	2,150	2,725	42,000
1935-39	...	...	2,860	5,000	86,000
1940-4	...	...	4,085	14,095	302,500
1945-49	...	...	4,415	4,350	125,000

* Records for this period incomplete.

CAUSES OF FIRES, 1920-1949

Table 21

	Number of Fires		Planted Area Burnt	Damage (including cost of extinguishing)
	Number	Per cent.	Acres	£
NORMAL CAUSES				
Railways	7,520	53	4,070	57,100
Adjoining land	1,810	13	7,740	153,800
General Public... ..	1,780	13	5,760	106,500
Commission employees	270	2	3,090	49,200
Incendiarism	240	2	990	15,100
Road Engines	170	1	500	6,700
Miscellaneous	210	1	770	14,100
Unknown	2,110	15	5,020	117,000
Total	14,110	100	27,940	519,500
WAR CAUSES				
Troops and R.A.F. ...	485	—	2,030	47,000
Enemy Action	105	—	1,970	46,000
TOTAL: ALL CAUSES ...	14,700	—	31,940	£612,500

UTILISATION OF HOME GROWN TIMBER

The Commissioners' interest in the utilisation of home grown timber arises not only from their obligation to market the produce from their own woods to the best advantage, but also from their general policy to promote good forestry.

Until the outbreak of war in 1939, the produce which the Commissioners had to sell was almost entirely confined to the output from the Crown woods transferred to them under the 1923 Act, and from the relatively small and widely scattered areas of woods from time to time acquired in the process of securing land for planting. This did, however, provide useful experience in the general problems of marketing home grown timber, and gave training to the Commissioners' staff which has subsequently been of great value.

In the early 1930's in particular, markets were depressed, and though the Commission was often able to hold off selling until suitable offers were forthcoming, the position was unsatisfactory. One development in the Forest of Dean at this time is worthy of note. The sawmill at Parkend, which was originally the property of the Commissioners, was sold in 1925 to a firm which continued to purchase the bulk of the Commission's fellings in the Forest. In 1932, mainly as a result of speculation in land and timber, this firm went into receivership. No alternative market could be found for the large fellings in the Dean, which for silvicultural reasons were necessary, so the Commissioners agreed to assist the former manager of the sawmill to restart the business. A Company was formed in March, 1933, with an authorised capital of £2,000, of which the Commissioners subscribed through a nominee £500 in preference shares, with the right to nominate one Director. The Commissioners purchased the plant and buildings from the Receiver, and leased them to the new Company until 1939, when the Company purchased the plant and buildings. From the Commissioners' point of view this experiment has proved successful and the Company continues to show good results.

So far as the general position was concerned, the Commissioners appointed in 1931 an Inter-Departmental Committee "to investigate and submit proposals for improvement in the utilisation of home grown timbers". An interim report was presented in 1933,* which drew attention to the lack of organisation in the supply and marketing of home grown timber and suggested some form of central organisation to overcome the difficulties. A National Timber Conference was then convened at which the owners of woodlands, the timber merchants and various Associations and Institutions interested in the question were represented. The eventual outcome was the setting up in 1936 of the National Home Grown Timber Council, the functions of which were not to engage in commercial transactions, but to concern itself with propaganda, economics, statistics and trade information, and also a limited amount of research other than that which would normally be undertaken by the Forest Products Research Laboratory, Princes Risborough. The Council, which was constituted a limited Company under an independent Chairman, was financed mainly by the Commissioners, the balance being contributed by the other interests represented. Some useful work was carried out, including a detailed investigation into the production of pitprops on a commercial basis, but the Council's activities ceased at the outbreak of war, and it was finally wound up in 1949.

The Commissioners also undertook a series of investigations into the uses of timber in particular industries, and reports on shipbuilding, coal-mining, turnery and box-making were published between 1934 and 1938 (see p. 147).

In June, 1939, in order to encourage thinnings of coniferous plantations and to build up a stock of pitwood, the Commissioners undertook to buy at agreed prices, at roadside, peeled poles suitable for conversion to pitprops. War broke out, however, before the scheme was taken up on any appreciable scale.

It is not proposed to discuss here the problems of utilisation of home grown timber which arose during the War. There was, of course, no longer need to search for markets, for demand greatly exceeded supply, and once again it was demonstrated that home grown timber can successfully be used for an enormous variety of purposes ranging from large lengthy baulks cut from Douglas fir for heavy construction work, to small branches of alder buckthorn, little thicker than one's fingers, for the manufacture of high grade charcoal. Once more also the country was dependent for its timber on privately-owned woodlands. Few of the plantations formed by the Commissioners were, on account of their age, able to contribute substantially. Heavy fellings were made in the old Crown woods, but over 90 per cent. of all the home grown timber came from woods which owed their origin to the foresight and skill of the private owner.

It must, however, be mentioned that at the outbreak of war two major restrictions affecting the utilisation of forest produce were imposed. Firstly, no felling was allowed without a licence issued by the Department responsible for home timber production, though there was a provision that an owner might fell up to 1,000 cubic feet per month (subsequently reduced to 250 cubic feet) for his own use. The great demand for timber did not cease with the conclusion of hostilities, but the need for conserving as much as possible of such timber as remained standing was obvious. The resolution of these conflicting claims was inevitably difficult. In 1946, arrangements were made with the Home Timber Production Department of the Board of Trade to consult the Forestry Commission before issuing licences for quantities over 50,000 cubic feet. This figure was reduced to 25,000 cubic feet

* Interim Report of the Inter-Departmental Home Grown Timber Committee, 1933.

in 1948 and to 10,000 cubic feet in 1949; and shortly after the close of the period under review (as from 1st January, 1950) responsibility for issue of all felling licences was transferred to the Commissioners. With the gradual cessation of direct operations by the Home Timber Production Department, the rate of fellings dropped, and by 1949 it became possible to make a substantial reduction in the total volume licensed for felling by the trade. In future, it is proposed to use the information which will be available from the Forestry Commission census to fix the maximum volumes which will be licensed year by year. In issuing licences, the Commissioners have regard not only to the total volume but also to the age, type, and condition of the stand. So far as practicable, fellings are confined to over-mature or poor quality stands, conserving all thriving, immature plantations.

The second restriction referred to above concerned prices, all sales being subject to maximum prices per cubic foot. These prices for the standing tree were for most categories considerably higher than those ruling before the War, and they remained substantially unchanged until 1947, when an increase of approximately 25 per cent. was made. A strong feeling developed on the part of woodland owners that even these prices were inadequate, on account of the increases which had taken place in wages and commodity prices generally, and prolonged negotiations with the Board of Trade took place to secure amendments. The outcome was the removal on 1st December, 1949, of all price control of home-grown timber. On account of the severe shortage of softwoods, which still persists, sawn home-grown softwoods are subject to control as regards use. One hardwood (ash) is similarly controlled.

During the years following the end of the war, the maximum control price for pitprops was the subject of especial criticism by private owners, and in order to encourage thinnings and to maintain production of pitprops at as high a level as possible, a thinning subsidy, to which reference has already been made in the Report (p. 35), was introduced early in 1949. Since then, the removal of control of standing timber prices has created a new situation; negotiations on the subject of pitprop prices are now proceeding.

One consequence of the shortage of sawn softwoods has been to stimulate the conversion of smaller sizes of logs than was the practice before the war. This class of material is coming forward in increasing amount from thinnings on private estates as well as from the Commissioners' plantations, and the need is now apparent for new machinery and improved technique for the efficient conversion of these small logs. A somewhat similar problem also requiring investigation is the utilisation of the inferior hardwood timber and scrub which now occupy large areas of potentially productive forest land. These are among the many problems concerning the utilisation of home-grown timber which are now arising and for which a solution is urgently necessary. As an initial step the Commissioners proceeded at the end of 1949 to set up a strong Committee to advise them on "measures designed to promote the utilisation and sale of produce from British woodlands". Any work it is decided to carry out will be entrusted to a special Utilisation Branch to be set up for the purpose at Headquarters.

Hitherto the Commissioners have done most of their thinnings with their own forest labour, but an increasing amount is now being sold standing to timber merchants. The Commissioners welcome this development and expect it to become more widespread as a result of the reduction in the volume of timber licensed for clear felling.

Other developments which call for mention are the trial of different types of chutes and wire rope-ways for extracting poles in difficult terrain; and the investigation of methods of peeling, and also of the extent to which it is economical to concentrate the manufacture of pitprops and other produce at central depots rather than to do the conversion at the ride side. (See photos Nos. 1, 5, 6, and 14.)

LABOUR, FOREST WORKERS HOLDINGS AND HOUSING

Labour

In the very early years of the Commission it was not difficult to attract workers to the forests, and the standard of worker was generally high. Much of the labour employed was, however, temporary and, the Commission's work being very largely seasonal, men were stood off each year after the planting programme had been completed. But as time went on, work in the new forests became more evenly spread over the year, until today casual labour is the exception, and seasonable fluctuation in the numbers employed is small.

Average numbers employed are given below:—

<i>Forest Year ...</i>	...	1925	1930	1935	1939	1945	1949
<i>Number employed ...</i>		2,200	3,100	3,200	4,300	4,600	12,100

It will be seen that no appreciable increase in numbers took place in the early 1930's, mainly owing to the financial crisis; the big jump between 1945 and 1949 reflects the post-war expansion.

At the outbreak of war, many forest workers were in the Territorial Army and were mobilised; many skilled men were put on to timber production work for the Home Timber Production Department, and others were called up or were attracted to the expanding war industries. The Women's Land Army and the Women's Forestry Service filled the most urgent gaps, and every other source of labour was tapped. For example, some conscientious objectors and other civilians were directed to work in the forests, and foreign nationals and prisoners-of-war were employed. In addition, considerable use was made of schoolboys, students and others at holiday camps. By such means it was possible, though with difficulty, to carry out essential maintenance work, and planting continued, on a diminishing scale, throughout the war. It was also possible to undertake a considerable nursery programme.

Since the war, the arrears of work in the forests, combined with the greatly expanded planting programme, have led to a great increase in the numbers employed. In the Forest Year 1949, the total labour force was over 12,000, or nearly three times as large as that in 1939. In the first post-war years, prisoners-of-war and European Volunteer Workers were employed in considerable numbers, but by 1947 the prisoners-of-war had returned, and the number of European Volunteer Workers who have settled down permanently is small. The Forest Workers Training Scheme set up by the Ministry of Labour helped to fill the need to some extent, but not all of the men who undertook training were suitable or willing to settle down permanently to forestry. But except in particular areas where shortages persist, it has been possible to secure enough labour to meet immediate needs. The shortage of housing has, however, made it necessary to transport men from their homes to the forests each day on a much greater scale than before; in March, 1948, for example, men were being carried to work at 44 forests in England, the total number transported being about 1,300 and the average distance 12

miles. This is a situation that can only be improved by providing more houses.

Since 1921, when the first scheme was launched, the Commissioners have from time to time been able to assist in several schemes for the relief of unemployment and for settling unemployed industrial workers on the land. In particular, comprehensive efforts were made with a considerable measure of success from 1935 onwards to absorb surplus labour from the Special Areas. The Ministry of Labour also at this time set up a number of training camps on Forestry Commission properties where work, mainly on forest roads, was provided as a means of training and rehabilitating the unemployed. The latest example was in 1946 when labour was recruited specially for forest road construction in districts where temporary unemployment arose.

So far as wages are concerned, the position of the forest worker has greatly changed. In 1919, wages were about 30s. per week. They rose gradually from 36s. to 42s. per week, until the position was regularised by the introduction in 1938 of a statutory minimum wage for all agricultural workers, including forest workers. During the war, the minimum rate rose steeply. In 1945, it was 70s. per week, and at the end of 1949 it was 94s. per week. A system of proficiency under which a Grade II worker receives 2s. 6d. per week, and a Grade I worker 5s. per week, above the statutory minimum rate, was introduced among the Commissioners' industrial staff and has worked well. The Commission also employs an increasing number of tradesmen and specialists such as tractor drivers, who are paid the appropriate rates.

The somewhat informal relationship which existed between the Commission as employers and the Trade Unions representing their workers, was regularised towards the end of 1944 by the formation of a Trade and Industrial Council on which both sides were represented. The Council first met in September, 1944, and has held regular meetings since. Its work has proved valuable and relations continue to be satisfactorily harmonious.

Forest Workers Holdings

The Acland Report of 1918 (Cmd. 8881) recommended the settlement of men on the land through a system of Forest Workers Holdings to be provided by the Commission, who would guarantee a minimum period of paid work a year. This benefited the Commission by ensuring a nucleus of steady forest workers (for whom 150 days work a year was guaranteed) while at the same time removing the disadvantage that, especially in the early years of the Commission, work could be provided for only part of the year. The Forest Workers Holding Scheme was begun as a scheme for the settlement of industrial workers on the land, but its nature gradually changed, until by 1939 it had become a means of establishing resident labour in the forests; most of the holdings themselves in fact provide only subsidiary means of subsistence, and the tenants and those members of their families who work for the Commissioners are calculated to spend over 80 per cent. of their working time on forestry work. On the whole these holdings have been well run by the tenants: when the scheme was last reviewed (in 1942-43) it was estimated that some 80 per cent. were successful, and that the livestock owned by tenants amounted in total value to £50,000, although the majority started with no capital. By 1935, 1,250 of these holdings had been established, and the number gradually increased until 1939 when there were 1,470. Construction since has been practically at a standstill. Nothing was possible during the War, and since then the Commission has concentrated on building houses rather than on laying out and equipping holdings.

Housing

The progress made in housing local supervisors and forest workers has already been briefly outlined in an earlier section of this report. Procedure has differed somewhat in the three countries, especially since 1947; prior to that year the general policy was to make the maximum use of such houses as were acquired with the land; many derelict buildings were restored and made habitable at a relatively low cost, and new houses were only built where the need for supervision and labour was most acute. The houses were erected as a rule either singly or in pairs, and only in a few cases, as in the large nurseries of Newton, near Elgin, and Tair Onen, between Cardiff and Cowbridge, were groups of as many as a dozen houses put up. The largest and most ambitious scheme undertaken in pre-war years was the erection of fifty-one Forest Workers Holdings in Kielder Forest on the Northumberland Border; thirty-two of these were erected in three groups of sixteen, ten and six houses respectively, the remainder being distributed over the forest in groups of twos and threes at strategic points.

Most of the new houses erected by the Commissioners before the war were brick-built to designs prepared by the Commissioners' estate staff; an architect was always employed in Scotland, but in England and Wales the building work was generally supervised by the Estate Officer.

In 1937, the Commissioners purchased and erected a number of Canadian cedar houses; of these some were single houses for the accommodation of foresters, but two blocks of eight houses each were put up to house forest workers, one block at Allerston Forest in Yorkshire and the other at Glasfynydd Forest in South Wales. These wooden houses have proved very satisfactory.

After the war, it was decided as a matter of Government policy that the Ministry of Works should undertake housing work for all Government Departments in England and Wales, so from 1947 onwards the Ministry has acted as agents for the Commissioners in their housing programme. In Scotland somewhat similar arrangements were made with the Scottish Special Housing Association.

New forest villages have been planned in several of the larger and more remote forests on the basis of long-term labour requirements, and a start has already been made on a number of these projects. In the Kielder group of forests in Northumberland, sites for eight villages with a total of 700 houses have been selected, and detailed plans prepared for four of these sites. Considerable progress has already been made with the first new village, which is near Kielder railway station, adjoining the group of sixteen houses built there before the second world war.

Other new forest villages now in course of construction will provide labour for the Forest of Ae in Dumfriesshire (see Photo Nos. 7 & 8) and for Wauchope Forest in Roxburghshire. The plans for Hafren Forest in Montgomery provide for eighty-three houses with a school and a village hall; twenty of the houses are now in process of building. The village of Santon Downham which lies in the centre of Thetford Forest on the borders of Norfolk and Suffolk has already been enlarged by the addition of forty-one houses out of the seventy-three required to complete the post-war scheme. (See Photo No. 9.)

Arrangements have been made with Rural District Councils in some parts of England and Wales, and with County Councils in Scotland, to build additional houses for occupation by forest workers.

Although the traditional two-storied brick-built house forms the basis of their post-war building programme, the Commissioners are also putting up prefabricated houses in considerable numbers. In England these consist partly of wooden houses of Canadian and Swedish manufacture and partly of concrete structures, but in Scotland almost all the prefabricated houses are of wood, the shells being imported from Finland and Sweden. Largely owing to the shortage of building operatives, especially in the rural areas, progress in the construction of permanent houses has been regrettably slow in Wales, but there are now signs that the position is improving.

In addition to permanent houses many temporary houses have also been erected, mostly by the conversion of huts taken from war-time camps. Although not completely up to modern standards, these houses are fitted with hot and cold water and bathrooms, and the tenants find them satisfactory. They have been erected at those places where the need for houses was most urgent, and have proved of the greatest value.

Housing progress made in the three countries during the post-war years 1947 to 1949 is shown in the two tables below, which give the position as at 30th September, 1949. Table 22 relates to permanent houses and Table 23 to temporary houses.

POST-WAR HOUSING—PERMANENT TYPES

Position at 30th September, 1949

	Number of Houses			
	Great Britain	England	Scotland	Wales
Houses completed	248	201	42	5
Work in progress on	390	34	311	45
Contracts placed but work not yet started on	148	38	110	—

POST-WAR HOUSING—TEMPORARY TYPES

Position at 30th September, 1949

	Number of Houses			
	Great Britain	England	Scotland	Wales
Houses completed	164	21	135	8
Work in progress on	27	5	21	1
Contracts placed but work not yet started on	18	12	—	6

EDUCATION

During the greater part of the period under review forestry education has centred in the main round the training of the Forest Officer and Forester grades, these corresponding roughly (as far as the State Service is concerned) with the commissioned and non-commissioned ranks of the armed forces. The adoption in 1946 of a much enlarged programme for both State and Private forestry has involved an all-round expansion in the educational field, as well as developments in new directions which are discussed in more detail in the paragraphs below.

Forest Officers

The necessary qualification for new entrants into either the home or the Colonial Forestry Service is a degree or post-graduate diploma in forestry.

In 1919 there were five Universities in this country conferring such degrees, namely Oxford, Cambridge, the University College of North Wales at Bangor, Edinburgh and Aberdeen. Cambridge University, however, closed its School of Forestry in 1933, but has continued since then to provide forestry lectures in connection with courses on agriculture and estate management. Up to the outbreak of war in 1939, 874 forestry degrees and diplomas were conferred and 75 officers (an average of between three and four per annum) were appointed to the Commissioners' service. During the war, though the Universities were able to keep their forestry departments open, the numbers of students were necessarily much reduced. In the six years 1939 to 1945 the total number of forestry degrees conferred was 108; of these graduates, sixteen were recruited to the Commissioners' service.

As soon as the war was over, the Universities took energetic steps to prepare for the rush of applicants which was bound to follow demobilisation, additional teaching staff was appointed, and in some cases premises were enlarged. Large numbers of men returning from the armed forces took advantage of the Government's Further Education and Training Scheme to study forestry, and the University Forestry Departments were quickly filled to overflowing. In the three post-war years, 1946 to 1948, 161 men graduated; of these twenty-one were appointed to the Commissioners' service, and a considerably larger number received appointments in the Colonial Forestry Service. For the greater part of the first fifteen years under review, the Universities of Aberdeen, Bangor, Cambridge and Oxford each received grants at the rate of £500 per annum towards the cost of their forestry departments. Smaller grants were also paid to the Edinburgh and East of Scotland College of Agriculture, and to King's College, Newcastle-on-Tyne, which bodies gave special courses in Forestry.

During the five years, 1935 to 1939, the total contributions from the Forestry Fund to educational institutions averaged £1,800 per annum, reduced in the war years to £1,400 per annum. In the past four years, 1946 to 1949, expenditure on educational grants has amounted to £19,380, distributed as follows: University of Aberdeen £6,233; University College of North Wales, Bangor £8,417; University of Cambridge £1,000; University of Edinburgh £3,505; King's College, Newcastle-on-Tyne £225. Payments to the University of Oxford are covered in the following section.

Imperial Forestry Institute

The Imperial Forestry Institute at Oxford was established in 1924 as a central institution for post-graduate instruction, for the training of research and other specialist officers, and for the supply of technical information on forestry. The University Professor of Forestry (then Professor R. S. Troup) was appointed Director of the Institute in addition to his duties as Professor of Forestry, and remained as its administrative head till 1936, when a separate Director (Mr. J. N. Oliphant) was appointed. This arrangement was continued till 1939, when the Institute and the School of Forestry were merged to form the Forestry Department of the University, with the present Professor of Forestry (Professor H. G. Champion) at its head. The documentation section of the Institute was merged with the Imperial (now the Commonwealth) Forestry Bureau which was established in 1938. The Institute has been attended since its inauguration in 1924 by 421 students (excluding undergraduates). These have comprised 155 post-graduates, 244 Forest Officers attending special courses, and twenty-two private students.

The contribution from the Forestry Fund from 1924 to 1939 was at the rate of about £2,000 per annum; as a result of economies effected during

the war years, there was a small reduction in the amount of the grant, which averaged £1,700 per annum for the period 1940 to 1945. In 1943 a scheme of development was drawn up, to be put into effect as soon as the war was over, the cost to be apportioned between the University of Oxford, the Forestry Commission and the Colonial Office. The scheme was approved, and the contributions made by the Commissioners have totalled £15,768 during the four years 1946 to 1949.

Forester Training Schools

When the Forestry Commission came into being there were two schools in existence for the training of foresters ; one at Parkend in the Forest of Dean and the other at Chopwell Woods near Rowlands Gill in Durham. These were insufficient, however, to meet the need for training local supervisors for the new Service, and three new schools were opened, two on private estates, at Dunkeld in Perthshire and Beaully in Inverness-shire, and one in the New Forest. Owing to changes in policy resulting from the financial depression of the early twenties, it became necessary to close the new schools and also that at Chopwell Woods and, after the Benmore estate in Argyll was acquired, instruction was confined, in 1929, to two centres only, namely, the Forest of Dean and Benmore.

During the 20 years 1919 to 1939, 427 students received their qualifying certificates ; of these 378 were appointed to the Commissioners' Service, some of the remainder went into private forestry and others into the Colonial Forestry Service.

At the outbreak of war in September, 1939, it was decided to discontinue training at both schools, most of the students going either into the fighting services or into timber production. Parkend School became a centre for training women measurers for the Timber Corps of the Women's Land Army, while Benmore was used to give six-months courses of forestry instruction to lads below military age. In 1941 both schools were re-opened for full two-year courses ; Benmore continued to function normally throughout the war, but the Parkend building was taken over by arrangement by the military in 1943, and was not released until May, 1946.

During the war years, 149 men in all passed through the two schools, the courses varying in length from six months to two years ; after their period of war service, most of these men were recruited by the Commissioners.

The need for additional training schools was clearly envisaged in the Commissioners' White Paper on Post-War Forest Policy (Cmd. 6447), and as soon as the war ended steps were taken to find new centres. These were eventually established at Lynford Hall in Thetford Forest, Norfolk, where a large mansion house was reconstructed, and at Glentress Forest in Peebleshire, where a war-time camp was converted into school premises. A third school was temporarily installed in a large house in the New Forest, but in February, 1948, this school was transferred to permanent quarters in a converted camp in Gwydyr Forest near Bettws y Coed, North Wales. Thus there are now five schools in being : Parkend and Lynford in England, Gwydyr in Wales, and Benmore and Glentress in Scotland.

Before the war Parkend had accommodation for about thirty-eight and Benmore for about thirty students, the instructing staff at each school consisting of a Forest Officer and a Forester Instructor. Since the war the school at Parkend has been enlarged to hold sixty students, the same number as in each of the three new schools that have been opened, but it has not been practicable to enlarge the school at Benmore. At the four larger schools

the instructing staff consists of two Forest Officers and two Forester Instructors. At Benmore there is one Forest Officer in charge and two Forester Instructors.

During the four years 1946 to 1949 a total of 369 men have been trained at the five schools ; of the 300 men awarded Forester Certificates, 271 have been recruited by the Commissioners, eighteen have elected to serve on private estates, and eleven have taken up posts in the Dominions and Colonies.

Short Courses for Estate Woodmen

The estate woodman plays a highly important part in private forestry. On the larger wooded estates, many of which have a long tradition of sustained forest management, the forester in charge of the woodlands is as a rule a thoroughly competent and experienced manager with an unrivalled knowledge of local conditions. But, on the small estates, supervision of the woodlands is often entrusted to an intelligent workman who has grown up on the estate and who, however efficient he may be as a forest worker, generally lacks the silvicultural and other knowledge necessary to manage the woods to the best advantage.

For such men the Commissioners have organised from time to time short courses of about three months duration, held on private estates with, in most cases, an experienced estate forester as instructor. The first series of courses was held in 1938 and 1939 on the following estates: Dartington Hall, Devon; Weasenham, Norfolk; Raby Castle, Durham; Bowhill, Selkirkshire; Darnaway, Morayshire; Langholm, Dumfriesshire. The number of woodmen taking these courses was 105.

This form of training was interrupted by the war, but the courses were resumed in 1946 and have been held since then on the Huntley Manor, Glos., Dartington Hall, Raby Castle, Bowhill and Darnaway Estates. Sixteen courses in all had been held by the end of the year under report, attended by a total of 198 men. Of these, 116 men came from private estates and 82 from the Commissioners' forests. With regard to the latter it should be observed that it is only after the requirements of private estates have been met that places on these courses are offered to men from State forests.

These courses have been well appreciated, and the thanks of the Commissioners are due to the owners of the several estates for providing facilities for the practical training of the men and for their accommodation.

Northerwood House

This house, situated on Emery Down, near Lyndhurst, Hants, in the heart of the New Forest, was generously donated to the Commissioners in 1945 by Major Herbert Aris. The gift was made on the understanding that the house would be used to promote forestry education, and it has proved a most valuable acquisition for this purpose.

Northerwood House was opened in June, 1947, when the first visitors were the leading delegates to the Fifth British Empire Forestry Conference. Since then it has been almost continuously occupied, partly by forestry students from the Universities who come to the New Forest during the vacations for practical instruction on working plans, etc., and partly for short instructional or refresher courses given to members of the Commissioners' staff and to various outside bodies. Northerwood House has also been found a convenient centre at which to hold interdepartmental and other meetings.

In the two years since it has been opened the house has been visited by thirty-seven groups of students numbering in all 700. Nineteen short courses

have been held for Commission officers, and there have been two special forestry courses for landowners and land agents, and two courses for timber merchants and their employes.

Forest Workers Training Scheme

This scheme began to operate in 1946 as part of the national scheme for giving training in civilian employment to men released from the armed forces and other forms of national service. Applicants were required to appear before a selection board, those selected being given twelve months practical training in forest work either on a private estate or on one of the Commissioners' forests.

Although the applicants were carefully chosen, of the 3,724 men who started training, only 1,297 men completed their full course. Of these, 927 men obtained employment as forest workers, 275 men entered Forester Training Schools, and 95 took up other occupations. Of the 927 forest workers, 273 found employment on private estates, the remaining 654 men being employed by the Commissioners. The Training Scheme has thus led to a substantial recruitment to the forester as well as to the forest worker classes.

At the 30th September, 1949, there were 262 men still under training, but the number of applicants is falling rapidly because the scheme is restricted to men who were called up for National Service before 31st December, 1948.

The gross expenditure up to the 30th September, 1949, has been £624,976. Receipts, represented by the value of the work done by the trainees, have amounted to £157,714.

Exhibits at Agricultural Shows

From 1922 up to the outbreak of war in 1939, forestry exhibits were regularly sent to the Royal Show in England, the Highland Show in Scotland, and the Royal Welsh Show. These activities were suspended during the war years but were resumed on a larger scale in 1947, when it was arranged that the Commissioners' exhibit would be shown at several shows each year. In 1947 the main exhibit was sent to ten shows, in 1948 to thirteen shows and in 1949 to sixteen shows. In addition exhibits were arranged locally for many of the smaller shows, mainly those of one day's duration. Technical Officers in attendance have dealt with a large number of enquiries on forestry matters from the public.

RESEARCH AND EXPERIMENT

The Commissioners have wide powers to carry out research and experimental work in forestry. The Forestry Act of 1949 empowered them to "make, or aid in making, such enquiries, experiments and research, and collect, or aid in collecting, such information as they may think important for the purpose of promoting forestry, and the teaching of forestry, and to publish or otherwise take steps to make known the results of such enquiries, experiments or research, and to disseminate such information." In accordance with those powers, the Commissioners, amongst their earliest activities, set up a Research Branch to initiate investigations into problems in forestry.

The duties of the Commissioners in respect of research on (a) timber and other forest products, and (b) the deeper underlying reactions which trees have in common with other organisms (so-called "fundamental" research) were largely determined by the reports of two Sub-Committees dealing with research by Government Departments. The first was a report issued in

1920 by the Agricultural Sub-Committee of a Cabinet Committee appointed to consider the co-ordination of research work carried out by Government Departments.

One of the recommendations made in this report was the setting up of a Forest Products Research Board to deal with research into the utilisation of timber and other forest products. This recommendation was put into effect, and research into timber in all its aspects was taken over by the Forest Products Research Laboratory under the Department of Scientific and Industrial Research. The Commissioners have kept in close touch with the development of this work, and have been represented throughout on the Forest Products Research Board of that Department.

Another recommendation of the Sub-Committee was "that for research work on other subjects in connection with forestry problems and for any fundamental research other than that directed to an immediate economic result in relation to forestry, the Forestry Commission should refer in the first instance to the appropriate authority in whom is vested the control of research upon the subject under consideration."

In practice, this recommendation led to certain difficulties but, in 1929, the policy regarding research in forestry was reviewed by the Research Co-ordination Sub-Committee of the Committee on Civil Research, which recommended that sufficient funds should be provided to enable the Commissioners to finance research of the kind referred to by the 1920 Sub-Committee. The Commissioners have in fact from time to time financed such research.

The recommendation to appoint an Advisory Committee on Forest Research was acted on, and the Committee was established in 1930. Composed of leading authorities in forestry and allied subjects, this Committee has been most helpful to the Commissioners.

The Research Branch consisted at first of a small group of officers who dealt with silviculture, the rate of growth and production of trees and timber crops, entomology and pathology and, although the staff was increased from time to time, there was little change in the general organisation of the branch between 1919 and the end of the war in 1945. It was directed by a Chief Research Officer from Headquarters in London. The silvicultural work, the major activity, was divided between two Research Officers, one stationed at the Imperial Forestry Institute, Oxford, and dealing with England and Wales, and the other stationed at Edinburgh and covering Scotland; each of these officers had a staff of Foresters and Foremen to assist him. In addition, there was an officer in charge of sample plot investigations, who covered the whole of Great Britain, while the needs of entomology and pathology were met after the first few years by appointing to the Imperial Forestry Institute an Assistant Entomologist and an Assistant Pathologist, who, though nominally on the staff of the Institute, were fully engaged on problems put before them by the Commissioners.

These officers were all engaged in work carried out directly for the Commissioners but, at the same time, a considerable body of research was being conducted at Universities and other Institutions by specialists in various subjects, these researches being financed by grants from the Forestry Fund.

The first recommendation of the Sub-Committee of 1920, that a Research Institution should be set up under the Forestry Commission to deal with problems connected with the growing crop, was not followed at the time, largely because of shortage of funds, although other reasons, such as the advisability of making full use of existing agencies and institutions, helped to sway the decision. The steady increase in the work, and the dispersal of staff

which was inevitable with the existing organisation, made it necessary in the end to secure a suitable building as a central Research Station. A convenient house was found in Alice Holt Lodge, near Farnham, on the borders of Surrey and Hampshire. This house, which was already in the Commissioners' charge, lent itself to conversion, and it had the additional great advantage of being situated in the middle of the State forest of Alice Holt, which has been under management for a considerable period.

The new Research Station was opened in 1946 and is still being developed. It houses the Chief Research Officer and all his staff, with the exception of four officers who are stationed in Edinburgh and of various Foresters and Foremen who are distributed over the country in proximity to the main centres of field experiment. The staff has been strengthened by the addition of new sections dealing with genetics and ecology; a photographic section has also been established. The work on pathology and entomology, formerly conducted at Oxford, has now been transferred to Alice Holt.

Throughout its existence, the Research Branch has maintained contact with other bodies and institutions both at home and abroad. Among these may be mentioned the Agricultural Research Council, the Agricultural Meteorological Committee, the Breckland Research Committee and the Ecological Reserves Committee. Abroad, the Research Branch has taken a full share in the activities of the International Union of Forest Research Organisations.

Expenditure on Forest Research by the Commissioners is summarised in Table 24, which gives averages for each of the six five-year periods between 1920 and 1949. Expenditure has risen from £6,897 per annum in 1920-24 to £15,900 per annum in the period 1935-39. The large post-war developments are reflected in the average annual figure of £65,304 since 1945.

AVERAGE ANNUAL EXPENDITURE OF THE RESEARCH BRANCH

Table 24

£

Five Year Period	Supervision and Overheads	Salaries and expenses of Foresters and Foremen	Stores and Labour	Grants to Institutions	Total	Percentage of Total Expenditure of Forestry Commission
1920-24 ...	1,290	4,097	891	619	6,897	2.5
1925-29 ...	1,450	3,594	3,155	834	9,033	1.4
1930-34 ...	1,234	5,187	4,276	1,451	12,148	1.7
1935-39 ...	1,682	5,821	5,130	3,267	15,900	1.8
1940-44 ...	1,000	7,125	5,363	2,083	15,571	1.4
1945-49 ...	4,435	30,826	25,092	4,951	65,304	1.5
Average 1920-49...	1,849	9,442	7,318	2,201	20,809	1.6

Silvicultural Research

From the outset the chief function of the silvicultural research staff has been to provide a solid basis for the necessarily empirical methods of the executive staff, to tackle and endeavour to provide a solution to problems as they arose in the course of the large-scale operations of the Commissioners, and when failures occurred to discover the causes and suggest remedies.

Faced as we are in this country with the need to restock and extend our forest areas mainly by planting, the success of nursery operations is of the greatest importance, and experiments were started at an early stage in which the various practices in the nursery were subjected to test. In its first seven years, the Research Branch reviewed in this way almost the whole of the nursery technique, and the results of its investigations were published in 1928 as a Forestry Commission Bulletin.*

In subsequent years the experimental study of practical methods was continued, but increasing attention was paid to improvement in yield by suitable methods of treating seed before sowing, and of covering seed in the seed bed. Methods of raising poplar and other species in the nursery were also investigated. The manurial treatment of nurseries was a problem to which increasing attention was given, but progress was slow and it became evident that the matter required more systematic investigation; accordingly in 1945 the Commissioners appointed a Sub-Committee, with Professor F. T. Brooks as Chairman, to study the problem of the nutrition of young forest trees. This Sub-Committee included Dr. A. B. Stewart of the Macaulay Institute, who for many years has advised the Commissioners on problems of nursery fertility, also Dr. E. M. Crowther of Rothamsted Experimental Station who has been largely responsible for the complicated series of experiments which have been undertaken by the Committee. The Committee's experiments have demonstrated, *inter alia*, the sensitiveness of conifer seedlings, especially Sitka spruce, to the hydrogen ion content of the soil, seedlings failing to thrive unless the soil is distinctly acid. This fact has raised, however, a new set of problems, because most of the green crops usually grown in rotation in nurseries for the purpose of humus enrichment require some lime in the soil. The Brooks Committee are also studying the effect of partial sterilisation of nursery soils by means of steam and by the use of formaldehyde; work on these lines was first started by the Commissioners' Research Officers in Scotland, who obtained dramatic results in some of the older established nurseries. The long continued researches of the late Dr. M. C. Rayner, whose recent death the Commissioners deplore, showed clearly that biological processes, mycorrhiza in particular, play an important part in the nutrition of trees. Dr. Rayner was a member of the Brooks Committee until her death, and much of the work of the Committee has been directed to investigating the reactions of seedlings to the organic compost form of manuring advocated by Dr. Rayner for biological reasons, compared with the cheaper and more easily applied method of manuring with artificial fertilisers. The problems involved are extremely complex, and time is needed for their solution.

The success of Dr. Rayner's experimental work on the use of composted hop-waste for the raising of conifer seedlings on the infertile sands at Wareham Forest, led the Commissioners' Research Officers to test the same technique on other types of soil; and small so-called heathland or old woodland nurseries were formed in different parts of the country. Treatment consisted in digging into the top four inches of worked soil composted hop waste at the rate of twenty tons per acre; the seed was then sown and covered in the usual way. The results in many cases showed a spectacular increase in the size of the seedlings produced, as compared with the growth of the same species in an average permanent nursery. It was not uncommon to obtain one-year-old seed beds of Sitka spruce in which the plants averaged over four inches in height in the composted heathland nursery, whereas the average height seldom exceeded one-and-a-half to two inches in permanent

* Forestry Commission Bulletin 11. Nursery Investigations. H.M.S.O. Out of print.

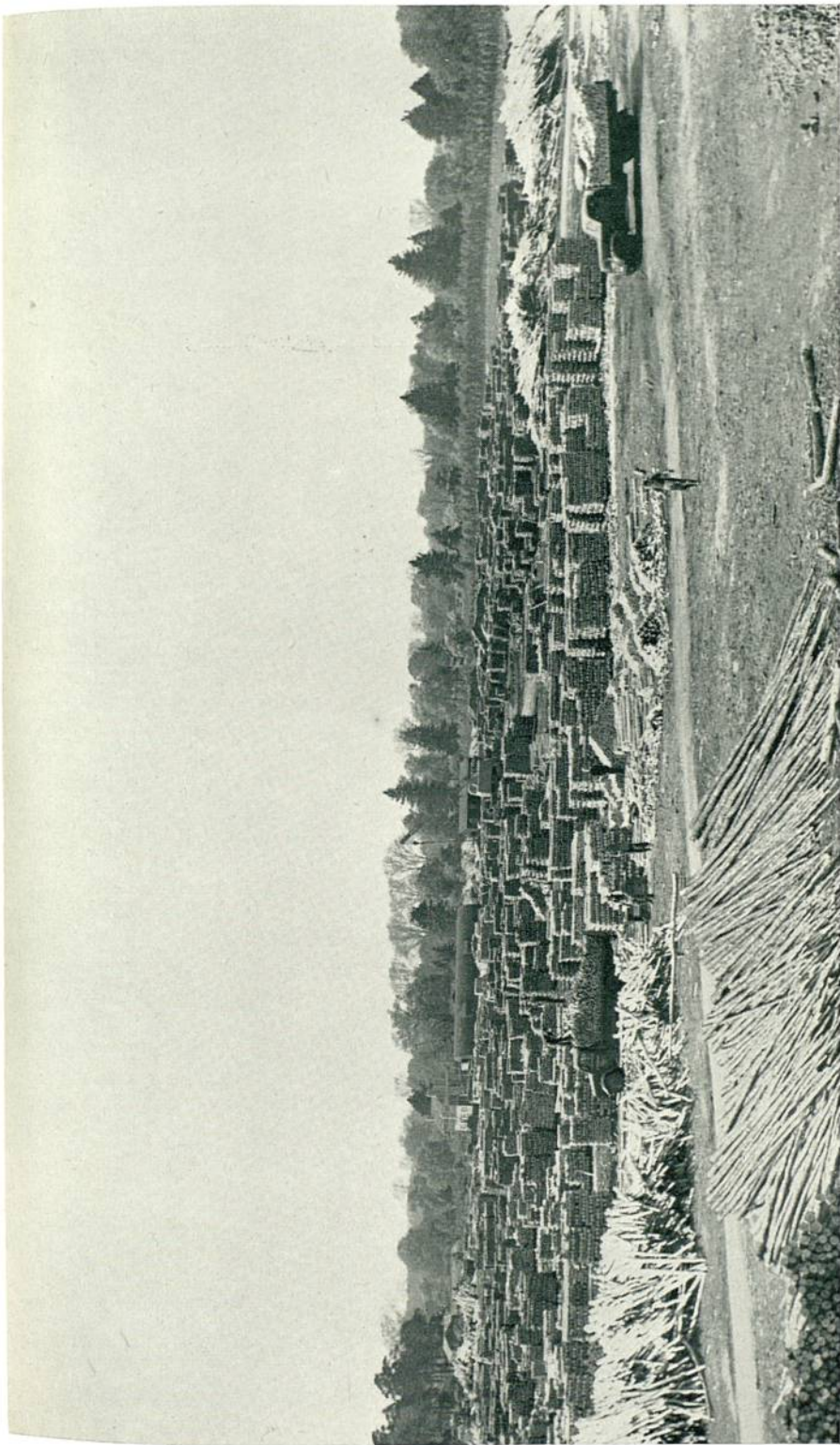


Photo 1. The Brandon Produce Depot at Thetford Forest, Suffolk



Photo 2. 1919: Derelict heathland before planting



Photo 3. 1923 Corsican pine four years after planting



Photo 4. 1934: The progress of the trees after fifteen years growth

THE DEVELOPMENT OF A CORSICAN PINE



Photo 5. 1939: After twenty years' growth, pit props are cut from the first thinning

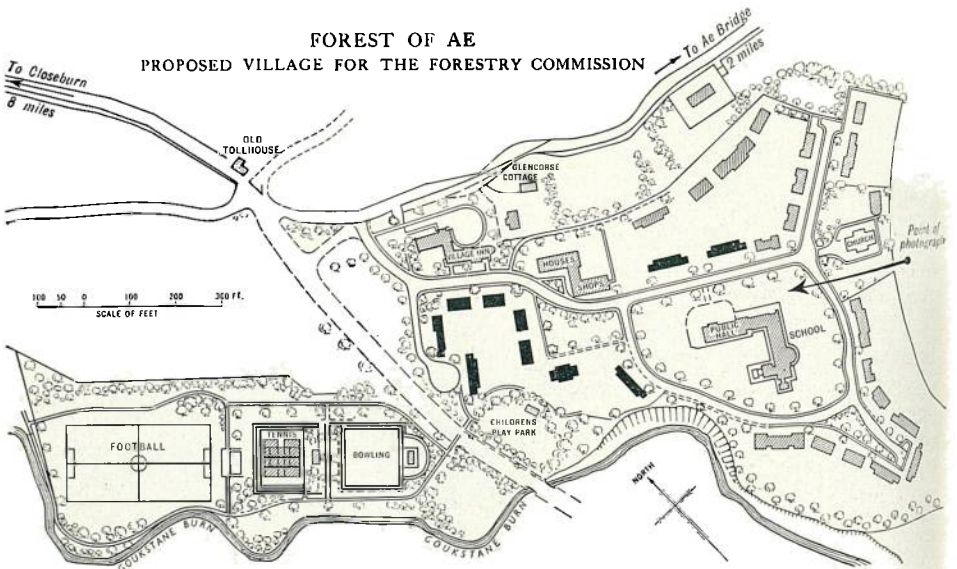


Photo 6. 1949: Thirty years after planting, the trees are still growing taller, and pitwood production continues

PLANTATION AT RENDLESHAM FOREST, SUFFOLK



Photo 7. The first houses of the new village for forest workers at the Forest of Ae, Dumfries-shire



New buildings completed or in course of erection.....

The arrow on the right shows the line along which the photograph was taken

Photo 8. Plan of the New Village at the Forest of Ae



Photo 9. Part of the new forest village at Santon Downham, Thetford Forest, Suffolk

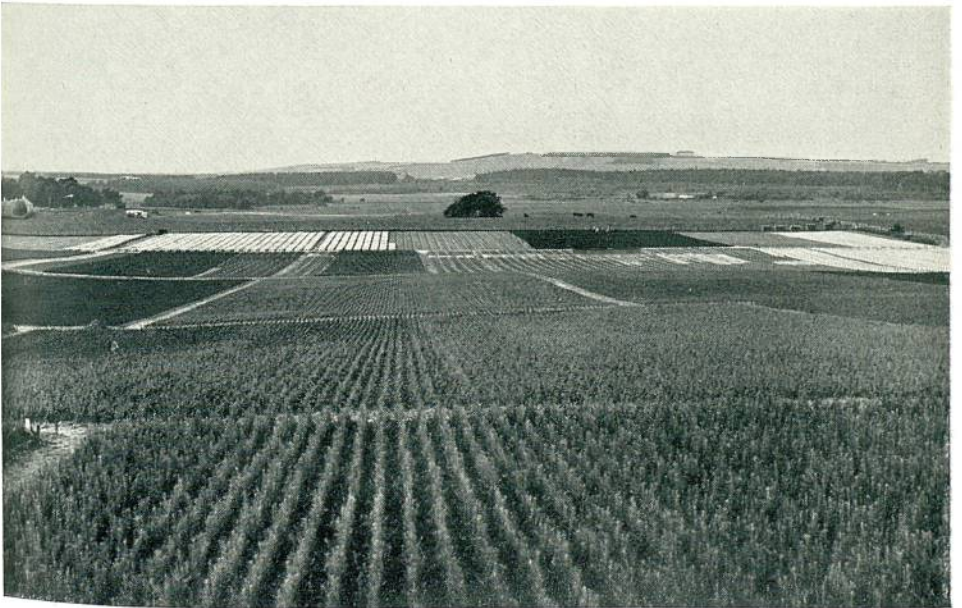


Photo 10. Newton Forest Nursery, near Elgin, Morayshire

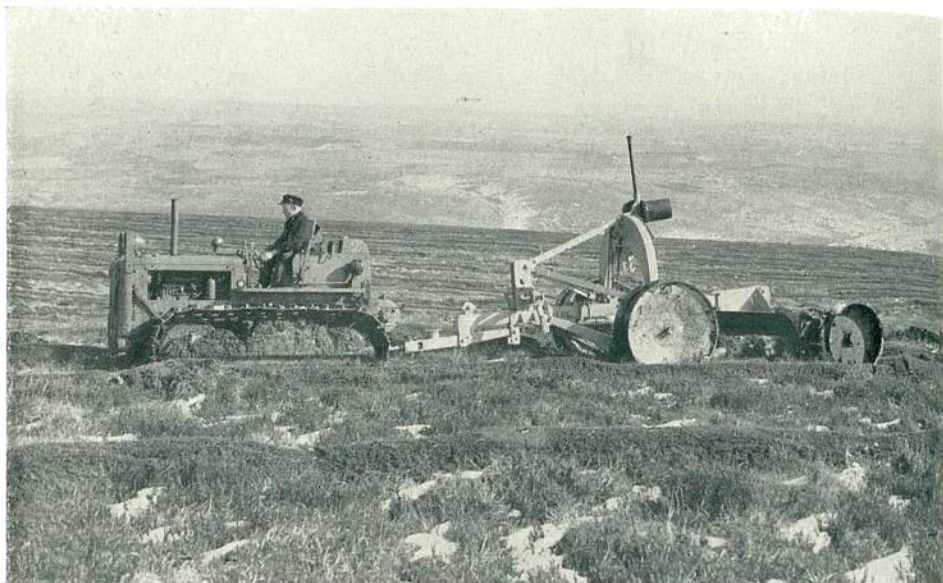


Photo 11. Ploughing moorland for afforestation at Kielder Forest, Northumberland

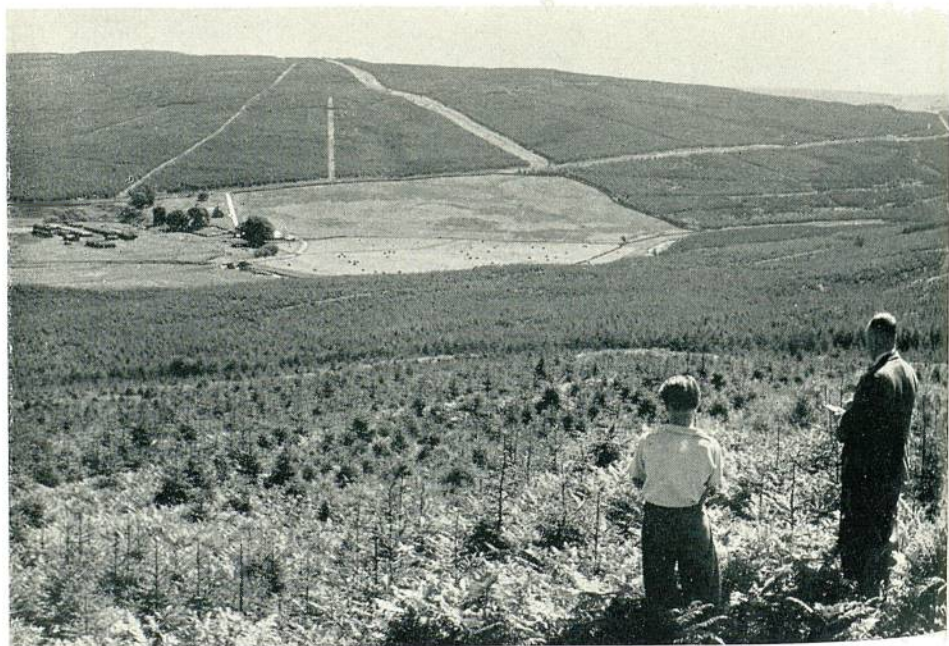


Photo 12. A Border Forest: Redesdale, Northumberland



Photo 13. Puck's Glen in the Argyll National Forest Park, showing the Bayley Balfour Memorial Rest Hut



Photo 14. Extracting Douglas fir poles, Tintern Forest, Monmouthshire

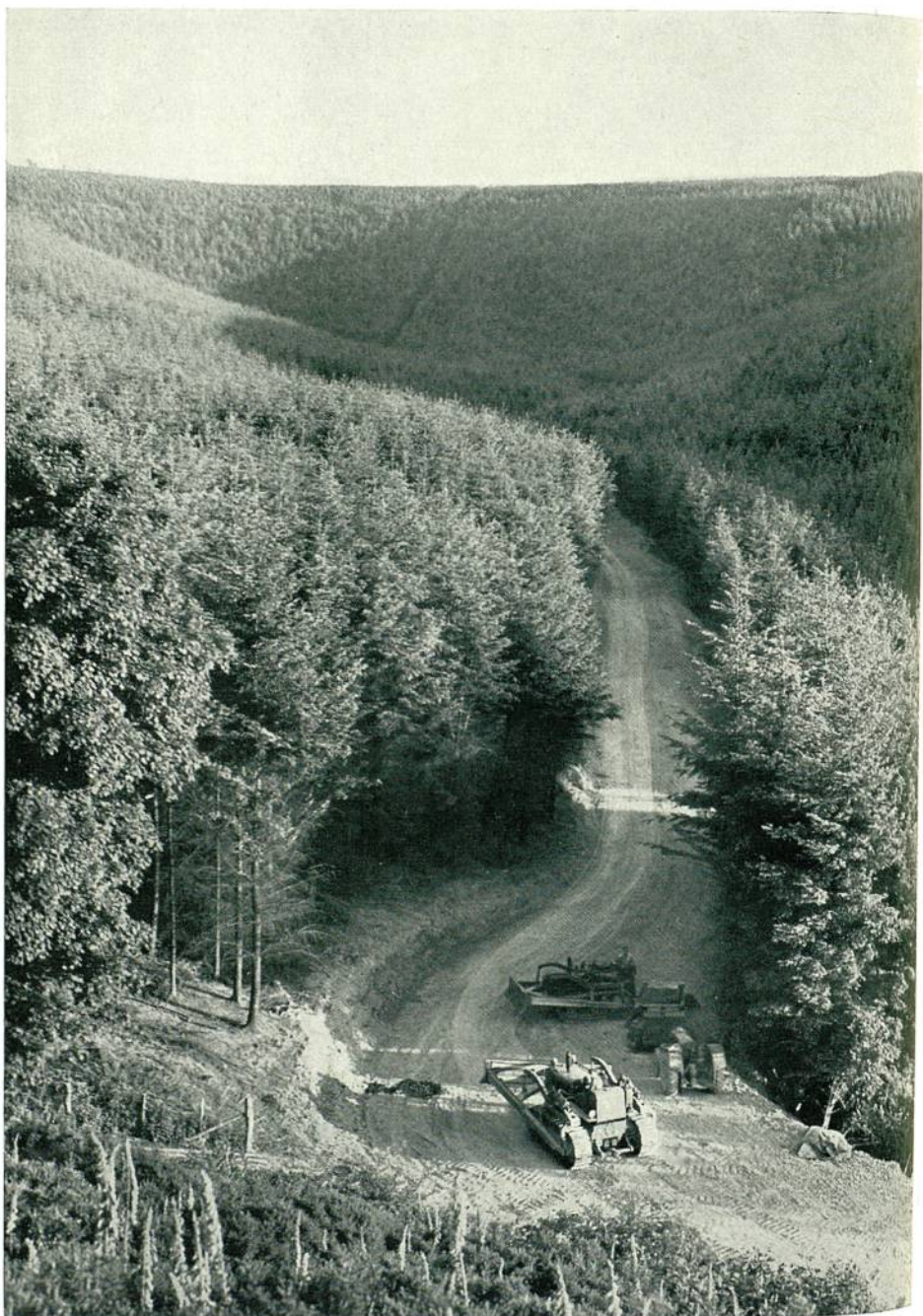


Photo 15. Bulldozers at work on a new road through Kerry Forest, Montgomery

nurseries. The strong heathland seedlings were easy to handle and line out at the end of the first year, and produced one-year plus one-year transplants which made excellent planting stock on ploughed ground.

Experimental work on these lines continued steadily during the war period ; by the end of the war success had been sufficiently consistent to justify extending the method into general practice, though at first only on a small scale.

The qualities of different geographical and racial strains of species of forest trees were recognised from the start, and provenance experiments covering all the major species have been laid down. The Commissioners have also co-operated with the International Union of Forest Research Organisations, and have taken part in the full scale provenance experiments with Scots pine, Norway spruce and European larch. Many of the earlier trials are now giving results of much importance, and they will provide a source of valuable information for decades to come.

Work on the establishment of plantations has occupied the greater part of the silviculturists' time throughout the last thirty years. Although there had been built up, during the nineteenth century, a considerable body of knowledge about a large number of tree species, most of that knowledge related to the growth of the trees on the more fertile soils, and very little of it was applicable to much of the land on which the new schemes of afforestation have to be carried out. There was therefore ample scope for experimental work. This was first directed to projects such as trials of various species on different types of land, methods of planting, preparation of the soil, etc. ; and gradually it became possible, mainly as a result of this work, to define more exactly what land was plantable, and to allocate species to different types of land to the best advantage. Early experiments on soil improvement by ploughing led to large scale trials, and eventually to the methods which are now used with success.

The most effective and economical method of restoring to useful production derelict broadleaved woodlands has been one of the earliest of the research projects. Different methods of localised planting, e.g., in widely spaced groups or strips, have been tried ; spacings within the groups and strips have been varied, different species tested, and so on. The problem, however, has proved a peculiarly difficult subject for experimental treatment, and this for two main reasons. In the first place the residual crops are extremely varied in character, and vary not only from wood to wood but also within any selected block of derelict woodland. Secondly, accurate costing—and it must be stressed that the question is largely one of economics—is difficult when working on an experimental scale. The recent war fellings have greatly increased the size of the problem and the urgency of its solution.

An important phase in the life history of a plantation occurs when the young trees close up to form canopy, and the need for thinning arises. The former Crown woods provided some useful material for investigation, but until the Commissioners' own plantations were old enough, the Research Officers had to rely on permission to establish thinning plots in suitable plantations on private estates. The Commissioners are indebted to many private owners for these facilities, which have been most freely given.

Thinning investigations are essentially of a long-term nature and, though some of the earliest thinning plots date back more than thirty years, there is still a long way to go before conclusive results can be obtained. Provisional conclusions are, that while within broad limits the intensity with which a coniferous plantation is thinned does not appreciably affect its total production, it does have a marked influence on the volume and value of the

intermediate yield, and on the diameter growth of the remaining trees. Meanwhile the comparative thinning plots have served a useful purpose as ocular demonstrations of the effect of thinning; the general success of the heavier grades of thinning has had some effect on practice, by emboldening foresters to thin more heavily, especially in plantations of some of the newer exotic species on the better sites.

Before 1914 little was known about the rate of growth of the various species in Great Britain, but during the first war, while the extensive fellings of that period were going on, much statistical information was collected on the rate of growth and the volume production of the more important coniferous species, and from these the Research Branch prepared yield tables which have served as the basis for much of the subsequent planning. Owing to lack of information at that time about the newer exotics, which are now of such importance, only provisional estimates could be made of their probable rate of growth and production; but the sample plots, permanently marked and regularly measured, which were established at an early date all over the country, have provided much additional data; revised yield tables based on those data have been published for Japanese larch, while tables for Sitka spruce, Douglas fir, and Corsican pine are in course of preparation.

Volume tables for all the principal timber trees, both broadleaved and coniferous, are being prepared, and it is expected that these will be useful for stocktaking and planning purposes. The rate of growth of broadleaved species is also being investigated, but the progress of this work is severely hampered by the scarcity of normally stocked plantations.

During the recent war, a survey of the fellings was carried out, in the course of which valuable assistance was rendered by parties organised by the Universities. It is hoped to publish an account of the work at an early date.

A certain amount of experimental work has been carried out on the high pruning of coniferous plantations, especially as to the desirability or otherwise of the removal of live branches. In this work the Commissioners have had much assistance from the staff of the Forest Products Research Laboratory. Results to date favour moderate live pruning of most of the common species, but some doubt exists in regard to the spruces, as a small number of cases have occurred where live pruning has apparently resulted in fungus attack.

The silvicultural research staff has been strengthened since the war by the appointment of a forest ecologist, and, in the year under report, of an officer to specialise on tree genetics.

Pathology and Entomology—General

The main functions assigned to the specialist officers concerned with pathological disorders and insect pests have been, firstly, to investigate known diseases and to prescribe control methods where feasible and, secondly, to hold a watching brief for new or hitherto unrecognized outbreaks wherever they may occur. These functions have involved a combination of field and laboratory work, though the latter has been inevitably limited in scope by the prior claims of the field investigations. In consequence, the Commissioners have farmed out to Universities and other institutions cases requiring intensive study. The Commissioners have received much assistance from members of the staff of the University Departments of Forestry, in particular from Mr. W. R. Day and Dr. R. N. Chrystal of Oxford, Dr. W. J. Dowson and Dr. J. Rishbeth of Cambridge, and Dr. A. E. Cameron and Dr. Malcolm Wilson of Edinburgh. The above-named have all made important contributions to knowledge on specific fungus diseases and pests.

Pathology

In the early years of the Commissioners' operations, the attention of the pathologists was at first directed more specifically to a number of the commoner diseases such as the larch canker, the needle-cast of Douglas fir caused by *Rhabdocline pseudotsugae*, and *Meria laricis* on larch and mildew on oak, both of which are controllable in the nursery by spraying. The appearance of elm disease in this country in 1927 led to an attempt at eradication by felling, but the disease was soon found to be too widespread for such measures to be practicable. Since then it has been kept under observation by means of annual surveys, and its somewhat erratic progress in different parts of the country recorded.

Other diseases investigated include the so-called Ink Disease of sweet chestnut, a heart rot of oak caused by *Stereum spadiceum*, the bacterial canker affecting certain varieties of poplar, and another bacterial disease, known as Watermark Disease, attacking the cricket-bat willow.

In recent years the increasing number of conifer plantations reaching the pole stage has resulted in local outbreaks of root disease and of stem cankers, both of which have been investigated. In some cases the root disease is definitely attributable to the fungus *Fomes annosus*, for example, in the group-dying of pine at Thetford; here the disease has been found to be associated with alkaline soil conditions. In other cases so far no pathogen has been found. Stem cankers following the brashing (low pruning) of plantations of Japanese larch and Norway spruce are under investigation at the present time.

Within the past few years a new and as yet unidentified disease of the common sycamore has appeared in the north-east of London. It was first discovered in Wanstead Park, but is now known to extend over an area of forty to fifty square miles in the environs of London; so far it has not been reported from any other part of the country. Further work on the disease is projected in the hope of finding out how it spreads.

Entomology

The beginning of the Commissioners' operations coincided with the end of the heavy fellings of the war of 1914-18, which left as a legacy large populations of Pine Shoot Beetles and Pine Weevils, and one of the first tasks of the newly-established Research Branch was to make a survey of the forest insect conditions in the British Isles, the results of which were published in 1919.* The problems created by the Pine Beetles and by the Pine Weevil were overcome largely by silvicultural means; thus the speedy removal of coniferous lop and top and dead and windblown trees cleared up most of the difficulties caused by the Pine Shoot Beetles, while Pine Weevil damage was greatly diminished by delaying planting until the pine stumps had dried out and no longer harboured the insect. Towards the end of the nineteen thirties, detailed experiments on methods of trapping were carried out by Mr. H. S. Hanson of the Farnham House Laboratory, as a result of which improved forms of traps were introduced.

Another of the pests on pine plantations, which did much damage and required intensive investigation, was the Pine Shoot Moth, *Evetria buoliana*. At one time the damage was so extensive in the large Scots pine plantations in Thetford and Rendlesham Forests in East Anglia that the future of these was seriously in doubt; but by about 1935 the attacks had diminished greatly in intensity, presumably a result of the increasing numbers of parasites and

*Forestry Commission Bulletin 2. Survey of Forest Insect Conditions in the British Isles (1919). H.M.S.O. Out of Print.

predators which ultimately gained control. Hand methods of control were the subject of much research, but proved costly and relatively ineffective.

From time to time outbreaks of *Pissodes* weevils on young Corsican pine have been investigated, but damage has seldom been extensive. Other insects which have been the subject of special study between 1919 and 1939 include *Adelges cooleyi* on Douglas fir—it was feared that the gall form of this insect might develop on Sitka spruce as it does in its native habitat in north-west America—also the group of moth larvae causing defoliation of oak, and the chafer grubs which gnaw the roots of seedlings and transplants in nurseries.

When war broke out in 1939 and heavy fellings at once became necessary in coniferous woodlands throughout the country, it was thought that such insects as the Pine Beetles and the Pine Weevil would breed up on a large scale as they had in the first world war. An intensive investigation was carried out, and it was found that there was little cause for alarm; the timber was so urgently needed and consequently so quickly removed from the felling areas that the Pine Beetle had no material in which to breed. Pine Weevils bred extensively in the felled areas, but little planting could be done during the War, and the stumps were mostly unsuitable for further breeding by the time that labour and plants were available for replanting.

When the War was over considerable quantities of unbarked logs were obtained from Germany, but examination of these logs showed that many were infested by bark beetles, among them one species—*Ips typographus*—which is the most dangerous pest of spruce forests on the Continent but is not known to have established itself in Britain. Measures were at once taken to deal with the problem; unbarked logs were diverted as far as possible to seaport and city mills, and strenuous efforts made to secure the barking of the logs in Germany. The position was closely watched, and so far there is no evidence that any of the beetles have succeeded in establishing themselves in our woodlands. A closely allied species, *Ips sexdentatus*, a pest of pine forests on the Continent, was also imported in large numbers after the War in the bark of maritime pine pitprops sent from southern France to the South Wales coalfield. In this case the beetle succeeded in establishing itself in several of the Commissioners' forests in South Wales; groups of pine trees were killed and the risk of a major epidemic was apparent. Prompt action was taken to check the spread of the insect, infested trees were felled and the bark destroyed and trap stems laid. These measures have proved successful in controlling the pest and no further damage has occurred.

Soil Research

Forest soils have not been the subject of research by the Commissioners' own staff, but have been studied at various institutions with the help of grants from the Forestry Fund. Up to 1935 this work was mainly concerned with the peat soils of the West and North of Scotland, and was carried out at the University of Aberdeen. The results were published in 1933 as Bulletin No. 15.* In 1935, the scope of the investigations was enlarged and, since then, grants have been made to the Macaulay Institute for Soil Research at Aberdeen. The work done has included the survey of two large blocks of land acquired for afforestation, and also the analysis of the soils in some of our sample plots.

*Forestry Commission Bulletin 15. Studies of Scottish Moorlands in relation to Tree Growth. H.M.S.O.

In 1946 the Commissioners decided to enlarge the scope of their research work on forest soils, and during the next two years four research students were appointed, one at the Macaulay Institute, two at the Imperial Forestry Institute, Oxford, and one at Rothamsted Experimental Station. The appointment at Rothamsted was for the purpose of studying the microfauna of forest soils, i.e. the mites and other small creatures which are believed to play an important part in converting tree leaves and needles into humus. The other appointments were made with the primary object of training men who could take their part in team work in connection with silvicultural or pathological problems which may arise in the future. For purposes of training a research project was necessary, the problem chosen being the study of the changes which take place in the soil of an afforestation area when the trees close up to form canopy. The student at the Macaulay Institute has been studying the soil changes at the sand dune forest of Culbin in Morayshire; the Oxford men are working on the moorland soils of Allerston Forest in Yorkshire.

Mycorrhiza Research

The Commissioners have given considerable attention to the intricate problem of tree mycorrhizas, structures which almost invariably form part of the root system of thriving forest trees. The earliest research was carried out in the 1920's by Dr. E. V. Laing at Aberdeen University: subsequently the late Dr. M. C. Rayner of Bedford College, London, who had already worked on the mycorrhiza of other plants, turned her attentions to the problem of tree mycorrhiza, and in 1933 began a series of researches at Wareham Forest in Dorset, aided by grants from the Commissioners. The results of part of this work were published in book form in 1944.*

Miscellaneous investigations

These have included work on the vegetative reproduction of certain trees; phenological studies in co-operation with the Agricultural Meteorological Committee; the rate of drying of pitprops felled at different seasons of the year; the technique of carrying out a Census of Woodlands; the investigation of certain pioneer plantations of outstanding interest; and Forest Gardens, i.e., study of the comparative growth of different tree species in contiguous blocks.

Mechanisation

During the course of the past thirty years the Commissioners' field officers, with the co-operation of agricultural engineering firms, have made substantial contributions to the development of heavy ploughs for preparing new ground for planting. There have also been mechanical developments in other directions, such as the use of portable wire ropeways for extracting thinnings, light two-wheeled timber carriages (sulkies) for bringing poles to a hard road (see Photo No. 14). Although considerable progress had been made in these and other directions, the Commissioners decided in 1947 that the time had come to appoint a Mechanical Development Engineer to study operations at present mechanised or partly mechanised, and to initiate improvements, also to introduce mechanisation in other operations where necessary. The field is a large one, and so far the Development Engineer has given most of his time to the study of extraction problems.

* Problems in Tree Nutrition. By M. C. Rayner and W. Neilson Jones. Faber, London 1944. 12s. 6d.

PUBLICATIONS

Since its establishment in 1919, the Forestry Commission has issued 102 publications, nearly all of which are published by H.M. Stationery Office and are available to the public through booksellers. These publications include the Commissioners' Annual Reports and special reports submitted to Parliament, and also others containing the results of original research, or providing technical information on forestry. Recent publications include illustrated booklets and guides giving information about the State forests; these are written in a non-technical style and are intended for the general public. The sales of these descriptive publications show that there is considerable interest in the details and progress of the Department's operations; they serve, moreover, to bring to public notice the danger of fire in the plantations, and the need for continual care in this respect.

The first of the Commissioners' Annual Reports covered the Forest Year ending 30th September, 1920, which was the first year of the Commissioners' operations; similar Reports have appeared annually except for a break due to the War, which prevented the publication of the Reports for the years 1939 to 1944 inclusive. A publication of outstanding importance was the Report by the Forestry Commissioners on *Post-War Forest Policy* (Cmd. 6447) which was published as a White Paper in 1943. This was followed by the Commissioners' Report on *Post-War Forest Policy—Private Woodlands*—published in 1944 (Cmd. 6500), and in 1948 by a booklet on the *Dedication of Woodlands*. Other Reports of an administrative character have dealt with the New Forest, the formation of National Forest Parks, and with the Empire Forestry Conferences.

Eighteen *Bulletins* have been issued, most of which embody the results of research into technical forest problems. Bulletin 14, however, entitled *Forestry Practice*, provides a summary of recommended methods of carrying out forest operations. Twenty-seven *Leaflets* have been published; these are mostly brief accounts of specific subjects, such as forest insect pests or fungal diseases.

Yield tables giving details of the growth and yield of the more important forest trees in Britain have been issued, also five *Guides to National Forest Parks*, and two booklets describing individual forests for the information of the general public.

A list of all publications which have been issued by the Commissioners will be found in Appendix 17, on page 147.

THE LIBRARY

The Forestry Commission Library, previously housed at the London Headquarters, was moved to the Forest Research Station at Alice Holt Lodge in 1946. During the last three years the books, now about 1,300 in number, have been reclassified and card indexed according to the Imperial Forestry Bureau's modification of Flury's decimal system, and more than 350 volumes of scientific periodicals have been bound, bringing the number of these up to about 800.

A start has been made on the important work of entering references on a card index; the cards now number about 15,000, and as this work proceeds the usefulness of the Library as a source of information will be much increased.

PUBLICITY AND PUBLIC RELATIONS

While the Commissioners have consistently striven to keep the public informed of their objectives and of the progress of their forest operations, they have found it no easy matter to get the facts clearly across to the man in the street. To assist them in this task the Commissioners appointed in 1938 a special officer to deal with publicity matters. This appointment lapsed, however, at the outbreak of war, but was renewed in 1947 when a fully experienced Information Officer was appointed. Since then much publicity work has been undertaken, including press conferences and tours of forests of special interest in various parts of the country. These tours have proved a useful means of informing representatives of the Press of the progress of some of the Commission's undertakings. The Commissioners gratefully acknowledge the assistance they have received, both from the Press and from the British Broadcasting Corporation, in keeping the public informed on forestry matters, and issuing warnings of fire danger during spells of dry weather.

Other activities of the Information Section include lectures on forestry to bodies such as Rotary and Young Farmer's Clubs, and the distribution of display material, booklets and pamphlets. In 1949 a series of panels illustrating different aspects of the Commission's work was displayed in the Library of the House of Commons.

NATIONAL FOREST PARKS

In acquiring land for afforestation the Commissioners have been obliged to take over large areas of unplanted land, mainly mountain tops too high or too exposed for tree planting. Much of this land is of high scenic value, and to meet the demand for public access to such areas the Commissioners have created, during the past fifteen years, six National Forest Parks having a total extent of 237,750 acres. Three of these Parks are in Scotland, one in Wales, one wholly in England, and the sixth (the Forest of Dean) lies partly in England and partly in Monmouthshire. Powers to regulate the admission of visitors to forest areas were taken under the Forestry Act, 1927, and for each Forest Park a short series of bye-laws has been enacted. These permit of the freest possible access consistent with the protection of plantations, particularly from fire.

The development of all the actual or potential National Forest Parks in Great Britain was originally entrusted to a small executive committee, aided by a much larger advisory committee on which many of the organisations concerned with open air activities were represented. Since 1945 control has been decentralised, and there are now four National Forest Park Committees. The three Scottish areas come under the control of one Scottish National Forest Park Committee, while each Forest Park south of the Border has its own Committee. Measures taken to encourage public access to the Forest Parks include the improvement of roads and footpaths, the provision of public camping sites, and co-operation with the Youth Hostels Associations and similar bodies in providing accommodation. Illustrated guide books (see page 147), with maps for ramblers, have been published for five of the Parks, and that for the sixth (Glen Trool) is in preparation.

The Argyll National Forest Park was the first of the series to be formed in Britain; it was established in 1935 with the co-operation of the Corporation of Glasgow, who agreed to the inclusion of their Ardgool Estate within its boundaries. It lies at the northern end of the Cowal Peninsula of Argyll, being bordered by three sea lochs—Loch Long, Loch Goil and the Holy

Loch, and includes the large stretch of fresh water, Loch Eck. The area is mountainous, rising to 3,318 feet on Ben Ime, and including the famous rock climbs of the Cobbler. Two public camping sites have been opened, one at Ardgartan and another at Arrochar; and there are seven Youth Hostels in or near the Park. At its southern end, near Dunoon, lie Puck's Glen, a noted beauty spot, and the Benmore Gardens. The total area is 58,000 acres.

Snowdonia National Forest Park, established in 1937, includes the two forests of Gwydyr and Beddgelert, which lie on either side of Snowdon and have a total area of 21,000 acres; roughly one-half of this carries plantations, the rest being high, rocky and windswept uplands. The needs of holiday makers are met by eleven Youth Hostels, as well as numerous hotels in the district; a public camping site has been opened near Beddgelert.

The Forest of Dean National Forest Park, opened in 1938, includes the Dean Forest, Highmeadow Woods and Tidenham Chase in Gloucester, and the forests of Tintern and Chepstow in the Wye Valley of Monmouthshire. Its total area of 29,000 acres covers one of the most densely wooded regions of Britain, and one of great natural beauty. A camping site has been opened at Christchurch, between Coleford and Symonds Yat.

Hardknott National Forest Park, a relatively small one, was opened in 1943, and occupies 7,250 acres of hill country in the dales of the rivers Esk and Duddon. Lying in Cumberland, in the heart of the western Lake District and close to Scafell, it has an exceptionally rugged terrain, reaching 2,960 feet above sea level at the summit of Bowfell. There is good access by the public road which crosses the Wrynose and Hardknott passes and touches on the ancient Roman fort of Hardknott; no camping sites have as yet been developed, but there are two Youth Hostels nearby.

Glen Trool National Forest Park, opened in 1947, is situated in Galloway, and with its 110,000 acres is the largest created so far. Three of its component forests—Carrick, Changue and Glen Trool, form a compact block of 92,000 acres around the Merrick (2,764 feet), the highest hill in the south of Scotland; the two other forests of Kirroughtree and Cairn Edward, occupy somewhat lower hill country between the towns of Newton Stewart and New Galloway. The region as a whole is remarkable for its distinctive scenery, features of which are the numerous lochs and rivers. Parts are somewhat difficult of access, and the opening of a camping site near Loch Trool has already led to a considerable increase in the number of visitors.

Glen More National Forest Park, which extends over 12,500 acres and was opened to the public in 1948, lies amidst the Cairngorm hills of Invernessshire; it centres on Loch Morlich, six miles from the village of Aviemore, and its highest point is the summit of Cairn Gorm, 4,084 feet above sea level. A remnant of the old Caledonian forest of Scots pine has been preserved at the lower levels, and the high tops, snowbound for much of the year, are the haunt of ptarmigan, dotterel, and snow bunting; many rare alpine plants also occur. A camping site has been opened near Glen More Lodge, where provision has also been made for the accommodation of organised parties.

THE BENMORE GARDENS

In 1925 Mr. Harry George Younger made a gift to the Forestry Commission of his estate at Benmore, near Dunoon, in Argyllshire. The greater part of its 10,200 acres is administered directly by the Commissioners, and since 1935 has been included in the Argyll National Forest Park. The gardens of Benmore House, however, have been managed since 1928 by the Younger (Benmore) Trust, set up by Mr. Younger. By arrangement with the Ministry

of Works, the gardens are controlled by the Regius Keeper of the Royal Botanic Gardens at Edinburgh, and contain a unique collection of forest trees, ornamental shrubs and flowering plants, including many kinds which thrive in the mild climate of Benmore but are rarely found elsewhere in Scotland. The collection of rhododendrons is a particularly fine one. The gardens are open to the public on payment of a small fee.

Adjoining the Benmore Gardens, and also controlled by the Trust, is Benmore House, which is used as one of the Forester Training Schools. Close by is the famous beauty spot known as Puck's Glen (Photo. 13), which was originally developed by Mr. Younger and is now maintained by the Commissioners. A large forest garden, or series of plots for the study of various timber trees growing under forest conditions, has been established near by.

THE NATIONAL PINETUM

Since 1925 the Commissioners have co-operated with the Director and staff of the Royal Botanic Gardens, Kew, in the establishment of the representative collection of coniferous trees forming the National Pinetum at Bedgebury, near Hawkhurst, in Kent. This site was chosen because it is reasonably near London but out of the smoke that adversely affects the growth of evergreen trees in Kew Gardens. The Pinetum, which is open to the public without charge, is situated on the western side of Bedgebury Forest, and stands on undulating ground bordering an ornamental lake. It is administered by a Committee which includes representatives of both Departments, and the cost of management is borne jointly by the Forestry Commission and the Ministry of Agriculture.

The object of the Pinetum is to facilitate the study of all those coniferous trees that can be grown in Britain. The collection now includes representatives of thirty-one genera and 231 species of conifers, together with a number of broadleaved trees and shrubs; it extends over sixty-four acres of ground. Despite occasional setbacks due to frost, the growth of most of the trees has proved satisfactory, and some of those planted at the outset, twenty-four years ago, have now grown into sizeable specimens. The collection is continually being extended, one of the latest additions being the interesting conifer, *Metasequoia glyptostroboides*, specimens of which have only recently been discovered in the interior of China.

Associated with, and adjoining, the Pinetum, though coming under the direct control of the Commissioners' Research Branch, is a series of "Forest Plots". This serves as a proving ground for species, both broadleaved and coniferous, which have a potential value as forest trees in Britain. At the present time, ninety-seven plots, each one quarter of an acre in extent, are carrying tree crops, ranging in age from one to twenty years. In all, thirty-two genera and eighty-one species of forest trees are represented. The plots are large enough to treat silviculturally, and some of the older ones have already been thinned, including among others the European, the Japanese and the hybrid larches, *Abies grandis*, *Picea omorika*, *Tsuga heterophylla* and *Nothofagus obliqua*. The plots also included a very representative collection of regional varieties of *Pinus nigra*, but most of these were destroyed by fire during the recent war.

BRITISH EMPIRE FORESTRY CONFERENCES

The Commissioners are empowered under the Forestry Act 1919 to make or aid in making such enquiries as they think necessary for the purpose of securing an adequate supply of timber in the United Kingdom and promoting

the production of timber in His Majesty's dominions. Their first step towards the latter object was to convene the first Forestry Conference of the British Empire, which was held in London in 1920. Subsequent Conferences took place in Canada in 1923, in Australia and New Zealand in 1928, and in South Africa in 1935; the most recent Conference, the fifth of the series, was held in Great Britain in 1947.

The Commissioners have taken a prominent part in these gatherings, and their Chairman, Lord Robinson, has had the honour of being elected Chairman of the last two Conferences.

Apart from drawing public attention to the importance of forestry in the individual countries of the Commonwealth, the Conferences have done useful work in assembling data as to the resources and utilisation of the forests, in laying down guiding principles of forest policy, exchanging information on matters of technique, and in reporting on local forest problems of importance to the country in which the Conference was being held.

The need for a concerted effort to obtain accurate information as to the extent and nature of the forest resources of the Commonwealth, was one of the chief issues discussed at the 1947 Conference held in this country. It transpired that surveys were either in progress or were projected in most of the Dominions and Colonies represented, and that in this work aerial photography was taking a leading part. Accordingly, the Conference decided to request the Commissioners to set up a Committee on Aerial Survey to act as a central clearing house for technical information. The Committee was duly appointed, and in December, 1948, Mr. C. d'A. Caldecott, a former officer of the Indian Forest Service, took up his duties as Secretary with headquarters at the Directorate of Colonial Surveys at Teddington. The large numbers of enquiries dealt with by the Committee indicate that it is serving a useful purpose.

Other Committees resulting from recommendations passed by the Fifth Conference have been set up to cover all branches of timber technology.

Preliminary work is now in hand for the Sixth British Commonwealth Forestry Conference, which will be held in Canada in 1952.

EUROPEAN COMMISSION ON FORESTRY AND FOREST PRODUCTS

Representatives of the Commissioners have attended European Conferences convened by the Food and Agriculture Organisation of the United Nations, for the exchange of information and views in the field of long-term forestry. The first of these Conferences was held at Mariánské Lázně in Czechoslovakia in 1947, and was attended by a Commissioner, Sir William Taylor; thereafter F.A.O. established a European Commission for Forestry and Forest Products.

The aim of the European Commission, which works in close liaison with the Economic Commission for Europe, is to assist member-governments to formulate and adopt co-ordinated forest policies, adjusted to the needs of Europe. The First Session of this Commission was held at Geneva in July, 1948, and was attended by delegates from nineteen countries, the French delegate, M. Dufay, Directeur-General des Eaux et Forêts, being Chairman. The United Kingdom was represented by the Director-General of the Forestry Commission and by the Director of Forestry for England, together with officers of the Foreign Office and the Board of Trade.

The Second Session was held at Geneva in September, 1949, with Mr. O. J. Sangar, Director of Forestry for England, as Chairman. Seventeen countries were represented.

The work of the European Forestry Commission has covered a wide field. Subjects to which special attention has been given include the provision of forest statistics on a standardised basis, and the collection, certification, and supply of seed. Much consideration has also been given to the special problems of the Mediterranean region. Other matters which the European Forestry Commission proposes to take up include the international control of forest pests, an investigation of logging technique, the training of forest workers, soil conservation and torrent control.

THE WORLD FORESTRY CONGRESS

The two previous Congresses had been convened by the International Institute of Agriculture and held in Rome in 1926 and Budapest in 1936. The third Congress was held in Helsinki in the summer of 1949, under the auspices of the Food and Agriculture Organisation of the United Nations. The United Kingdom delegation of eighteen members included representatives of the Forestry Commissioners, private forestry, heads of University forestry departments, and the timber trade, and was led by a Commissioner, the Earl of Radnor, who was elected a Vice-President of the Congress.

For detailed discussions the Congress divided into five sections, dealing respectively with Silviculture, Forest Surveys, Economics and Policy, Utilisation, and Forest Industries. The general findings of the Congress were incorporated in a report which was adopted at the final plenary session.

Besides calling the attention of governments to the current problems facing foresters and the timber-using industries, the Congress served a useful purpose in bringing together foresters, timber technologists and industrialists from all parts of the world.

TRIBUTE TO STAFF

It is only fitting in closing this account of the first thirty years of forestry and the State Forest Service that the Commissioners should express the hearty thanks which are due to their staff past and present. Forestry, more than most other undertakings, calls for sustained enthusiasm, patience and restraint—an unusual combination of human characteristics. The Commissioners were fortunate initially in attracting to the new Service a number of men who, in the face of discouragements as to the future of British forestry, devoted their lives and their whole energies to promoting its development. The standard of conduct thus set has been generally maintained, and there is now a well-established esprit-de-corps in the British Forest Service.

THE FOREST YEAR 1948-49

SUMMARY OF THE YEAR'S WORK, FOREST YEAR ENDED 30th SEPTEMBER, 1949

The weather during the winter and spring was generally favourable for the carrying out of forest operations, except in Wales where wet weather in the spring delayed sowings in the nurseries. The summer and autumn months were exceptionally sunny, and drought conditions which developed in England and Wales had the effect of reducing somewhat below normal the growth of seedlings and newly planted trees; in Scotland the effects of the dry weather were not felt, and good growth in both nurseries and young plantations can be reported. Throughout the country fire danger was acute for prolonged periods from the spring into the autumn.

Land Acquired.—The total area at the end of the forest year was 1,560,000 acres, as compared with 1,477,000 acres in the previous year, the increase being due to new acquisitions amounting to 83,000 acres. At the end of the year, the sub-division of the total area was 949,000 acres of "forest land", that is land already planted or to be planted, and 611,000 acres of "other land", which comprises forest nurseries, agricultural and grazing land, and other land unsuitable for planting. The areas of individual categories are given in Table 26, page 97.

The area acquired during the year was 83,000 acres, of which 53,000 acres were classed as "plantable land". The distribution of this area between the countries is as follow:—England 24,000 acres, Scotland 19,000 acres, Wales 10,000 acres. The comparable figures for the previous year were:—England 8,600 acres, Scotland 5,600 acres, Wales 15,800 acres. (See page 99.)

Forest Units.—The number of forest units formed during the year was 30; of these 12 were in England, 14 in Scotland and 4 in Wales. (See page 98.)

Forest Nurseries.—To provide the additional plants required for the planting programme, the area under nurseries was increased by 75 acres to a total of 2,233 acres. The stocks of seedlings and transplants in the nurseries amounted to 557 million; of these 403 million were seedlings and 154 million were transplants. (See page 102.)

New Plantations.—The area planted during the year was 43,886 acres. This, though 14,000 acres short of the White Paper Programme, represents an increase of 7,500 acres over the area planted in the previous year.

The plantations made during the year were distributed as follows:—England 15,286 acres, Scotland 19,817 acres, Wales 8,783 acres. (See page 100.)

Fire Protection.—Prolonged periods of fire danger occurred in most parts of the country, during which 1,094 outbreaks of fire occurred, resulting in the loss of 489 acres of plantations. Compared with the previous year, the number of outbreaks was of the same order, but the loss of plantations was very much less—489 acres as against the 1,837 acres burned in 1948. (See page 106.)

Preparation and Sales of Produce.

Thinning and Clear Fellings.—The area of plantations thinned during the year was 30,563 acres, an increase of nearly 2,000 acres compared with the previous year. The increase was almost equally divided between Scotland and Wales. The figures for the individual countries are: England 19,446 acres; Scotland 6,925 acres; Wales 4,192 acres. The area clear felled

was 847 acres, which is 130 acres more than last year ; England felled 673 acres ; Scotland 67 acres ; Wales 107 acres. (See Table 43, page 108.)

Sales of Forest Produce.—The gross income from all classes of forest produce was £1,089,888, with an expenditure under the corresponding head of account of £701,487. The figures for the previous year were: Income £905,315, Expenditure £637,370. The produce sold or used for forest purposes amounted to $7\frac{1}{2}$ million cubic feet. The major products were pitwood, round timber, telegraph, transmission, and other poles, posts and stakes, and pulpwood. (See page 107.)

Roads.—Road construction for the extraction of thinnings and other forest produce proceeded at 121 forests, a total of 232 miles of roadway being completed in the year. The road work included the necessary culverts and bridges ; seven of the bridges were between 60 and 90 foot spans. (Page 108.)

New Buildings.—Progress in the building of new houses was still slow, but considerably better than in the previous year ; 237 houses were completed, and work was in hand on a further 417 houses. (See page 109.)

Technical Supervision.—The four Directors of Forestry are assisted by 19 Conservators (one of whom is Deputy Surveyor, New Forest), 21 Divisional Officers (one of whom is Deputy Surveyor, Dean Forest), and 144 District Officers. During the year eighteen appointments to the District Officer grade were made. Local supervision at forest units was carried out by 507 Foresters and 419 Foremen, as compared with 511 Foresters and 304 Foremen in the previous year. (See page 110.)

Forest Labour.—The number of workers employed on forestry operations remained the same as last year at 11,100. The number of men engaged on road work decreased from 1,300 to 1,000. (See page 110.)

Planting on Private Estates.—Under the Interim Planting Grants Scheme, 10,959 acres of new plantations were inspected and approved during the year, including 432 acres of planting in Dedicated Woodlands. Of this area, 8,277 acres were planted during the year under review, and it is estimated that a further area still to be inspected will bring the area up to 10,000 acres. In addition, an estimated area of 3,100 acres was planted on private estates without the aid of grants, making the estimated total of private planting over 13,000 acres. (See page 110.)

The Dedication Scheme.—During the year, Dedication deeds were completed by 17 owners in respect of 12,267 acres of woodland. Plans of Operations had been approved, and deeds were in course of preparation, for a further 53 estates involving 28,922 acres of woodland. Besides these, 248 estates, with 230,000 acres of woodlands, had begun the preparation of Plans of Operations. (See page 111.)

Education.—Grants for higher education were made to the Universities of Aberdeen, Edinburgh, Oxford, Cambridge and Wales.

Five Forester Training Schools continued their work throughout the year, and 112 men completed the full course. Of these, 102 gained employment under the Commissioners, six secured posts in the Colonial Forestry Service, and four went into private forestry.

Short courses, of three months duration, were held for foresters and woodmen on three private estates.

The Universities continued to make use of Northerwood House as a centre for giving practical instruction to their students. Four courses on forestry practice were held there for landowners, estate agents, and timber merchants, in addition to ten courses for members of the Commissioners' own staff.

Under the Forest Workers Training Scheme, 412 men either completed their full year's training or entered a Forester Training School; all but 32 of them continued to work in forestry. At the end of the year, 262 men were still in training. (See page 112.)

Forestry exhibits were staged at sixteen of the principal agricultural shows.

Research and Experiment.—Research into forestry problems was continued at the Forest Research Station at Alice Holt Lodge, near Farnham. 64 new sample plots for measuring the growth of tree crops were established during the year. Experimental work on a new method of seed testing, and on the nutrition of forest trees in the nursery stages, was carried out; there was also an extension of work on the rehabilitation of derelict woodlands.

Research on poplars was continued, and 6,000 cuttings of recommended varieties were supplied to private owners and to the nursery trade. Insect pests observed causing abnormally severe damage to plantations included the aphid *Neomyzaphis abietina* on Sitka spruce, and the Large Larch Sawfly. The pathologist made special studies of a new disease of sycamore discovered near London, and of the distribution of Elm Disease. The development engineer has investigated methods of extracting thinnings from the forest by such means as wire ropeways and portable chutes.

Grants for forest research in specific fields were made to the following organisations: Aberdeen University for botanical studies; Rothamsted Experimental Station for research on soils, and also on the nutrition of trees in forest nurseries; the Macaulay Institute for Soil Research, Aberdeen, and the Imperial Forestry Institute, Oxford, for soil research; and to other investigators concerned with the study of the mycorrhiza of forest trees. (See page 113.)

Census of Woodlands.—The survey of the area of woodlands was completed, and showed that the total woodland area of Great Britain at September, 1947, was 3,448,362 acres. The total volume of timber then standing was estimated as 2,658 million cubic feet (quarter girth measure, over bark). (See page 115.)

Publications.—New publications issued during the year included two guides to National Forest Parks, the *Twenty-ninth Annual Report* of the Commissioners, and the *Proceedings of the Fifth British Empire Forestry Conference*. (See page 116.)

National Forest Parks.—The six National Forest Parks, covering 237,750 acres in all, continued to attract many visitors; greater use was made of the public camping sites than in the previous year. (See page 117.)

Finance.—The gross payments during the Forest Year amounted to £6,881,257; receipts amounted to £1,350,425. The net payments were £5,530,832 as compared with £5,552,775 in the previous year. (See page 96.)

THE NATIONAL COMMITTEES FOR ENGLAND, SCOTLAND AND WALES

The National Committees, on whom the Commissioners have devolved certain of their functions, have continued to meet at monthly intervals.

The Order made under Section 3 of the Forestry Act, 1945, whereby the members of the Committees hold office, expired on the 5th December, 1948, but the existing members were re-appointed by an Order, dated 6th December, 1948, for a term of three years. By the appointment of Mr. David Lewis to the National Committee for Wales, the membership of that Committee was brought up to the full number.

The membership of the Committees at the end of the year was as follows, the Chairman of the Forestry Commission being an ex-officio member of each Committee :—

England.—The Earl of Radnor (*Chairman*), Major Sir Richard Cotterell, Bt., Sir William Taylor, Lord Quibell, Major Charles Mitchell, The Hon. James W. Best, with Mr. E. S. J. Hinds (*Secretary*).

Scotland.—Major Sir Samuel Strang Steel, Bt. (*Chairman*), Mr. J. M. Bannerman, Mr. J. E. Hamilton, Major John Stirling of Fairburn, The Duke of Buccleuch and Queensberry, Mr. John A. Cameron, Mr. J. Veitch, with Mr. F. C. Handford (*Secretary*).

Wales.—Mr. Lloyd O. Owen (*Chairman*), Major Sir Richard Cotterell, Bt., Sir William Taylor, Mr. W. H. Vaughan, Colonel J. C. Wynne Finch, Professor R. Alun Roberts, Mr. David Lewis, with Mr. M. E. W. Mackenzie (*Secretary*).

THE REGIONAL ADVISORY COMMITTEES

Most of these Committees met twice during the year. The matters discussed have included the Dedication Scheme, co-operation in forestry between private estates, the Forest Workers Training Scheme, lectures and visits to increase public interest in forestry, prices of timber, the Thinning Grants Scheme, the management of small woodlands, and the treatment of derelict woodland areas.

The membership of the Committees at the end of the year is given below :—

ENGLAND

North West.—Capt. G. C. Wolryche-Whitmore (*Chairman*), Mr. J. V. Allen, Mr. N. G. Barraclough, Mr. P. J. B. Clive, Mr. T. H. Evans, Mr. B. W. I. Davies, Mr. J. Edwards, Mr. W. M. F. Vane, M.P., with Mr. E. Hewitt (*Secretary*).

North East.—The Rt. Hon. Lord Bolton (*Chairman*), Col. W. St. A. Warde-Aldam, Capt. J. P. Bradford, Professor R. W. Wheldon, Mr. A. Kirkup, Jr., Mr. A. M. Leitch, Mr. W. Robertson, with Mr. L. A. Chaplin (*Secretary*).

East.—Major R. G. Proby (*Chairman*), Major K. W. Brown, Mr. S. Dye, Col. A. H. Lloyd, Mr. R. W. B. Newton, Col. E. R. Pratt, Mr. D. H. Sanderson, Mr. C. H. Thompson, with Mr. G. H. Clark (*Secretary*).

South East.—Col. H. Eeles (*Chairman*), Mr. J. W. C. Agate, Lt.-Col. W. Burrell, Lord Cowdray, Mr. W. H. Pearson, Mr. A. D. C. Le Sueur, with Mr. H. W. Gulliver (*Secretary*).

South West.—Mr. G. F. Lutterell (*Chairman*), Col. C. M. Floyd, Major H. T. H. Foley, Mr. W. E. Hiley, Mr. J. R. Maer, Mr. M. Phillips Price, Professor M. Skene, with Mr. G. F. Taylor (*Secretary*).

SCOTLAND

North.—Lord Cawdor (*Chairman*), Mr. J. Armstrong, Mr. G. Brown, Brig. Gen. J. W. Fleming, Lord Lovat, Mr. A. R. Mackenzie, Dr. D. J. Macleod, Bailie D. MacPherson, with Mr. M. Nicholson (*Secretary*).

East.—Professor H. M. Steven (*Chairman*), Lord Glentanar, Sir Ian Forbes-Leith, Bt., Mr. W. Leven, Mr. Maitland Mackie, Bailie R. A. Raffan, Mr. W. Riddoch, with Mr. J. P. Lenman (*Secretary*).

South.—Lord Haddington (*Chairman*), Sir James Hunter Blair, Bt., Mr. J. C. Carson, Mr. W. P. Earsman, Mr. J. J. Patterson, Professor J. Ritchie, Mr. C. J. Cameron, with Mr. T. H. McGeorge (*Secretary*).

West.—Mr. J. Maxwell MacDonald (*Chairman*), Sir George I. Campbell, Bt., of Succoth, Mr. P. Campbell, Capt. J. Craig, Mr. T. Bruce Jones, Mr. J. Kirkwood, Mr. D. Mackay, with Mr. T. Farmer (*Secretary*).

WALES

North.—Col. G. R. D. Harrison (*Chairman*), Alderman H. T. Edwards, Mr. E. Humphrey Howard, Mr. W. Jones, Mr. R. C. Ridell, Professor T. Thomson, Col. R. J. Wordsworth, with Mr. K. Mayhew (*Secretary*).

South.—Major J. D. D. Evans (*Chairman*), Lord Merthyr, Major J. Francis, Mr. J. E. Lewis, Mr. H. A. Hyde, Mr. A. E. Gough, Mr. D. G. Badham, with Mr. W. Evans (*Secretary*).

THE FORESTRY FUND

Movements on the Forestry Fund Account from 1st October, 1945, are shown in Table 25 below:

FORESTRY FUND ACCOUNT

Table 25

£

Year ending 30th September	Balance from preceding Year	Receipts			Payments (Appendix 1)
		Total	Parliamentary Votes (3)	From Forestry Operations etc. (Appendix 1) (4)	
	(1)	(2)	(3)	(4)	(5)
1946	703,729	3,312,504	2,750,000	562,504	1,937,614
1947	2,078,619	5,516,690	4,856,000	660,690	3,871,688
1948	3,723,621	6,079,720	5,000,000	1,079,720	6,632,495
1949	3,170,846	7,245,425	5,895,000	1,350,425	6,881,257
1950	3,535,014	—	—	—	—

The balance in the Forestry Fund at 1st October, 1948, was £3,170,846. Receipts amounted to £5,895,000 from Parliamentary Votes, and to £1,350,425 from Forestry Operations, etc., making a total of £7,245,425. Payments amounted to £6,881,257, so that the balance in the Fund at 30th September, 1949, was £3,535,014.

In Appendix 1, page 119, the payments and receipts shown above are analysed by heads of account. It will be seen that payments increased by £248,762 as compared with the previous year. Receipts increased by £270,705, a rise of over 25 per cent. on the previous year's total. This was due to the increase in sales of forest produce, derived largely from the thinning of the earlier plantings which are now coming into production on a considerable scale.

Appendix 2, page 120, is a statement of expenditure and income in which amounts due to or by the Commissioners at the end of the Forest Year are brought into account; salaries and overheads shown in Columns (2) to (5) of Appendix 1 are distributed over the heads of account to which they are appropriate; income from forestry operations, education, etc., is shown separately; and adjustments are made between heads of account in respect of such items as produce used for forest purposes, transfers of land and buildings between forests and Forest Workers Holdings, and value of work done in forests by trainees and students.

In Appendices 3-9, pages 121 to 125, the expenditure and income under the heads given in Appendix 2 are analysed in greater detail; further

details of individual items of expenditure and receipts are discussed under their appropriate heads in the section of this Report dealing with the progress of work (pages 97 to 117).

PROGRESS OF WORK

Acquisition and Utilisation of Land

The total area of land acquired through the Forestry Fund and the Transfer of Woods Act, 1923, between the 29th November, 1919, and the 30th September, 1949, was 1,559,900 acres. The utilisation or intended utilisation of this land is given in Table 26 below, which shows that 949,100 acres are classed as Forest Land, comprising 614,200 acres of plantations and 334,900 acres of land still to be planted. The 334,900 acres still to be planted is well distributed between the three countries; England holds 114,100 acres, Scotland 164,600 acres and Wales 56,200 acres. The distribution is considered reasonably satisfactory having regard to the planting programmes of each country. It should be noted that much of this land is let for grazing as late as possible before it is required for planting.

UTILISATION OF LAND

Table 26

At 30th September, 1949

Thousand acres

Description	Great Britain	England	Scotland	Wales
Total Acquired	1,559·9	526·4	820·8	212·7
Forest Land: Total	949·1	394·1	395·4	159·6
Acquired Plantations	57·3	41·5	12·1	3·7
Planted by Forestry Commission	556·9	238·5	218·7	99·7
To be planted	334·9	114·1	164·6	56·2
Other Land: Total	610·8	132·3	425·4	53·1
Nurseries	2·2	1·0	·9	·3
Rough Grazing and Agricultural Land	371·1	62·7	264·8	43·6
Forest Workers' Holdings	14·1	6·6	3·3	4·2
Unplantable and Miscellaneous	223·4	62·0	156·4	5·0

Table 26 includes areas which have not, for the time being, been placed at the disposal of the Commissioners by the appropriate Minister. Table 27 which follows gives details by countries of this land, which is managed by the respective Agricultural Departments for grazing and other agricultural purposes.

LAND NOT PLACED AT THE DISPOSAL OF THE COMMISSIONERS

Table 27

At 30th September, 1949

Acres

	Great Britain	England	Scotland	Wales
Total	253,045	16,914	217,390	18,741
Forest Land	55,535	4,640	48,062	2,833
Agricultural, rough grazing and miscellaneous	197,510	12,274	169,328	15,908

FOREST UNITS

Up to the end of September, 1949, the Commissioners had established 351 forests; the numbers in each of the three countries are given in Table 28 below. The individual forests are listed by Conservancies in Appendices 13, 14 and 15 on pages 129 to 135, and appear in the maps in Appendix 16 on page 136.

FOREST UNITS, 1949

Table 28

Number

	Great Britain	England	Scotland	Wales
<i>Number of Forests</i>				
At beginning of Year	322	119	151	52
At end of Year	351	131	164	56

Thirty units were formed during the year, but one unit, Gartly Moor, formerly classed as a separate forest, is now merged into Clashindarroch Forest; the new units are as follows:—

England :—

- Abinger, Surrey.
- Bagot, Staffordshire.
- Blandford, Dorset.
- Burwell, Lincolnshire.
- Fernworthy, Devon.
- (Formerly part of Dartmoor.)
- Gaywood, Norfolk.
- Glynn, Cornwall.
- (Formerly part of Bodmin.)
- Longtown, Cumberland.
- Poorstock, Dorset.
- Shipbourne, Kent.
- York, Yorkshire.
- Stokeleigh, Somerset.

Scotland :—

- Bareagle, Wigtownshire.
- Brownmoor, Dumfries-shire.
- Clach Liath, Ross-shire.
- Corrennie, Aberdeenshire.
- Dalmacallan, Dumfries-shire.
- Delgaty, Aberdeenshire.
- Garelochhead, Dunbartonshire.
- Glen Isla, Angus.
- Kilgrammie, Ayrshire.
- Laiken, Nairn.
- Raasay, Isle of Raasay.
- Rumster, Caithness.
- Shin, Sutherland.
- Torrachilty, Ross-shire.

Wales :—

- Bechan, Montgomeryshire.
- Coed Caerdydd, Brecknock.
- Slebech, Pembrokehire.
- Towy, Brecknock and Cardiganshire.

LAND ACQUIRED TO DATE BY LEASE OR PURCHASE

The net total area in respect of which the legal formalities of acquisition had been completed by the 30th September, 1949, was 1,435,248 acres. In addition to these completed acquisitions, entry had been secured to certain other areas. For details see Table 29 below.

From Table 29 it will be noted that, of the total area acquired, 910,712 acres were classified at the time of acquisition as plantable land, of which 38 per cent. is in England, 45 per cent. in Scotland, and 17 per cent. in Wales. These percentages are the same as in the previous year, and differ only by a matter of 1 per cent. from those for 1947.

SUMMARY STATEMENT OF LAND ACQUIRED BY LEASE, OR FEU, OR PURCHASE*

Table 29 29th November, 1919 to 30th September, 1949 Acres

	Total	By Lease or Feu			By Purchase		
		Total	Plant-able†	Other	Total	Plant-able†	Other
Total:							
Great Britain ...	1,439,620	442,795	298,352	144,443	996,825	612,360	384,465
England ...	423,961	149,114	131,278	17,836	274,847	214,537	60,310
Scotland ...	808,307	230,117	117,853	112,264	578,190	289,205	288,985
Wales ...	207,352	63,564	49,221	14,343	143,788	108,618	35,170
Acquisitions completed:							
Great Britain ...	1,435,248	440,200	295,904	144,296	995,048	610,826	384,222
England ...	421,237	146,519	128,830	17,689	274,718	214,408	60,310
Scotland ...	806,659	230,117	117,853	112,264	576,542	287,800	288,742
Wales ...	207,352	63,564	49,221	14,343	143,788	108,618	35,170
Entry Secured:							
Great Britain ...	4,372	2,595	2,448	147	1,777	1,534	243
England ...	2,724	2,595	2,448	147	129	129	—
Scotland ...	1,648	—	—	—	1,648	1,405	243
Wales ...	—	—	—	—	—	—	—

* Excluding Crown Woods amounting to 120,000 acres (of which some 60,000 acres are plantable) transferred to the Commissioners under the Forestry (Transfer of Woods) Orders in Council.

† Including planted land.

ACQUISITION OF LAND DURING THE YEAR

The total area of land acquired during the year amounted to 82,813 acres, of which 67,932 acres were purchased and 14,881 acres were leased ; disposals amounted to 143 acres.

Of the total acquired during the year, 52,749 acres were classified as plantable ; this comprised 34,134 acres of bare land, 16,874 acres of land previously under a tree crop, and 1,741 acres of standing woods. The areas acquired respectively by lease or feu, and by purchase, during the past three years are given in Table 30 below.

ACQUISITION OF PLANTABLE LAND

Table 30 Years ended 30th September Acres

	Total	By Lease or Feu	By Purchase
1947 ...	22,322	13,016	9,306
1948 ...	29,945	14,465	15,480
1949 ...	52,749	13,628	39,121

The expenditure during the current year on the acquisition of land was £262,234 (Appendix 3, Col. 5, page 121). Of this sum £224,153 was in respect of the purchase of land, including standing timber and buildings,

£36,808 was on rents and feu duties, and £1,273 was on the redemption of tithes. It should be noted that the expenditure on the acquisition of land cannot be directly related to the area of 82,813 acres acquired during the year, since that area includes some land to which entry has been secured, but in respect of which contracts have not been completed.

Cultural Operations

Cultural operations include works carried out in the making of plantations, that is preparatory work such as fencing, clearing of ground, ploughing and draining, the actual planting, the maintenance of existing plantations, and their protection against damage by fire and other causes. Nursery operations also come under this head. Expenditure amounted to £2,070,139—an increase of £102,227 over the corresponding amount for last year (Appendix 3, col. 6, page 121). The details of expenditure are given in Appendix 4, from which it will be seen that the major part of the increase has been on planting and the preparatory work thereto.

PLANTATIONS

The areas of the plantations made during the year are given in Table 31 below.

AREAS PLANTED AND UNDERPLANTED

Table 31

In year ended 30th September, 1949

Acres

Country or Conservancy	Planted	Under-planted	Country or Conservancy	Planted	Under-planted
GREAT BRITAIN ...	43,886	397			
ENGLAND: Total ...	15,286	294	SCOTLAND: Total ...	19,817	87
Conservancy:			Conservancy:		
North West ...	3,238	—	North ...	4,258	14
North East ...	5,739	57	East ...	6,013	63
East ...	2,028	165	South ...	5,909	—
South East ...	1,463	—	West ...	3,637	10
South West ...	1,763	12	WALES: Total ...	8,783	16
New Forest ...	594	12	Conservancy:		
Dean Forest ...	461	48	North ...	4,716	9
			South ...	4,067	7

The area planted during the year amounted to 43,886 acres, including 150 acres of natural regeneration. In addition to the above, 397 acres were under-planted, i.e., young trees were introduced under the shelter of an older crop. The contributions made by the three countries to the newly planted area were: England 15,286 acres (35 per cent.), Scotland 19,817 acres (45 per cent.), Wales 8,783 acres (20 per cent.).

Details of the areas planted at individual forests will be found in Appendices 13 to 15, which are summarised by Conservancies in Appendix 12 (pages 129 to 135).

Table 32 below analyses the area planted during the year so as to show the acreage under conifer and broadleaved species respectively, and there is a further breakdown as between afforestation, i.e., the planting of bare land, and replanting, which denotes the planting up of land formerly under a tree crop.

It will be noted that of the total area of 43,886 acres, 41,164 acres (94 per cent.) are under conifers and 2,722 acres (6 per cent.) under broadleaved species. The greater part of the broadleaved planting (2,471 out of the 2,722 acres) was carried out in England.

The subdivision into afforestation and replanting indicates that 30,864 acres (70 per cent.) were afforested and 13,022 acres (30 per cent.) replanted. The latter area includes the replanting of 870 acres of plantations destroyed by fire.

SUMMARY OF PLANTATIONS MADE

Table 32

In year ended 30 September 1949

Acres

	Great Britain	England	Scotland	Wales
TOTAL PLANTED:				
All species	43,886	15,286	19,817	8,783
Conifers	41,164	12,815	19,772	8,577
Broadleaved	2,722	2,471	45	206
AFFORESTED:				
All species	30,864	8,692	15,046	7,126
Conifers	30,275	8,149	15,027	7,099
Broadleaved	589	543	19	27
RE-PLANTED:				
All species	13,022	6,594	4,771	1,657
Conifers	10,889	4,666	4,745	1,478
Broadleaved	2,133	1,928	26	179

The maintenance of plantations formed in previous years was given due attention, and "beating up", that is the replacing of failures in the two and three year old and older plantations, was carried out where necessary.

The number of plants used during the year in making plantations and beating up totalled 83 million. The main species used were:—Spruces (Norway and Sitka) 58 per cent., pines (Scots and Corsican) 26 per cent., larches (European and Japanese) 5 per cent., Douglas fir and other conifers 4 per cent.; broadleaved species, chiefly beech and oak, 7 per cent. For further details of the species used see Appendices 10 and 11, pages 126 to 128.

Expenditure

The expanding programme to which the Commissioners are working resulted in considerably increased expenditure on preparatory work and planting during the year. The cost under this head amounted to £672,502, an increase of £86,370 compared with the previous year. Maintenance expenditure on the other hand at £611,185 shows a decrease of £22,982 (see Appendix 4, page 122).

Planting Progress to Date

The total area planted by the Commissioners from 1920 to 30th September, 1949, was 586,000 acres; this, however, has been reduced by losses from fire, fellings, and other causes, to the present actual total of 556,900 acres. The rate at which the planting has been carried out since 1920 is shown in Table 33 below.

PLANTATIONS MADE, 1920-1949

Table 33

Years ended 30 September

Acres

	Total	Afforested	Re-planted
Total, 1920-1949	586,000	426,272	159,728
1920-29	138,271	101,976	36,295
1930-39	230,607	174,428	56,179
1940-45	100,028	71,732	28,296
1946	10,448	5,884	4,564
1947	26,356	17,456	8,900
1948	36,404	23,932	12,472
1949	43,886	30,864	13,022

From the foregoing table it may be observed that of the total of 586,000 acres planted by the Commissioners to the 30th September, 1949, 426,272 acres were afforested and 159,728 acres were replanted; this latter figure includes 15,906 acres replanted after damage by fire.

The total area planted to date may be further analysed as follows:—

	<i>Total</i> (acres)	<i>Conifers</i> (acres)	<i>Broadleaved</i> (acres)
Total Planted ...	586,000	542,118	43,882
Afforested	426,272	410,867	15,405
Replanted	159,728	131,251	28,477

NURSERIES

During the year under review the area of land devoted to the raising of young trees for planting operations increased by 75 acres to a total of 2,233 acres.

Expenditure amounted to £518,117, an increase of £19,655 over the previous year (see Appendix 4, page 122).

Area.—Nursery areas are treated on a rotation of cropping; of the 2,233 acres of nursery land 21 per cent. was under seedbeds, 30 per cent. under transplant lines, and 31 per cent. was fallowed or under green crops. Details of the use of nursery areas in each Conservancy are given in Table 34 below.

USE OF NURSERY AREAS

Table 34

At 30 September 1949

Acres

	Total	Seedbeds	Trans-plant Lines	Fallow and Green Crops	Other
GREAT BRITAIN	2,233	475	660	701	397
<i>Percentage of total area ...</i>	<i>100</i>	<i>21</i>	<i>30</i>	<i>31</i>	<i>18</i>
ENGLAND: Total	1,013	213	311	300	189
Conservancy:					
North West	230	24	62	78	66
North East	226	56	81	43	46
East	183	29	70	63	21
South East	107	36	31	26	14
South West	111	31	31	26	23
New Forest	112	21	24	54	13
Dean Forest	44	16	12	10	6
SCOTLAND: Total	870	172	237	327	134
Conservancy:					
North	248	53	53	110	32
East	209	39	63	69	38
South	174	42	59	46	27
West	239	38	62	102	37
WALES: Total	350	90	112	74	74
Conservancy:					
North	155	51	45	28	31
South	195	39	67	46	43

Seed supply.—The amount of conifer seed sown in the Commissioners' nurseries was 15,904 lb., which is slightly less than the amount for the previous year. There was, however, an increase from 57,073 lb. of broad-leaved seeds in 1948, to 242,873 lb. in the year under report; oak and beech sowings together accounted for 240,146 lb. The amounts of seed sown in the past three years are compared in Table 35 below.

SEED SOWN IN NURSERIES

Table 35 Years ended 30 September lb.

	1947	1948	1949
TOTAL SEED SOWN			
Great Britain	147,675	73,427	258,777
England	130,583	53,177	216,631
Scotland	12,273	11,836	15,671
Wales	4,819	8,414	26,475
CONIFEROUS SEED			
Great Britain	15,852	16,354	15,904
England	7,656	6,043	4,711
Scotland	6,482	7,255	7,612
Wales	1,714	3,056	3,581
BROADLEAVED SEED			
Great Britain	131,823	57,073	242,873
England	122,927	47,134	211,920
Scotland	5,791	4,581	8,059
Wales	3,105	5,358	22,894

Sources of seed.—The seed required for the raising of stocks of forest trees is obtained partly from abroad from trees growing in suitable localities, and partly from collections made from trees in the Commissioners' forests and also on private estates. A summary of the amounts of seed imported from abroad, collected from home woods, and disposed of by sales to the nursery trade and also to private woodland owners is given in Table 36 below.

SUMMARY OF IMPORTS, HOME COLLECTION AND SALES OF SEED
IN 1948 AND 1949

Table 36 Year ended 30 September lb.

Description	1948	1949
Imports:		
Total	22,323	39,951
Coniferous	20,217	13,800
Broadleaved	2,106	26,151
Home Collected:		
Total	99,978	369,161
Coniferous	16,656	3,929
Broadleaved	83,322	365,232
Sales:		
Total	3,652	25,691
Coniferous	3,168	5,351
Broadleaved	484	20,340

Imported Seed.—In the year under review 13,800 lb. of conifer seed were imported, a drop of 6,400 lb. on the previous year's total; this reduction was due chiefly to a partial failure of the Sitka spruce crop in British

Columbia. On the other hand seed of Japanese larch and *Pinus contorta* was more plentiful. For the second year in succession no Douglas fir seed was procurable from British Columbia, but fortunately a limited supply was available from the State of Washington in the U.S.A.

Imports of seeds of broadleaved species totalled 26,151 lb., of which 6,560 lb. were red oak, a species to which we have perhaps given too little attention in the past. The purchases of beech and pedunculate oak were made with a view to comparative tests with plants raised from seed collected in British woodlands. Details of quantities purchased and sources of origin are given in Table 37 below.

IMPORTED SEED

Table 37

Year ended 30th September, 1949

Description	Quantity	Value	Origin
TOTAL OF ALL SPECIES	lb. 39,951	£ 23,168	
CONIFEROUS:			
Total ...	13,800	22,113	—
Corsican pine ...	1,972	2,846	Corsica.
Corsican pine ...	4	Gift	Italy
Japanese larch ...	5,891	6,871	Japan
Douglas fir ...	76	350	Denmark
Douglas fir ...	1,565	5,713	Washington, U.S.A.
Norway spruce ...	1,094	616	Germany
Sitka spruce ...	478	1,380	Denmark
Sitka spruce ...	1,100	1,961	British Columbia, Canada
Sitka spruce ...	200	450	Washington, U.S.A.
Thuja plicata ...	100	130	Canada
Pinus contorta ...	496	724	British Columbia, Canada
Abies grandis ...	676	743	Washington, U.S.A.
Abies nobilis... ..	53	45	Denmark
Sequoia sempervirens	30	46	California, U.S.A.
Picea omorika ...	11	178	Germany
Pinus montana ...	10	3	Denmark
Cryptomeria japonica	10	7	Japan
Other conifers ...	34	50	Various
BROADLEAVED:			
Total ...	26,151	1,055	—
Beech ...	6,560	461	Holland
Oak (Pedunculate) ...	11,813	371	Holland
Oak (Pedunculate) ...	1,204	45	Normandy, France
Oak (Red) ...	6,560	173	Holland
Other Hardwoods ...	14	5	Various

Home-collected seed.—The data are set out in Tables 38 and 39 below.

Conifers.—With the exception of the virtual failure of Corsican pine, 1949 was a fairly good year for cone collection, and there were substantial increases in the quantities of Douglas fir, Japanese larch and Norway spruce cones gathered. Scots pine cones were also plentiful, but collection was reduced owing to the large amount of seed in store as a result of the bumper crop of the previous year.

Broadleaved species.—The winter of 1948-49 will long be remembered for its abundant mast of beech and oak. Over 80,000 lb. of beech seed were collected, the largest quantity for many years; there was also an unusually heavy crop of acorns, advantage of which was taken to collect over 120 tons of seed. The storage of such large quantities of seed presented some

difficulties, but special precautions were taken during the winter months and most of the seed kept in good condition for sowing in the spring of 1949.

HOME COLLECTION OF CONIFER SEED

Table 38 Year ended 30th September, 1949

	Cones collected				Cones Kilned	Seed extracted
	Total	England	Scotland	Wales		
	Bushels				Bushels	lb.
Total ...	4,914	1,826	2,129	959	4,607	3,929
Scots Pine ...	1,698	815	850	33	1,718	820
Corsican Pine ...	122	107	6	9	100	85
European Larch ...	174	59	96	19	246	191
Japanese Larch ...	767	93	452	222	638	470
Douglas Fir ...	416	326	42	48	425	110
Norway Spruce ...	115	95	3	17	135	71
Other Conifers ...	1,622	331	680	611	1,345	2,182

HOME COLLECTION OF BROADLEAVED SEED

Table 39 Year ended 30 September 1949 lb.

	Total	England	Scotland	Wales
Total ...	365,232	345,552	3,417	16,263
Ash ...	60	4	—	56
Beech ...	80,101	78,543	519	1,039
Oak ...	280,698	263,472	2,606	14,620
Sycamore ...	477	189	150	138
Sweet Chestnut ...	737	709	—	28
Other Broadleaved Trees ...	3,159	2,635	142	382

Sales of seed.—By agreement with the nursery trade and with private woodland owners, the Commissioners have continued to import the main supplies of seed of Douglas fir, Sitka spruce, Japanese larch and Corsican pine required for private as well as for State planting, and during the current year it has been possible to meet all requirements. There was a certain demand also for oak and beech seed which the Commissioners were able to meet. The amount of seed sold was:—

	Total lb.	Trade lb.	Private Owners lb.
Conifer seed ...	5,351	4,932	419
Broadleaved seed	20,340	19,603	737

Stocks of transplants and seedlings.—At the end of the forest year the stocks of forest trees in the nurseries amounted to 154 million transplants and 403 million seedlings. Compared with the previous year this shows an increase of 10 million transplants, and a decrease of 14 million seedlings.

Comparative figures for the past three years, subdivided into coniferous and broadleaved trees, are given in Table 40 below.

STOCKS OF TRANSPLANTS AND SEEDLINGS

Table 40	At 30th September		Thousands of Plants
	1947	1948	1949
TOTAL TRANSPLANTS			
Great Britain	118,694	143,770	154,329
England	46,864	62,296	64,814
Scotland	54,342	59,819	66,186
Wales	17,488	21,655	23,329
CONIFEROUS			
Total, Great Britain ...	108,290	134,961	148,398
England	37,346	54,351	59,455
Scotland	53,736	59,330	65,997
Wales	17,208	21,280	22,946
BROADLEAVED			
Total, Great Britain ...	10,404	8,809	5,931
England	9,518	7,945	5,359
Scotland	606	489	189
Wales	280	375	383
TOTAL SEEDLINGS			
Great Britain	337,831	416,732	402,559
England	157,139	120,294	121,290
Scotland	138,531	221,120	219,358
Wales	42,161	75,318	61,911
CONIFEROUS			
Total, Great Britain ...	322,593	410,442	364,922
England	142,750	115,462	90,060
Scotland	138,008	220,117	217,036
Wales	41,835	74,863	57,826
BROADLEAVED			
Total, Great Britain ...	15,238	6,290	37,637
England	14,389	4,832	31,230
Scotland	523	1,003	2,322
Wales	326	455	4,085

Forest Protection

The work of forest protection falls under two heads—protection against fire and protection against damage by animals, insects and fungus pests. The cost of these operations, which increased by a little over £19,000 compared with the previous year, amounted to £268,335. The increase is shared almost equally between the two heads and is accounted for partly by the high fire hazard which prevailed from late spring well into the autumn, and partly by increased expenditure on the control of injurious animals and insects. The amounts spent on protection in previous years are shown in Appendix 4, column 5, page 122.

FOREST FIRES

In general, the spring, summer and autumn months were remarkably dry and fine, resulting in prolonged fire danger periods during which look-outs and fire fighters were kept in a constant state of readiness. Table 41 below gives a comparison of the number and extent of fires over the past five years; from this table it will be seen that, while there were almost as many fires in 1949 as in the previous year, the damage was very much less. One thousand

and ninety-four fires occurred on or near Forestry Commission property during the year ; of these some 90 per cent. were extinguished before damage had been caused, but those which did penetrate into, or started in, the plantations caused a loss of 489 acres of plantations valued at £22,000 including cost of extinguishing. It is worthy of note that the four largest fires, which burned areas of 170, 48, 44, and 40 acres respectively, were responsible for over 60 per cent. of the whole area lost.

NUMBER AND EXTENT OF FOREST FIRES, 1945-1949

Table 41 Years ended 30th September

	Number of Fires	Area Burned (acres)	Assessed Damage £ thousand
1945	630	276	7·0
1946	803	1,104	26·0
1947	701	645	25·0
1948	1,189	1,837	45·0
1949	1,094	489	22·0

CAUSES OF FOREST FIRES

Table 42 Year ended 30th September 1949

	Number of Fires	Area Burned (acres)
Total	1,094	489
Railways	750	40
Adjoining Land	144	38
General Public	89	311
Commission Employees	16	23
Road Engines	2	—
Miscellaneous	22	11
Unknown	71	66

Table 42 above analyses the causes of the forest fires which occurred during the year. Fires originating from railways were again responsible for the greatest number of outbreaks, accounting for 60 per cent. of the total number of fires, but for only 8 per cent. of the damage. Outbreaks of fire attributed to the general public caused the greatest loss, amounting to 311 acres out of the total of 489 acres burned. On the whole, considering the exceptionally prolonged period of dry weather, our losses were light.

Preparation and Sale of Produce

THINNINGS AND CLEAR FELLINGS

As in the previous year the greater part of the produce disposed of was obtained from thinnings made in the younger plantations. The area over which thinnings took place was 30,563 acres as compared with 28,590 acres in the previous year. Although most of the thinnings have been felled and extracted by the local forest staff, 1,826 acres of thinnings were sold standing to timber merchants. The total area clear felled amounted to 847 acres. Details

of the acreage thinned and felled in each Conservancy are given in Table 43 below.

AREAS THINNED AND FELLED

Table 43

Year ended 30th September, 1949

Acres

	Thinned	Felled		Thinned	Felled
GREAT BRITAIN, Total	30,563	847	SCOTLAND: Total ...	6,925	67
ENGLAND: Total ...	19,446	673	Conservancy:		
Conservancy:			North ...	1,734	3
North West ...	2,228	158	East ...	2,833	41
North East ...	1,079	42	South ...	1,296	10
East ...	8,251	135	West ...	1,062	13
South East ...	856	191	WALES: Total ...	4,192	107
South West ...	2,303	47	Conservancy:		
New Forest ...	3,283	74	North ...	2,442	—
Dean Forest ...	1,446	26	South ...	1,750	107

The produce sold or used for forest purposes during the year was 7½ million cubic feet; the major product was pitwood and nearly 3 million cubic feet were prepared and sent direct to the mines; this does not cover all the pitwood originating from the State forests as further quantities reach the mines from timber, poles and standing thinnings sold to merchants.

Other produce from the State forests include round timber, posts and stakes, material for pulping, telegraph and transmission and other poles, and firewood. Small quantities of oak bark for tanning were also harvested.

Expenditure on the preparation of produce was £701,487, and the income, including sales of plants, amounted to £1,089,888 (Appendix 3, cols. 7 and 15, page 121).

Roads

As explained in the Commissioners' Annual Report for the preceding year, the separate Engineering Branch which had been set up in the winter of 1946-47 was merged into the general organisation of the Commission in April, 1948. In the accounts for the forest years 1947 and 1948 all expenditure of the Engineering Branch, including cost of machinery, camps, and salaries and overheads was shown under a separate head—Engineering (see Appendix 5, page 122), and during these years the road expenditure charged to Forestry Operations related only to work carried out by the forest staff, in general without special equipment.

In the accounts for the present year all expenditure and income relating to road construction has been charged to Forestry Operations; this accounts for the increase in road expenditure of £104,832 in 1948 to £539,656 in the present year, as shown in Appendix 3, Col. 8, on page 121.

This rearrangement also explains increases in other sub-heads such as Overhead Charges, Supervision, Stores and Miscellaneous, as shown in Appendix 3, Cols. 2, 3, 4, 10 and 11. Receipts from roadworkers for board and lodging at camps are now credited to Forestry Operations and included in Col. 16 of Appendix 3.

The number of men employed on forest road work at the end of September, 1949, was 1,000. As will be seen from Table 44 below, 232 miles of road were completed and, at the end of the year, work was proceeding at 121 forests (Photo 15). The road work carried out during the year included the necessary bridges and culverts, seven of the bridges erected being between sixty and

ninety foot spans. The lengths of road completed and under construction in each of the three countries are given below.

FOREST ROADS

Table 44 Year ended 30th September, 1949

	Length of Road (Miles)				Number of Forests at which work was proceeding
	Completed		Under Construction		
	All weather	Fair weather	All weather	Fair weather	
GREAT BRITAIN, Total	162	70	53	15	121
England	77	43	34	6	38
Scotland	61	17	11	6	59
Wales	24	10	8	3	24

Holdings and Estate Management

The Estate staff have been occupied with the management of the considerable number of tenancies included in the Commissioners' estates, details of which are given in Table 45 below :—

TENANCIES

Table 45 Year ended 30th September, 1949

Description	Great Britain	England	Scotland	Wales
Forest Workers Holdings	1,487	708	409	370
Other Tenancies: TOTAL	6,457	3,362	2,273	822
Agricultural Holdings:				
Under £20 per annum	1,320	452	512	356
Over £20 per annum	575	213	172	190
Foresters Houses	305	112	157	36
Cottages	1,147	640	477	30
Residential and Sporting	737	332	336	69
Easements, Permissions, Minerals, etc. ...	2,196	1,613	442	141
Site Rents and Feus	177	—	177	—

There has been little change in the number of Forest Workers Holdings during the year ; these now total 1,487 of which 708 are in England, 409 in Scotland and 370 in Wales. Details of expenditure and income are given in Appendix 6, page 123. Other tenancies of all descriptions have increased from 6,159 at the end of 1948 to 6,457 in the year under report ; this increase is spread fairly uniformly over the several categories listed. The number of houses, including foresters houses and cottages, rose by 254—from 1,198 to 1,452—during the year. New houses completed during the year totalled 237, of which 161 were erected in England, 67 in Scotland and 9 in Wales. At the end of the year under review 417 houses were in process of construction.

Expenditure on new buildings amounted to £708,545 and on building repairs to £54,050. The income from rents and royalties amounted to £108,414 (see Appendix 3, Columns 9 and 14, page 121).

Technical Supervision

There are no changes to report in Headquarters and Directorate appointments. The Directors of Forestry were assisted by 19 Conservators (one of whom is Deputy Surveyor, New Forest), 21 Divisional Officers (one of whom is Deputy Surveyor, Forest of Dean), and 144 District Officers. Eighteen appointments to the District Officer grade were made, but four officers in this grade left the service during the year and four promotions were made.

The local supervision of the work in the forests is carried out by Foresters and Foremen, most of whom have been recruited from men who have passed through one of the Forester Training Schools. The numbers in these grades at the 30th September, 1949, were:—Foresters 507 and Foremen 419.

Labour Employed in State Forests

The number of men, women and boys employed on forestry operations at the 30th September, 1949, was 11,100; the number of men on road work was 1,000. The numbers at the corresponding date in 1948 was 11,100 and 1,300 respectively.

Private Forestry

Payment of Planting Grants, under the Interim Grants Scheme, amounted during the year to £74,280. Advances totalling £681 were also made to the Liverpool Corporation in connection with a proceeds-sharing scheme at Lake Vyrnwy.

The salaries and expenses of the staff employed in advisory and agency work, and in connection with Grant Schemes and Dedication Schemes, totalled £42,007, including overhead charges.

Total expenditure during the year under the head of Private Forestry thus amounted to £116,968.

PLANTING

During the year 697 planting schemes were inspected, covering a total area of 10,959* acres, of which 8,277 acres were planted in the year under report; the balance of 2,682 acres was planted mostly in 1948, though a small number of the schemes dated as far back as 1946. The full area planted under the Grant Schemes in 1949 will not be known definitely until all the schemes have been inspected, but it is likely to amount to at least 10,000 acres.

Table 46 gives details by countries of the schemes inspected during the year, and of the corresponding areas of plantations formed. It will be noted that while most of the planting in Scotland and Wales is with coniferous species, in England more than half the area planted was under mixed conifers and broadleaves or pure broadleaved species.

The Commissioners are aware that a substantial amount of planting has been carried out on certain estates without the aid of planting grants; the extent of such planting is not accurately known, but from estimates supplied by the Commissioners' Private Woodland Officers it is believed that about 3,100 acres were so planted. This area, added to the figure of approximately 10,000 acres estimated to have been planted under the Interim Planting Grants Scheme and the Dedication Scheme, brings the total private planting in Forest Year 1949 to about 13,000 acres.

* Includes 432 acres of planting in Dedicated woodlands.

GRANT SCHEMES

Table 46

Year ended 30th September 1949

				Great Britain	England	Scotland	Wales
Number of Schemes	...	...	...	697	451	203	43
Area planted (acres)							
Total	...	...	...	10,959	5,387	5,094	478
Conifers	...	...	...	7,928	2,557	4,936	435
Broadleaved	...	...	...	313	269	23	21
Mixed	...	...	...	2,718	2,561	135	22

THE DEDICATION SCHEME

During the year Dedication deeds were completed by seventeen owners in respect of a total of 12,267 acres of woodland. Of these, eight schemes covering 4,214 acres are in England and nine schemes covering 8,053 acres in Scotland. At the end of the year, in addition to the Plans of Operations approved for estates already dedicated, fifty-three Plans had been approved and deeds were in course of preparation for these areas. The details of these are given in Table 47 below.

PLANS OF OPERATIONS APPROVED
DEEDS IN COURSE OF PREPARATION

Table 47

				Great Britain	England	Scotland	Wales
Number of Plans	...	...	...	53	18	31	4
Area (acres)	...	...	...	28,922	9,809	18,450	663

In addition to the above, at the end of the year 248 estates with a woodland area of 230,000 acres had started on the preparation of Plans of Operations.

THINNING GRANTS

This scheme was introduced in April, 1949, but subject to certain conditions was made operative from the 1st January, 1949. By the end of the year, payments had been made in respect of 3,367 acres, from which the out-turn was over one million cubic feet. Table 48 below gives the number of thinning schemes inspected and approved for payment, along with their distribution between countries.

THINNING GRANTS

Table 48

Year ended 30th September 1949

				Number of Schemes	Area (acres)	Volume (cubic feet)
GREAT BRITAIN	...	...	...	203	3,367	1,074,569
England	...	...	...	125	1,838	486,228
Scotland	...	...	...	53	1,119	443,774
Wales	...	...	...	25	410	144,567

Education

Expenditure on education, which includes expenditure on Forester Training Schools, Short Courses, the Forest Workers Training Scheme and also grants to educational institutions, amounted to £268,625; the income, which consisted of payments by private employers for the services of trainees under the Forest Workers Training Scheme, payments by trainees for board and lodging, and the value of work done by trainees and students in the Commissioners' forests, was £97,306. Details will be found in Appendix 7 on page 124.

FORESTER TRAINING SCHOOLS AND SHORT COURSES

Expenditure under these heads amounted to £94,170, made up as follows—salaries and expenses of instructors £17,713, allowances to men under training £33,445, and rent, stores, fuel, etc., £43,012. This is £19,740 less than in the previous year, when there was heavy non-recurring expenditure on buildings. Expenditure on Notherwood House is included under these heads.

Of the 268 men in residence during the year at the five Forester Training Schools, 112 second year students were awarded Forester certificates; 102 of these were placed in employment with the Forestry Commission, four took up positions in private forestry, four were selected for posts in the Colonial Forest Service, and two Cypriot foresters returned to their Service in Cyprus. The first-year class again included two Cypriot foresters who were accepted for the two years course by arrangement with the Colonial Office, and also four students nominated by the Government of Northern Ireland. Ten first-year men who had successfully completed the first year's course but who were not considered suitable for the further year's training, were awarded Foremen certificates.

Short courses were held during the spring at the same private estates as in the previous year—namely, Darnaway Estate, Morayshire—Instructor Mr. E. S. Grant; Dartington Hall Estate, Totnes, Devon—Instructor Mr. T. Brown; and Raby Castle Estate, Durham—Instructor, Mr. H. Smith. The number of men who attended these courses was 42; of these 30 were from private estates and 12 from State forests. All but one of the men attending courses were successful in passing the examination held by the Royal Forestry Societies for the Woodman's Certificate (in England) and the Junior Forester's Certificate (in Scotland).

The thanks of the Commissioners are due to the Earl of Moray, Lord Barnard, and to the Dartington Hall Trustees for the facilities which they provided for these courses.

FOREST WORKERS TRAINING SCHEME

Expenditure under this Scheme amounted to £137,421, of which £75,965 represented allowances to trainees, and £61,456 expenditure on the maintenance of training centres, etc. During the year 412 men either completed their full year's training or entered a Forester Training School. Of this number, 201 entered the employment of the Forestry Commission, 91 were employed by private estates, 88 entered Forester Training Schools, and 32 took employment other than forestry. At the end of the year 262 men were in training; of these 213 were on Forestry Commission areas, and 49 on private estates.

NOTHERWOOD HOUSE

Good use was again made of the facilities provided by Notherwood House. Students from the forestry departments of the Universities of Aberdeen,

Edinburgh, Oxford and the University College of North Wales were accommodated for a total period of five months while studying working plan methods and silviculture in the New Forest. Ten short courses were held for the Commissioners' staff on the following subjects: nursery work, management, care and maintenance of mechanical equipment, fire protection, and elementary silviculture and establishment work. In addition, four special courses on forestry practice were given for landowners, estate agents and timber merchants. These were well attended.

FORESTRY EXHIBITS

Forestry exhibits were provided at sixteen of the principal agricultural shows. A special exhibit was also staged in the library of the House of Commons comprising panels of photographs illustrating various aspects of forestry work.

Apart from conveying useful information about forestry to the general public, it was found that private woodland owners, farmers and foresters took the opportunity of visiting the forestry exhibit to discuss their forestry problems with the Commission officers present.

In staging the exhibits, close liaison was maintained with the Forestry Societies, the Forest Products Research Laboratory and the Timber Development Association.

GRANTS TO EDUCATIONAL INSTITUTIONS

Grants amounting to £13,202 were made during the year as follows: University of Aberdeen—£2,261; Imperial Forestry Institute, Oxford—£6,543; University College of North Wales, Bangor—£2,648; University of Cambridge—£250; University of Edinburgh—£1,500.

Research and Experiment

Research work and special investigations into forestry problems have been continued at the Forest Research Station, Alice Holt Lodge, near Farnham. The expenditure was £114,058, as compared with £92,056 in the previous year. (For details see Appendix 8, page 125).

SAMPLE PLOTS

The mensuration section is responsible for the selection and periodic remeasurement of permanent sample plots established in plantations throughout Great Britain. During the year sixty-four new plots were established, mostly in plantations of the newer exotic species. These were chosen to cover gaps in the existing series. In addition sixty-eight existing plots were remeasured during the year. Table 49 below shows the distribution by countries of the 407 sample plots at present being maintained.

PERMANENT SAMPLE PLOTS

Table 49	Number			
	Great Britain	England	Scotland	Wales
In being on 1st October, 1948 ...	345	164	141	40
New plots established during the year ...	64	19	22	23
Plots abandoned (felled, blown, etc.) during the year ...	2	—	2	—
In being on 30th September, 1949 ...	407	183	161	63
Remeasured during the year ...	68	44	24	—

Other work carried out by the mensuration section includes the revision of yield tables, the preparation of volume tables, and various investigations into the rate of growth of our more important broadleaved trees.

SILVICULTURE

The work of the silvicultural section falls naturally into two parts—nursery investigation and forest experiments—and a large programme of research is being conducted under each of those heads.

The problem of seed testing has received considerable attention with the object of finding a quicker method of seed testing than the standard procedure. Promising results have been obtained by the use of a solution of tetrazolium bromide, which stains the embryos of viable seed.

The Sub-committee, which was appointed by the Advisory Committee on Forest Research to study the nutrition of young trees in the nursery, planned a series of experiments which were carried out in various nurseries by the silvicultural staff. Other work in the nursery has included experiments on the partial sterilisation of nursery soils by steam and by chemicals, some of which have given dramatic results.

In the forest, the assessment and maintenance of the numerous experimental plantations has continued, and new lines of work have been followed where necessary. The major development has been an extension of the work on the rehabilitation of the derelict broadleaved woodlands which cover a large area, particularly in the southern parts of England. The problems in this type of woodland are both silvicultural and economic. Work has also been carried out in co-operation with the Department of Agriculture for Scotland in the formation of shelter-plantations in Caithness.

Research on poplars has continued, and cuttings of recommended varieties have been made available to private owners and to the nursery trade so that stocks of suitable plants can be built up. More than 6,000 cuttings were supplied during the year.

The Commissioners were represented at the meeting of the International Commission on Poplars in Belgium and Holland in 1949.

ENTOMOLOGY

Sitka spruce in almost all parts of the country has been suffering from severe attacks of the aphid, *Neomyzaphis abietina*, which have led to serious defoliation locally. In some districts there are signs that the attacks are abating, but this is not general.

Among the large number of other insects which cause damage to trees and plantations, particular attention has been paid to the bark-beetles and to the sawflies. There has been no recrudescence of the attacks of the bark-beetle, *Ips sexdentatus*, which was reported last year, but the position is being carefully watched. A survey, carried out in Wales and in the West and North-West of England, has revealed the presence in small numbers at different centres of the Large Larch Saw-fly, which was the cause of serious damage to European larch about forty years ago.

PATHOLOGY

Among the numerous diseases which have been referred to the pathologist, a new disease of the sycamore, caused by a fungus as yet unidentified, has been reported from the eastern outskirts of London. This disease leads to the rapid death of affected trees; its distribution is now being investigated.

The survey of the distribution and intensity of the Elm Disease has been continued, though on a modified scale. There has been little change to report although the virulence of its attacks seems to vary from year to year.

Other diseases which are receiving attention include the following:—the group dying of Sitka spruce in different parts of the country, but particularly in the Border districts ; a similar phenomenon affecting Scots pine on calcareous soils ; the disease of *Thuja* caused by the fungus *Keithia thujina* ; and the various leaf-cast diseases of the Douglas fir.

OTHER PROJECTS

Other sections in which research is in progress are those of ecology, forest genetics and mechanisation.

The ecologist has been occupied in studying the beech in its relation to various environments.

With the appointment during the year of an officer to specialise on forest genetics, a start has been made on a field of research which has been much developed in other countries, notably Denmark and Sweden. This officer has visited tree breeding stations in Denmark to study their technique.

The development engineer has devoted much time to the study of methods of extraction, particularly to the use of easily transportable chutes, and to light wire ropeways for the extraction of thinnings. Various types of machines for removing the bark from poles were under investigation at the close of the year.

THE ADVISORY COMMITTEE ON FOREST RESEARCH

This Committee met at Strathpeffer at the end of September for its annual review of the programme of research work. During the meeting, visits were paid to experimental work at Achnashellach and Findon Forests.

UTILISATION

The usual liaison with the Director of the Forest Products Research Laboratory and his staff has been maintained.

BOTANICAL AND SOIL RESEARCH

Grants paid to Institutions for forest research include £191 to the University of Aberdeen for studies in the morphology of Douglas fir and Scots pine ; £729 to the late Dr. M. C. Rayner and to Dr. I. Levisohn, for work on the mycorrhiza of forest trees ; and £401 to the Rothamsted Experimental Station for research on the nutrition of trees in forest nurseries. To further research on forest soils, grants totalling £4,497 were made to the Macaulay Institute for Soil Research at Aberdeen, the Rothamsted Experimental Station, and the Imperial Forestry Institute, Oxford. The researches which are being carried out at these centres include studies of the changes which take place in the soil after afforestation, both from the biological and the physico-chemical aspects.

Census of Woodlands

This Census was begun in all three countries in 1947, and by the end of 1948 the survey of private woodlands in Scotland and in Wales had been completed. During the year under review, the survey of the private woodlands in England was also completed, along with a similar survey of the State Forests in all three countries. For Great Britain as a whole, the total area of woodland at September, 1947, was found to be 3,448,362

acres, of which 2,825,331 acres were in private ownership, and 623,031 acres were comprised in State forests. Further details are given on pages 44 to 48, and in Table 17 on page 46.

An estimate of the volume of timber then standing was also made, and showed a total for Great Britain of 2,658 million cubic feet (quarter girth measure over bark). Details are given on page 48 and in Table 18 on page 47. Work was begun on the estimation of the increment of the standing woodlands.

Publications

Four new items were published during the year by H.M. Stationery Office. Two of these, the *Glen More* and the *Hardknott National Forest Park Guides**, extend the series of illustrated guide books for which there has been a considerable demand from the public. The two other publications were the Commissioners' *Twenty-ninth Annual Report* in respect of the year ending on 30th September, 1948†, and the *Proceedings of the Fifth British Empire Forestry Conference, 1947*‡. Nine technical *Leaflets*§ were revised and reprinted. (See Appendix 17, page 147.)

Two unpriced illustrated pamphlets were published directly by the Forestry Commissioners, for distribution to the public at agricultural shows and lectures. These were entitled *Britain's New Forests* and *Forestry in Wales*; the latter was also published in Welsh under the title *Coedwigaeth yng Nghymru*.

Publicity and Public Relations

During the year nearly forty notices and statements referring to the Department's activities were issued to the Press, and assistance was given to many publications wishing to produce special features on forestry. Facilities were provided for representatives of a considerable number of newspapers and the British Broadcasting Corporation to visit some of the State forests, among them being Quantock, Allerston, Bramshill, and Mortimer in England; New-castleton, Tentsmuir, and the Black Isle Forests in Scotland; and Coed y Brenin, Clocaenog and Tintern in Wales. Visits were also made to the Argyll National Forest Park, to Notherwood House, the Commissioners' educational establishment in the New Forest, and to Gwydyr Forester Training School in North Wales. These visits have resulted in much attention being drawn to the Commissioners' operations.

Nearly 300 lectures on forestry were given to organisations such as Rotary Clubs, Young Farmers' Clubs and Youth Clubs; 150 of these lectures were given by Forest Officers, and approximately the same number by speakers from the Central Office of Information. Pamphlets summarising the work of the Department have been widely distributed. Considerable quantities of leaflets emphasizing the danger of forest fires were distributed, notably through the motoring organisations.

A pictorial exhibition designed to illustrate the work of the Commissioners was placed in the Library of the House of Commons, and a similar exhibit dealing with National Forest Parks was prepared for the International Town and Country Planning Exhibition at Olympia.

Many requests for information and display material were received from individual teachers and educational establishments, and numerous general enquiries dealt with.

* H.M.S.O., Price 2s. each.

† H.C. 171, 1948-49 (H.M.S.O., Price 1s. 3d.).

‡ H.M.S.O., Price 10s.

§ H.M.S.O., Price 2d. each.

National Forest Parks

The six National Forest Parks—Argyll, Forest of Dean, Glen More, Glen Trool, Hardknott and Snowdonia, covering a total of 237,750 acres, have continued to attract tourists, the number of overnight visitors to the official camping grounds showing an increase of 3,000 over the previous year. The Commissioners welcome this evidence that the facilities provided are appreciated by the public.

(Signed) ROBINSON (*Chairman*)

RADNOR

J. M. BANNERMAN

R. C. G. COTTERELL

LLOYD O. OWEN

J. E. HAMILTON

JOHN STIRLING

W. H. VAUGHAN

JOHN WALTON

H. A. TURNER, *Secretary*,
25, Savile Row,
London, W.1.

APPENDICES

Appendix I

PAYMENTS AND RECEIPTS BY HEADS OF ACCOUNT

£

Year ending 30th September	Payments											Receipts (13)	Net Payments (14)	
	Total (1)	Salaries and Wages and Allowances (2)	Head-quarters Charges (3)	Charges of Directors of Forestry (4)	Charges of Conservators (5)	Forestry Operations (6)	Private Forestry (7)	Education (8)	Research and Experiment (9)	Special Services (10)	Forest Workers Holdings (11)			Engin- eering (12)
Grand Total 1920-49	38,678,499	3,149,548	170,607	209,264	544,288	29,726,237	716,589	1,081,591	353,863	129,168	977,908	1,619,436	10,110,713	28,567,786
1920-29 ...	4,502,018	494,157	22,676	30,586	74,434	3,118,837	299,600	76,004	36,927	23,342	325,455	—	851,484	3,650,534
1930-39 ...	7,926,093	714,343	53,003	49,485	107,251	6,232,917	128,653	73,538	84,916	13,681	468,306	—	1,821,852	6,104,241
1940-45 ...	6,927,334	550,592	31,164	36,705	91,559	5,976,639	69,079	39,813	58,463	1,471	71,849	—	3,784,038	3,143,296
1946 ...	1,937,614	164,645	7,678	10,107	22,707	1,637,845	7,891	48,646	17,884	875	19,336	—	562,504	1,375,110
1947 ...	3,871,688	315,582	10,456	19,701	66,144	2,635,112	48,544	286,438	34,655	14,820	26,410	413,826	660,690	3,210,598
1948 ...	6,632,495	429,552	20,119	33,034	92,741	4,326,421	75,204	326,151	52,216	39,522	31,925	1,205,610	1,079,720	5,552,775
1949 ...	6,881,257	480,677	25,511	29,646	89,452	5,798,466	87,618	231,001	68,802	35,457	34,627	—	1,350,425	5,530,832

Appendix 2

EXPENDITURE AND INCOME

£

Year ending 30th September	Expenditure										Income					Net Expenditure
	Total (1)	Forestry Operations (Appendix 3) (2)	Private Forestry (3)	Education (Appendix 7) (4)	Research and Experiment (Appendix 8) (5)	Special Services (Appendix 9) (6)	Forestry Workers Holdings (Appendix 6) (7)	Engineering (Appendix 5) (8)	Total (9)	Forestry Operations (Appendix 3) (10)	Education (Appendix 7) (11)	Forestry Workers Holdings (Appendix 6) (12)	Engineering (Appendix 5) (13)	Miscellaneous (14)		
Grand Total 1920-49.	39,384,191	33,255,231	958,912	1,280,458	624,266	231,342	1,214,449	1,819,533	10,840,736	10,067,416	315,645	413,109	24,227	20,339	28,543,455	
Percentage	100	84.4	2.4	3.3	1.6	0.6	3.1	4.6	100	92.9	2.9	3.8	0.2	0.2	—	
1920-29 ...	4,485,649	3,512,577	340,927	101,313	79,650	61,299	389,883	—	916,559	882,108	2,427	27,515	—	4,509	3,569,090	
1930-39 ...	8,070,155	7,056,580	166,767	97,998	140,245	42,694	565,871	—	1,943,543	1,770,014	443	168,856	—	4,230	6,126,612	
1940-45 ...	7,051,637	6,680,667	96,557	51,853	99,078	7,888	115,594	—	3,972,935	3,839,708	225	127,567	—	5,435	3,078,702	
1946 ...	1,984,811	1,821,628	33,943	66,565	33,911	3,387	25,377	—	535,117	499,642	12,465	22,291	—	719	1,449,694	
1947 ...	4,176,138	3,061,751	104,911	331,087	65,268	26,461	35,232	551,428	747,620	627,381	94,284	21,803	3,257	895	3,428,518	
1948 ...	6,762,556	4,857,167	98,839	363,017	92,056	43,202	40,170	1,268,105	1,267,978	1,115,055	108,495	22,131	20,970	1,327	5,494,578	
1949 ...	6,853,245	6,264,861	116,968	268,625	114,058	46,411	42,322	—	1,456,984	1,333,508	97,306	22,946	—	3,224	5,396,261	

Appendix 3

FORESTRY OPERATIONS: EXPENDITURE AND INCOME

£

Year ending 30th September	Expenditure (Appendix 2, Column 2)										Income (Appendix 2, Column 10)					Net Expenditure	
	Total	Overhead Charges	Superior Supervision	Local Supervision	Acquisition of Land, etc.	Cultural Operations (See Appendix 4)	Preparation and Sale of Produce	Roads	Buildings	Stores	Miscellaneous	Total	Sales of Land and Buildings	Rents and Royalties	Forest Produce		Other
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
Grand Total	33,255,231	1,295,852	1,562,556	2,364,284	3,644,085	13,989,224	2,770,580	926,869	2,007,987	1,630,708	3,063,086	10,067,416	299,831	2,025,036	6,780,076	962,473	23,187,815
1920-49...																	
Percentage	100	3.9	4.7	7.1	11.0	42.1	8.3	2.8	6.0	4.9	9.2	100	3.0	20.1	67.3	9.6	—
1920-29...	3,512,577	192,997	201,122	174,130	787,509	1,510,801	118,853	37,502	77,986	41,733	369,944	882,108	78,784	274,091	406,594	122,639	2,630,469
1930-39...	7,056,580	332,060	352,049	493,661	1,534,471	3,071,019	362,395	61,872	184,981	86,845	577,227	1,770,014	76,484	791,032	699,094	203,404	5,286,566
1940-45...	6,680,667	254,471	285,761	610,503	699,647	3,223,256	499,406	70,040	110,652	211,243	715,688	3,839,708	130,750	559,603	2,893,709	255,646	2,840,959
1946 ...	1,821,628	74,069	77,566	175,761	144,726	794,133	162,414	36,979	59,334	83,127	213,519	499,642	368	95,883	349,365	54,026	1,321,986
1947 ...	3,061,751	110,065	164,424	247,189	78,648	1,351,964	288,655	75,988	161,537	304,109	279,172	627,381	759	94,346	436,111	96,165	2,434,370
1948 ...	4,857,167	135,284	198,282	294,134	136,850	1,967,912	637,370	104,832	650,902	357,952	373,649	1,115,035	8,905	101,667	905,315	99,168	3,742,112
1949 ...	6,264,861	196,906	283,352	368,906	262,234	2,070,139	701,487	539,656	762,595	545,699	533,887	1,333,508	3,781	108,414	1,089,888	131,425	4,931,353

CULTURAL OPERATIONS: EXPENDITURE

(Appendix 3, Col. 6)

Appendix 4

£

Year ending 30th September	Grand Total (1)	Plantations				Nurseries (6)
		Total (2)	Prepara- tory work and Planting (3)	Establish- ment and Main- tenance (4)	Forest Protec- tion (5)	
Grand Total, 1920- 1949	13,989,224	10,273,377	4,113,569	4,295,480	1,864,328	3,715,847
<i>Percentage of Column 2</i> ...	—	100	40·0	41·8	18·2	—
<i>Percentage of Column 1</i> ...	100	73·4	29·4	30·7	13·3	26·6
1920-29	1,510,801	1,029,528	638,503	295,201	95,824	481,273
1930-39	3,071,019	2,346,887	1,053,327	916,427	377,133	724,132
1940-45	3,223,256	2,326,965	625,220	1,139,353	562,392	896,291
1946	794,133	560,267	144,098	293,692	122,477	233,866
1947	1,351,964	988,258	393,787	405,455	189,016	363,706
1948	1,967,912	1,469,450	586,132	634,167	249,151	498,462
1949	2,070,139	1,552,022	672,502	611,185	268,335	518,117

ENGINEERING: EXPENDITURE AND INCOME

Appendix 5

£

Year ending 30th September	Expenditure (Appendix 2, Column 8)						Income (Appendix 2, Column 13)	Net Expen- diture
	Total (1)	Superior Super- vision and Overhead Charges (2)	Salaries and Expenses of Engineers (3)	Plant, Mach- inery, etc. (4)	Road Construc- tion (5)	Camps and Misc. (6)		
Grand Total 1947-49 ...	1,819,533	75,069	112,330	360,541	1,154,316	117,277	24,227	1,795,306
<i>Percentage</i>	100	4·1	6·2	19·8	63·4	6·5	—	—
1947	551,428	24,459	34,630	157,047	303,783	31,509	3,257	548,171
1948	1,268,105	50,610	77,700	203,494	850,533	85,768	20,970	1,247,135
1949	—	—	—	—	—	—	—	—

Appendix 6

FOREST WORKERS HOLDINGS: EXPENDITURE AND INCOME

£

Year ending 30th September	Expenditure (Appendix 2, Column 7)										Income (Appendix 2, Column 12)			Net Expendi- ture
	Total (1)	Superior Super- vision and Overhead Charges (2)	Purchase and Rent of Land and Buildings (3)	Buildings			Fencing, Drain- age, etc. (7)	Miscel- laneous (8)	Total (9)	Rents (10)	Other (11)			
				New (4)	Adapta- tions (5)	Repairs (6)								
Grand Total 1920-49.	1,214,449	199,149	208,947	448,508	94,852	172,678	55,815	34,500	413,109	409,006	4,103	801,340		
Percentage ...	100	16.4	17.2	37.0	7.8	14.2	4.6	2.8	100	99.0	1.0	—		
1920-29 ...	389,883	35,894	103,940	192,184	32,302	3,882	17,561	4,120	27,515	26,261	1,254	362,368		
1930-39 ...	565,871	94,399	108,894	234,824	43,830	46,341	27,967	9,616	168,856	167,966	890	397,015		
1940-45 ...	115,594	42,133	8,659(Cr.)	18,443	7,506	42,094	5,427	8,650	127,567	127,234	333	11,973(Cr.)		
1946 ...	25,377	5,573	1,117	945	436	14,110	1,100	2,096	22,291	21,532	759	3,086		
1947 ...	35,232	7,247	829	998	5,334	17,147	649	3,028	21,803	21,360	443	13,429		
1948 ...	40,170	6,902	1,739	694	2,491	23,164	1,491	3,689	22,131	22,124	7	18,039		
1949 ...	42,322	7,001	1,087	420	2,953	25,940	1,620	3,301	22,946	22,529	417	19,376		

Appendix 7

EDUCATION: EXPENDITURE AND INCOME

£

Year ending 30th September	Expenditure (Appendix 2, Column 4)										Income (Appendix 2, Column 11)	Net Expendi- ture
	Total (1)	Superior Supervision and Overhead Charges (2)	Salaries and Expenses (3)	Forester Schools and Short Courses			Forest Workers Training Scheme		Grants to Institutions (9)			
				Instructors Salaries and Expenses (4)	Allowances to Appren- tices (5)	Rent, Stores, Fuel, Light, etc. (6)	Allowances to Trainees (7)	Upkeep of Training Centres (8)				
Grand Total 1920-49.	1,280,458	79,283	30,821	80,956	137,136	199,909	365,999	258,977	127,377	(10)	315,645	964,813
Percentage	100	6.2	2.4	6.3	10.7	15.6	28.6	20.2	10.0	—	—	—
1920-29	101,313	13,125	—	15,401	21,709	20,387	—	—	30,691	2,427	2,427	98,886
1930-39	97,998	12,184	—	10,848	17,682	14,638	—	—	42,646	443	443	97,555
1940-45	51,853	6,331	—	6,242	12,688	7,700	—	—	18,892	225	225	51,628
1946	66,565	6,751	—	3,709	2,531	4,706	34,148	10,204	4,516	12,465	12,465	54,100
1947	331,087	13,589	6,113	10,867	15,135	45,678	145,634	86,328	7,743	94,284	94,284	236,803
1948	363,017	16,103	12,076	16,176	33,946	63,788	110,252	100,989	9,687	108,495	108,495	254,522
1949	268,625	11,200	12,632	17,713	33,445	43,012	75,965	61,456	13,202	97,306	97,306	171,319

RESEARCH AND EXPERIMENT: EXPENDITURE AND INCOME

Appendix 8

£

Year ending 30th September	Expenditure (Appendix 2, Column 5)					Income	Net Expendi- ture
	Total	Superior Supervision and Overhead Charges (2)	Salaries and Expenses (3)	Labour, Stores, etc. (4)	Grants to Institu- tions (5)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Grand Total 1920-49 ...	624,266	55,456	283,254	219,535	66,021	7,812	616,454
Percentage ...	100	8·9	45·4	35·1	10·6	—	—
1920-29 ...	79,650	13,699	38,458	20,230	7,263	1,058	78,592
1930-39 ...	140,245	14,584	55,042	47,030	23,589	2,540	137,705
1940-45 ...	99,078	6,329	47,056	33,768	11,925	1,791	97,287
1946 ...	33,911	2,411	16,892	12,626	1,982	329	33,582
1947 ...	65,268	4,530	30,140	26,231	4,367	217	65,051
1948 ...	92,056	6,902	40,422	35,623	9,109	629	91,427
1949 ...	114,058	7,001	55,244	44,027	7,786	1,248	112,810

SPECIAL SERVICES: EXPENDITURE AND INCOME

Appendix 9

£

Year ending 30th September	Expenditure (Appendix 2, Column 6)						Income	Net Expendi- ture
	Total	Superior Super- vision and Overhead Charges (2)	Consul- tative Committee Expenses (3)	Publica- tions (4)	Special Enquiries (5)	Relief of Un- employ- ment (6)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Grand Total 1947-49	231,342	89,084	677	9,043	112,710	19,828	453	230,889
Percentage	100	38·5	0·3	3·9	48·7	8·6	—	—
1920-29 ...	61,299	26,585	523	1,995	12,368	19,828	347	60,952
1930-39 ...	42,694	28,698	145	1,279	12,572	—	33	42,661
1940-45 ...	7,888	6,329	9	2	1,548	—	6	7,882
1946 ...	3,387	2,411	—	—	976	—	12	3,375
1947 ...	26,461	6,341	—	2,507	17,613	—	25	26,436
1948 ...	43,202	6,119	—	1,400	35,683	—	19	43,183
1949 ...	46,411	12,601	—	1,860	31,950	—	11	46,400

Appendix 10

PLANTATIONS MADE DURING THE YEAR ENDED

Country or Conservancy	Area Planted (Acres)						Total
	Total		Afforested		Re-Afforested		
	Conifers	Broad-leaved	Conifers	Broad-leaved	Conifers	Broad-leaved	
GREAT BRITAIN ...	41,164	2,722	30,275	589	10,889	2,133	83,197
ENGLAND: ...	12,815	2,471	8,149	543	4,666	1,928	30,243
Conservancy:							
North West ...	3,125	113	1,716	32	1,409	81	5,615
North East ...	5,675	64	5,040	20	635	44	10,117
East ...	1,336	692	670	287	666	405	5,283
South East ...	813	650	97	84	716	566	3,593
South West ...	1,219	544	616	75	603	469	3,178
New Forest ...	440	154	10	45	430	109	1,379
Dean Forest ...	207	254	—	—	207	254	1,078
SCOTLAND: ...	19,772	45	15,027	19	4,745	26	37,993
Conservancy:							
North ...	4,258	—	2,046	—	2,212	—	8,490
East ...	5,991	22	3,838	9	2,153	13	12,553
South ...	5,896	13	5,667	—	229	13	10,363
West ...	3,627	10	3,476	10	151	—	6,587
WALES: ...	8,577	206	7,099	27	1,478	179	14,961
Conservancy:							
North ...	4,594	122	3,890	23	704	99	7,937
South ...	3,983	84	3,209	4	774	80	7,024

30th SEPTEMBER, 1949—SUMMARY BY CONSERVANCIES

Species Planted, including Beating Up (Thousands of plants)										
Scots Pine	Corsican Pine	European Larch	Japanese Larch	Douglas Fir	Norway Spruce	Sitka Spruce	Oak	Beech	Other Species	
									Conifers	Broad leaved
15,698	5,480	1,146	2,982	2,657	13,754	34,777	2,078	3,439	850	336
4,638	3,775	490	991	1,258	3,990	9,567	1,829	3,159	305	241
938	691	15	277	296	1,049	2,071	51	136	28	63
847	77	—	589	111	1,816	6,497	—	123	50	7
950	2,167	27	2	247	113	—	1,183	562	9	23
1,121	73	20	—	336	407	—	106	1,468	31	31
634	340	27	106	62	298	904	5	627	149	26
130	404	17	14	189	218	95	16	236	16	44
18	23	384	3	17	89	—	468	7	22	47
9,546	813	621	753	677	7,093	17,857	115	175	306	37
3,786	77	273	225	77	1,425	2,527	—	2	97	1
4,384	717	302	282	263	2,022	4,329	4	115	131	4
889	15	1	43	268	2,215	6,735	111	30	24	32
487	4	45	203	69	1,431	4,266	—	28	54	—
1,514	892	35	1,238	722	2,671	7,353	134	105	239	58
471	714	8	964	214	1,450	3,885	110	41	51	29
1,043	178	27	274	508	1,221	3,468	24	64	188	29

SUMMARY OF SPECIES USED FOR PLANTING AND BEATING UP

Appendix 11

Year ended 30 September 1949

Thousands of plants

SPECIES	GREAT BRITAIN				ENGLAND				SCOTLAND				WALES			
	Total	Planting	Beating up	Total	Planting	Beating up	Total	Planting	Beating up	Total	Planting	Beating up	Total	Planting	Beating up	
																Total
All Species	83,197	71,745	11,452	30,243	24,624	5,619	37,993	34,019	3,974	14,961	13,102	1,859	15,698	13,319	2,379	
Scots Pine	5,480	4,632	848	3,775	3,226	549	813	672	141	1,514	1,276	238	1,146	1,032	114	
Corsican Pine	2,982	2,395	587	991	740	251	621	569	52	892	734	158	2,657	2,153	504	
European Larch	13,754	12,252	1,502	3,990	3,524	466	7,093	6,474	145	722	1,006	232	34,777	30,976	3,801	
Japanese Larch	55	38	17	53	37	16	17,857	15,786	2,071	7,353	6,676	677	...	...	...
Douglas Fir	9	6	3	5	2	3	2	4	1	—	—	—	...	...	...
Norway Spruce	358	322	36	117	95	22	241	227	14	—	—	—	...	...	...
Sitka Spruce	13	13	—	1	1	—	12	12	—	—	—	—	...	...	...
Tsuga heterophylla	109	69	40	89	58	31	20	11	9	—	—	—	...	...	...
Thuja plicata	7	2	5	6	1	5	1	1	—	—	—	—	...	...	...
Thuja plicata ...	49	46	3	30	29	1	19	17	2	—	—	—	...	...	...
Pinus contorta	78	53	25	42	38	4	28	7	21	8	8	16	...	...	...
Hybrid Larch	3,439	2,572	867	3,159	2,346	813	175	137	38	105	89	16	...	...	...
Lawson Cypress	2,078	1,467	611	1,829	1,283	546	115	58	57	134	126	8	...	...	...
Picea omorika	29	22	7	26	19	7	3	3	—	—	—	—	...	...	...
Abies grandis	16	12	4	16	12	4	—	—	—	—	—	—	...	...	...
Ash	250	183	67	4	3	1	7	7	—	239	173	66	...	...	...
Beech	213	181	32	157	131	26	6	4	2	50	46	4	...	...	...
Oak
Sycamore
Cherry
Other Conifers
Others Broadleaved

SUMMARY AREA STATEMENT OF LAND USE BY CONSERVANCIES

Appendix 12

At 30th September, 1949

Acres

Country or Conservancy	Total	Planted during year ended 30th September, 1949		Under Plantations	Provisional Allocation of Other Land	
		Afforested	Re-afforested		Plantable	Agricultural, Unplantable, &c.
GREAT BRITAIN	1,559,943	30,864	13,022	614,190	334,938	610,815
ENGLAND:	526,464	8,692	6,594	279,967	114,159	132,338
North West Conservancy	79,736	1,748	1,490	44,109	18,368	17,259
North East Conservancy	161,675	5,060	679	64,491	47,533	49,651
East Conservancy	95,082	957	1,071	67,843	17,558	9,681
South East Conservancy	38,828	181	1,282	23,266	13,839	1,723
South West Conservancy	51,859	691	1,072	33,785	14,011	4,063
New Forest	74,064	55	539	26,988	908	46,168
Dean Forest	25,220	—	461	19,485	1,942	3,793
SCOTLAND:	820,797	15,046	4,771	230,843	164,589	425,365
North Conservancy	260,367	2,046	2,212	59,797	37,674	162,896
East Conservancy	145,706	3,847	2,166	70,596	46,098	29,012
South Conservancy	186,580	5,667	242	40,466	44,902	101,212
West Conservancy	228,144	3,486	151	59,984	35,915	132,245
WALES:	212,682	7,126	1,657	103,380	56,190	53,112
North Conservancy	124,366	3,913	803	53,588	33,061	37,717
South Conservancy	88,316	3,213	854	49,792	23,129	15,395

AREA STATEMENT OF LAND USE BY FORESTS—ENGLAND

Appendix 13

At 30th September, 1949

Acres

Forest	Total	Planted during year ended 30th September, 1949		Under Plantations	Provisional Allocation of Other Land	
		Afforested	Re-afforested		Plantable	Agricultural, Unplantable, &c.
NORTH WEST CONSERVANCY:						
TOTAL	79,736	1,748	1,490	44,109	18,368	17,259
1. Delamere	1,934	—	88	1,800	99	35
2. Thornthwaite	4,880	107	1	3,412	402	1,066
3. Cannock Chase	6,316	—	12	5,349	839	128
4. Mortimer	7,309	—	233	5,974	1,056	279
5. Walcot	1,849	142	96	1,546	296	7
6. Clipstone	8,240	—	249	5,799	2,211	230
7. Ennerdale	8,400	213	—	3,002	859	4,539
8. Hope	2,985	35	1	612	1,832	541
9. Bawtrey	583	—	13	516	22	45
10. Sherwood	2,487	—	143	2,202	207	78
11. Kershope	12,504	648	—	7,847	1,263	3,394
12. Hardknott	8,011	63	—	841	1,881	5,289
13. Grizedale	5,807	—	306	3,044	1,942	821
14. Greystoke	1,572	173	—	1,331	241	—
15. Cotgrave	370	115	—	194	176	—
16. Dalton	452	—	50	67	307	78
17. Kinver	826	—	131	152	632	42
18. Gisburn	2,674	252	—	252	2,024	398
19. Long Mynd	679	—	—	—	474	205
20. Swynnerton	806	—	167	169	637	—
21. Bagot	968	—	—	—	968	—
22. Longtown	84	—	—	—	—	84

Appendix 13—continued

Forest	Total	Planted during year ended 30th September, 1949		Under Plantations	Provisional Allocation of Other Land	
		Afforested	Re-afforested		Plantable	Agricultural, Unplantable, &c.
NORTH EAST CONSERVANCY:						
TOTAL	161,675	5,060	679	64,491	47,533	49,651
1. Chopwell	816	—	42	732	67	17
2. Allerston	13,046	275	30	9,956	1,719	1,371
3. Rothbury	1,888	—	106	1,116	630	142
4. Selby	795	—	24	742	52	1
5. Kielder	74,153	1,999	396	24,046	19,086	31,021
6. Hamsterley	5,510	173	—	3,849	1,024	637
7. Ampleforth	2,293	2	44	1,743	218	332
8. Rosedale	10,397	61	13	2,653	4,600	3,144
9. Harwood	2,109	—	5	1,454	494	161
10. Slaley	1,480	50	—	1,250	5	225
11. Arkengarthdale	1,340	16	—	1,067	64	209
12. Redesdale	17,758	1,281	19	6,734	4,060	6,964
13. Langdale	10,817	112	—	1,785	5,728	3,304
14. Widehaugh	70	—	—	—	—	70
15. Warke	18,260	1,067	—	7,000	9,284	1,976
16. Scardale	658	24	—	310	271	77
17. York	285	—	—	54	231	—
EAST CONSERVANCY:						
TOTAL	95,082	957	1,071	67,843	17,558	9,681
1. Hazelborough	2,453	—	56	1,820	266	367
2. Salcey	1,279	8	—	1,182	78	19
3. Ampthill	452	1	5	363	—	89
4. Renalesham	8,062	140	29	6,349	609	1,104
5. Rockingham	5,146	25	7	3,927	1,049	170
6. Swaffham	5,959	17	23	5,193	521	245
7. Thetford Chase	46,209	400	129	31,931	8,004	6,274
8. Bourne	2,850	—	65	1,614	734	502
9. Laughton	2,144	—	—	2,051	29	64
10. Swanton	1,650	8	82	1,182	386	82
11. Dunwich	843	—	—	704	116	23
12. Yardley Chase	2,113	—	12	1,465	496	152
13. Bardney	2,846	155	42	1,737	983	126
14. The King's Forest	5,932	—	224	5,290	392	250
15. Wigsley	1,801	40	141	653	1,129	19
16. Willingham	1,903	33	121	1,033	782	88
17. Wendover	814	15	15	561	203	50
18. Hevingham	229	—	77	123	88	18
19. Shouldham	957	115	12	355	597	5
20. Watlington	306	—	7	271	8	27
21. Bramfield	541	—	24	39	502	—
22. Burwell	461	—	—	—	461	—
23. Gaywood	132	—	—	—	125	7
SOUTH EAST CONSERVANCY:						
TOTAL	38,828	181	1,282	23,266	13,839	1,723
1. Alice Holt	2,142	—	12	1,794	132	216
2. Bere	1,443	—	6	1,414	—	29
3. Woolmer	2,073	—	—	297	1,756	20
4. Bedgebury	3,365	—	124	2,514	625	226
5. Bramshill	4,108	—	169	3,514	494	100
6. Chiddingfold	2,090	—	31	1,854	228	8
7. Lyminge	2,496	—	84	1,933	502	61
8. Friston	1,986	73	38	933	1,037	16
9. Micheldever	2,457	—	64	1,602	770	85
10. Buriton	1,733	—	2	1,367	186	180
11. Westbury	359	—	—	347	2	10
12. Challock	1,502	—	61	526	971	5
13. Goodwood	2,824	—	235	1,093	1,730	1
14. Vinehall	850	—	—	420	413	17
15. Gravetye	910	3	4	374	29	507

Appendix 13—continued

Forest	Total	Planted during year ended 30th September, 1949		Under Plantations	Provisional Allocation of Other Land	
		Afforested	Re-afforested		Plantable	Agricultural, Unplantable, &c.
16. Marden	1,193	—	105	389	804	—
17. Arundel	2,777	89	—	1,483	1,229	65
18. Orlestone	750	—	45	604	145	1
19. Alton	947	—	48	114	833	—
20. Andover	1,000	—	175	269	709	22
21. Southwater	349	16	44	60	289	—
22. Basing	211	—	35	123	88	—
23. Bishopstoke	299	—	—	200	99	—
24. Abinger	726	—	—	16	558	152
25. Shipbourne	238	—	—	26	210	2
SOUTH WEST CONSERVANCY:						
TOTAL	51,859	691	1,072	33,785	14,011	4,063
1. Dymock	1,600	—	—	1,332	212	56
2. Brendon	2,189	—	—	1,847	4	338
3. Eggesford	882	—	—	838	30	14
4. Haldon	3,019	—	—	2,986	—	33
5. Halwill	4,457	71	15	3,375	469	613
6. Quantock	2,283	5	23	1,772	166	345
7. Bodmin	1,283	—	61	842	186	255
8. Haugh	606	—	—	513	75	18
9. Wyre	2,396	—	30	1,789	554	53
10. Wilsey Down	899	20	—	878	—	21
11. Bruton	859	—	42	726	128	5
12. Dartmoor	2,287	139	—	1,590	293	404
13. Herodsfoot	668	—	21	197	444	27
14. Westwoods	1,187	—	2	601	335	251
15. Lydford	599	—	12	476	85	38
16. Collingbourne	1,239	—	84	1,043	188	8
17. Hartland	2,142	150	—	1,367	332	443
18. Mendip	1,197	123	40	996	145	56
19. Savernake	4,472	—	164	2,607	1,768	97
20. Stanway	1,016	—	48	175	841	—
21. Braydon	450	—	25	325	123	2
22. Okehampton	382	—	—	299	57	26
23. Neroche	2,131	—	207	416	1,458	257
24. Culmhead	40	—	—	—	—	40
25. Plym	534	—	87	133	401	—
26. Wareham	3,508	1	—	3,246	—	262
27. Gardiner	757	60	—	632	122	3
28. Charmouth	676	46	45	274	361	41
29. Purbeck	1,468	60	—	60	1,291	117
30. Blandford	2,092	—	5	40	2,042	10
31. Fernworthy	1,477	16	53	1,232	100	145
32. Glynn	2,244	—	108	1,039	1,120	85
33. Poorstock	331	—	—	2	329	—
34. Stokeleigh	489	—	—	137	352	—
NEW FOREST:						
TOTAL	74,064	55	539	26,988	908	46,168
1. New	65,155	4	414	19,781	73	45,301
2. Parkhurst	1,270	—	18	1,043	16	211
3. Ringwood	4,318	—	43	3,808	231	279
4. Ferndown	799	—	26	589	111	99
5. Brightstone	1,627	44	—	1,021	353	253
6. Combley	559	—	1	551	—	8
7. Osborne	133	—	3	133	—	—
8. Shalfleet	203	7	34	62	124	17
DEAN FOREST:						
TOTAL	25,220	—	461	19,485	1,942	3,793
1. Dean	23,963	—	461	18,276	1,941	3,746
2. Tidenham Chase	1,257	—	—	1,209	1	47

AREA STATEMENT OF LAND USE BY FORESTS—SCOTLAND

Appendix 14

Acres

Forest	Total	Planted during year ended 30th September, 1949		Under Plantations	Provisional Allocation of Other Land	
		Afforested	Re-afforested		Plantable	Agricultural Unplantable, &c.
NORTH CONSERVANCY:						
TOTAL	260,367	2,046	2,212	59,797	37,674	162,896
1. BORGIE	2,704	—	108	389	840	1,475
2. INCHNACARDOCH	9,168	4	146	1,774	853	6,541
3. PORTCLAIR	5,500	158	15	2,110	244	3,146
4. SOUTH LAGGAN	4,110	8	—	1,132	—	2,978
5. ACHNASHELLACH	19,674	—	56	926	146	18,602
6. RATAGAN	2,481	—	—	1,440	—	1,041
7. SLATTADALE	1,154	—	—	912	—	242
8. GLEN RIGH	5,883	130	—	1,837	354	3,692
9. GLEN HURICH	15,180	—	—	2,582	1,272	11,326
10. GLEN URQUHART	4,000	—	—	1,997	919	1,084
11. CULLODEN	1,590	—	17	723	852	15
12. NEVIS	7,658	—	7	1,124	—	6,534
13. THE QUEEN'S FOREST	12,500	—	19	2,158	1,077	9,265
14. CRAIG NAN EUN	1,922	—	—	1,358	—	564
15. CRAIG PHADRIG	211	—	2	203	1	7
16. GLEN SHIEL	3,653	—	—	765	—	2,888
17. NORTH STROME	1,969	—	—	851	—	1,118
18. SALEN	7,498	100	—	2,376	350	4,772
19. SOUTH STROME	3,556	—	5	1,232	—	2,324
20. FINDON	1,334	—	1	1,232	5	97
21. GLEN GARRY	21,979	210	—	3,122	1,638	17,219
22. KESSECK	909	—	20	682	104	123
23. EILANREACH	922	—	—	825	—	97
24. DORNOCH	704	—	—	665	—	39
25. INVERINATE	1,232	—	—	1,038	—	194
26. BALBLAIR	1,374	61	—	831	296	247
27. CLUNES	5,852	57	—	1,151	363	4,338
28. LAEL	2,272	—	—	1,882	—	390
29. FIUNARY	24,569	166	—	2,506	3,069	18,994
30. GLEN LOY	2,546	—	—	1,976	46	524
31. GLEN BRITTLE	8,716	55	—	1,435	36	7,245
32. LONGART	1,264	72	36	924	207	133
33. LEANACHAN	7,546	179	—	1,435	2,566	3,545
34. GUISACHAN	2,371	99	—	819	1,228	324
35. ARDROSS	4,149	138	134	2,377	1,314	458
36. INSHRIACH	2,297	131	—	1,058	793	446
37. MILLBUIE	6,425	—	464	5,475	344	606
38. ASSICH	1,043	15	45	384	310	349
39. MORANGIE	4,085	234	—	574	2,201	1,310
40. KILCOY	3,204	—	664	1,653	1,235	316
41. STRATH NAIRN	3,924	111	67	407	1,309	2,208
42. FERNESS	1,538	—	134	304	584	650
43. STRATH CONON	9,799	—	151	446	2,245	7,108
44. STRATH DEARN	2,305	—	121	305	1,167	833
45. FARIGAIG	4,590	63	—	118	434	4,038
46. URRAY	702	—	—	54	584	64
47. BATTAN	789	—	—	—	740	49
48. RUMSTER	2,362	55	—	55	877	1,430
49. LAIKEN	845	—	—	17	810	18
50. CLACH LIATH	547	—	—	41	500	6
51. SHIN	13,427	—	—	94	2,462	10,871
52. TORRACHILTY	3,620	—	—	—	2,769	851
53. RAASAY	715	—	—	23	530	162

Appendix 14—continued

Forest	Total	Planted during year ended 30th September, 1949		Under Plantations	Provisional Allocation of Other Land	
		Afforested	Re-afforested		Plantable	Agricultural, Unplantable, &c.
EAST CONSERVANCY:						
TOTAL	145,706	3,847	2,166	70,596	46,098	29,012
1. Monaughty	3,014	—	55	2,860	44	110
2. Kirkhill	1,539	—	90	999	412	128
3. Montreathmont	2,442	—	—	2,081	99	262
4. Culbin	6,311	230	100	4,404	1,667	240
5. Edensmuir	1,304	—	—	1,118	170	16
6. Tentsmuir	4,149	44	—	3,458	42	649
7. Drummond Hill	5,274	171	—	3,622	—	1,652
8. Teindland	1,305	—	109	1,169	49	87
9. The Bin	5,927	40	73	4,444	478	1,005
10. Speymouth	5,255	339	13	1,527	2,913	815
11. Blairadam	1,749	66	—	1,450	12	287
12. Drumtochty	3,285	—	22	2,326	26	933
13. Kemnay	1,173	29	—	1,152	—	21
14. Midmar	905	—	54	648	—	257
15. Deer	2,219	—	—	2,035	—	184
16. Scootmore	3,062	100	—	2,036	552	474
17. Clashindarroch	21,148	660	—	6,607	9,793	4,748
18. Roseisle	2,322	—	—	1,865	431	26
19. Blackcraig	2,048	4	—	1,524	251	273
20. Carden	482	—	—	457	—	25
21. Inglismaldie	1,132	—	75	1,109	14	9
22. Durris	3,842	180	60	2,993	624	225
23. Newton	175	—	—	—	15	160
24. Newtyle	1,085	1	—	886	15	184
25. Alltcailleach	3,834	—	320	2,959	700	175
26. Kinfauns	717	—	—	717	—	—
27. Whitehaugh	1,576	39	14	1,135	68	373
28. Craig Vinean	2,576	—	167	1,930	252	394
29. Glen Devon	915	87	—	674	216	25
30. Lossie	1,904	151	4	1,139	456	309
31. Keillour	2,181	109	79	964	838	379
32. Tilliefoure	3,632	—	265	1,296	1,265	1,071
33. Blackhall	3,233	246	—	1,064	1,056	1,113
34. Rosarie	3,322	133	166	989	2,040	293
35. Pitfichie	5,053	—	277	1,129	2,725	1,199
36. Fetteresso	8,063	409	—	1,491	3,909	2,663
37. Strathord	1,020	150	—	660	338	22
38. Allean	2,940	180	—	444	505	1,991
39. Auchernach	1,560	77	27	304	438	818
40. Dallas	2,021	11	92	441	789	791
41. Countesswells	664	—	54	404	224	36
42. Pitmedden	1,307	189	—	959	167	181
43. Rannoch	3,786	19	50	764	2,625	397
44. Tomintoul	1,450	106	—	226	805	419
45. Hallyburton	896	—	—	79	807	10
46. Corrennie	1,018	33	—	51	897	70
47. Delgaty... ..	426	—	—	—	426	—
48. Glen Isla	10,465	44	—	7	6,945	3,513
SOUTH CONSERVANCY:						
TOTAL	186,580	5,667	242	40,466	44,902	101,212
1. Glentress	2,352	—	—	1,516	372	464
2. Cairn Edward	15,034	552	—	3,497	5,872	5,665
3. Newcastleton	3,551	20	2	3,271	6	274
4. Dalbeattie	4,448	184	83	3,442	320	686

Appendix 14—continued

Forest	Total	Planted during year ended 30th September, 1949		Under Plantations	Provisional Allocation of Other Land	
		Afforested	Re-afforested		Plantable	Agricultural Unplantable, &c.
5. Forest of Ae	10,709	425	14	4,080	3,634	2,995
6. Edgarhope	1,711	—	20	999	163	549
7. Greskine	1,154	—	—	827	145	182
8. Auchenroddan	730	—	—	704	—	26
9. Kirroughtree	3,728	140	—	2,595	339	794
10. Fleet	1,785	—	—	988	204	593
11. Kilsture	500	—	13	492	5	3
12. Change	2,190	257	—	1,160	377	653
13. Dundeeugh	3,930	5	20	860	2,563	507
14. Tinnisburn	1,404	67	—	1,165	141	98
15. Corriedoo	1,022	95	—	729	149	144
16. Garcrogo	1,921	79	31	570	940	411
17. Laurieston	4,405	187	—	629	2,753	1,023
18. Twiglees	5,108	706	—	3,535	1,174	399
19. Castle O'er	2,646	247	—	1,848	583	215
20. Glen Trool	41,551	615	—	1,223	6,165	34,161
21. Claunchie	639	87	—	215	419	5
22. Shielswood	1,013	—	—	—	—	1,013
23. Mabie	3,258	249	43	1,074	1,047	1,137
24. Wauchope	9,096	401	16	1,194	4,742	3,160
25. Carrick	48,335	425	—	748	4,967	42,620
26. Elibank... ..	2,912	253	—	809	1,048	1,055
27. Glen Gap	1,994	197	—	304	1,221	469
28. Craik	3,368	270	—	411	2,329	628
29. Cardrona	1,860	60	—	1,273	—	587
30. Craigieburn	585	80	—	225	352	8
31. Leithope	1,165	66	—	66	979	120
32. Brownmoor	386	—	—	—	386	—
33. Dalmacallan	1,455	—	—	8	948	499
34. Kilgrammie	568	—	—	9	559	—
35. Bareagle	67	—	—	—	—	67
WEST CONSERVANCY:						
TOTAL	228,144	3,486	151	59,984	35,915	132,245
1. Inverliever	26,943	155	—	4,283	2,328	20,332
2. Glen Duror	8,319	8	—	2,241	127	5,951
3. Glen Branter	10,915	—	—	3,817	384	6,714
4. Ardgartan	18,126	—	—	4,250	962	12,914
5. Barcaldine	4,006	—	71	2,898	1,034	74
6. Benmore	12,999	155	12	3,878	1,587	7,534
7. Glen Finart	8,712	—	—	2,354	416	5,942
8. Fearnoch	1,342	—	—	1,121	—	221
9. Lennox	580	—	15	526	4	50
10. Loch Ard	26,910	554	—	8,825	7,108	10,977
11. Devilla	918	—	2	808	96	14
12. Achaglachgach	1,969	1	—	1,571	—	398
13. Knapdale	19,705	—	—	4,401	2,149	13,155
14. Strathyre	10,174	117	—	4,985	265	4,924
15. Tulliallan	112	—	—	—	—	112
16. Garadhban	1,137	—	—	1,012	—	125
17. Inverinan	12,795	36	4	2,549	3,038	7,208
18. Asknish	5,900	201	—	1,688	1,636	2,576
19. Carron Valley	6,640	310	—	2,951	1,794	1,895
20. Carradale	10,583	334	41	1,681	1,711	7,191
21. Minard	5,189	155	6	1,081	1,743	2,365
22. Saddell	4,917	200	—	604	652	3,661
23. Kilmichael	12,687	401	—	880	3,579	8,228
24. Corlarach	1,522	257	—	522	232	768
25. Glendaruel	6,055	167	—	329	2,222	3,504
26. Strath Lachlan	7,616	254	—	536	1,873	5,207
27. Torrie	976	181	—	193	677	106
28. Garelochhead	397	—	—	—	298	99

AREA STATEMENT OF LAND USE BY FORESTS—WALES

Appendix 15

As at 30th September, 1949

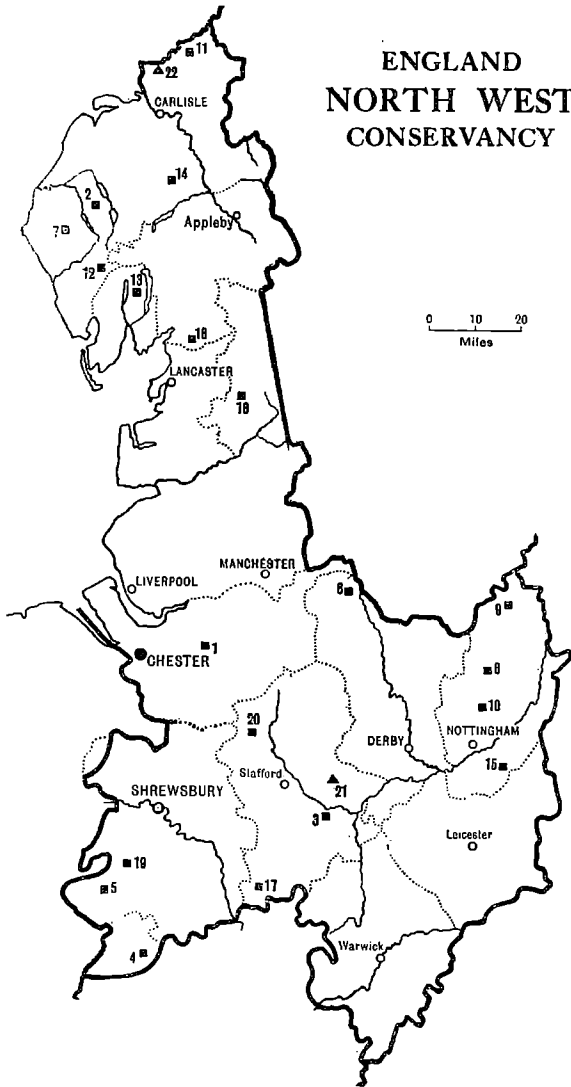
Acres

Forest	Total	Planted during year ended 30th September, 1949		Under Plantations	Provisional Allocation of Other Land	
		Afforested	Re-afforested		Plantable	Agricultural, Unplantable, &c.
NORTH CONSERVANCY:						
TOTAL	124,366	3,913	803	53,588	33,061	37,717
1. Hafod Fawr	1,367	—	13	469	88	810
2. Gwydyr	19,121	330	60	8,608	3,783	6,730
3. Coed y Brenin	16,842	256	80	6,933	3,235	6,674
4. Kerry	2,326	53	60	2,051	149	126
5. Beddgelert	2,771	—	—	1,604	67	1,100
6. Cynwyd	1,700	—	—	1,538	33	129
7. Dovey	14,485	501	52	8,246	3,103	3,136
8. Radnor	4,339	—	83	2,644	451	1,244
9. Cwmeinion	938	3	—	602	2	334
10. Mathrafal	595	5	11	436	137	22
11. Tarenig	2,614	58	—	1,344	72	1,198
12. Bryn Mawr	1,670	64	20	777	616	277
13. Myherin	8,220	341	54	4,230	1,046	2,944
14. Clocaenog	14,932	647	—	7,011	4,296	3,625
15. Dyfnant	4,343	63	106	794	2,482	1,067
16. Hafren	10,376	619	—	3,537	2,988	3,851
17. Coed Sarnau	4,232	420	16	1,423	1,962	847
18. Newborough	2,101	188	11	319	1,149	633
19. Aberhirnant	6,038	121	56	272	3,552	2,214
20. Carno	297	54	—	53	190	54
21. Coed Clwyd	1,338	88	—	88	985	265
22. Coed y Goror	795	—	101	183	602	10
23. Cwmmins Coch	931	102	3	115	532	284
24. St. Asaph	1,103	—	77	311	714	78
25. Bechan	60	—	—	—	60	—
26. Towy	832	—	—	—	767	65
SOUTH CONSERVANCY:						
TOTAL	88,316	3,213	854	49,792	23,129	15,395
1. Tintern	4,893	—	86	4,041	439	413
2. Margam	5,630	116	—	1,556	3,246	828
3. Llanover	2,677	—	—	2,315	222	140
4. Llantrisant	1,156	—	16	1,053	—	103
5. Chepstow	997	—	13	997	—	—
6. Rheola	13,751	525	28	7,316	4,218	2,217
7. Brechfa	14,760	831	169	9,741	1,001	4,018
8. Brecon	1,869	—	—	1,577	—	292
9. Glasfynydd	2,243	248	—	2,111	36	96
10. Pembrey	4,503	32	35	1,409	2,611	483
11. Caio	3,728	70	52	2,383	224	1,121
12. Crychan	7,566	424	25	4,546	2,001	1,019
13. Mynydd Du	2,720	43	—	1,461	267	992
14. Iton	515	—	14	333	182	—
15. Hay	721	—	—	675	—	46
16. St. Gwynno	3,288	289	20	1,724	856	708
17. Coed y Rhaiadr	610	—	2	555	7	48
18. Cwmogwr	2,756	161	—	915	525	1,316
19. Giedd	746	2	30	445	178	123
20. Michaelston	4,614	136	—	1,675	2,291	648
21. Tair Onen	189	—	10	53	—	136
22. Usk	1,116	101	2	978	59	79
23. Monmouth	499	—	14	242	164	93
24. Wentwood	945	—	81	564	367	14
25. Cilgwyn	191	12	51	189	—	2
26. Goytre	240	—	28	203	37	—
27. Derry Ormond	768	5	178	183	502	83
28. Taf Fechan	1,130	218	—	467	577	86
29. Coed Caerdydd	2,342	—	—	85	1,972	285
30. Slebech	1,153	—	—	—	1,147	6

**OUTLINE MAPS SHOWING CONSERVANCY BOUNDARIES AND
DISTRIBUTION OF FORESTS AS AT SEPTEMBER 30th, 1949**

Appendix 16

Forests are listed by Conservancies in order of acquisition ; new units are shown by triangles, and former Crown Woods are indicated in the lists by asterisks.

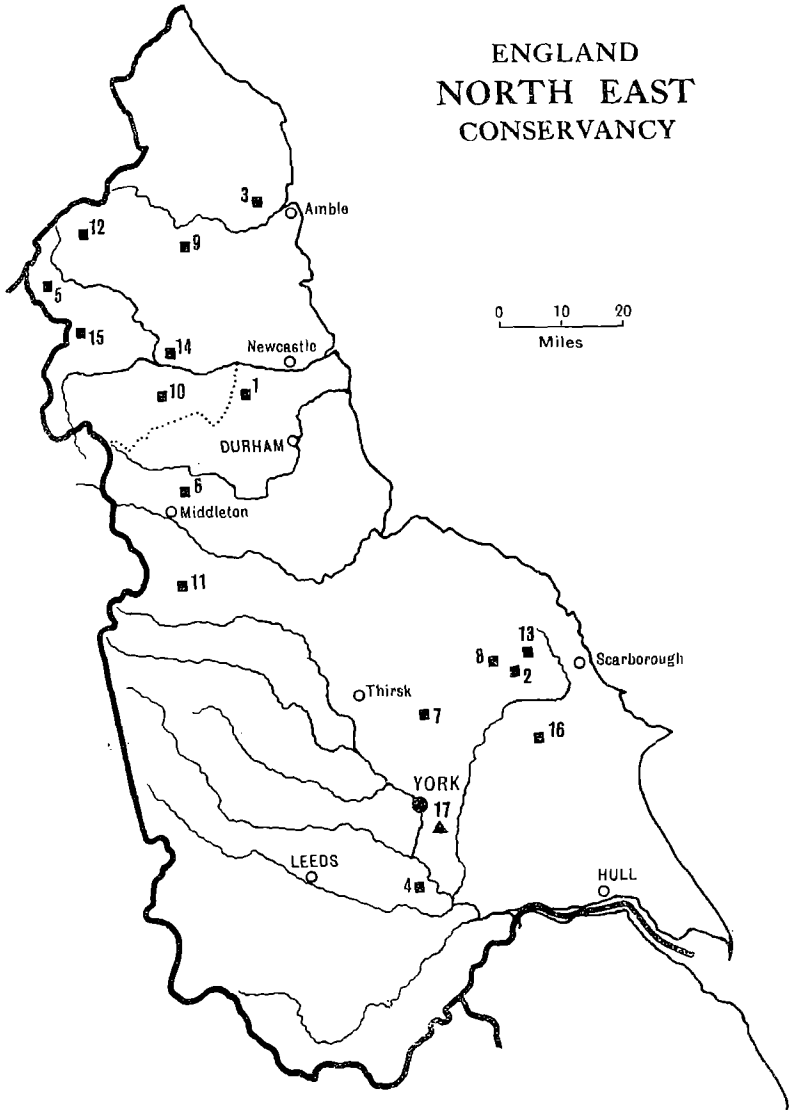


Conservator's Office: Upton Grange, Upton-by-Chester (Chester 4006).

- | | |
|--|---------------------------|
| 1. Delamere, Cheshire* | 13. Grizedale, Lancs. |
| 2. Thornthwaite, Cumberland | 14. Greystoke, Cumberland |
| 3. Cannock Chase, Staffs. | 15. Cotgrave, Notts. |
| 4. Mortimer, Hereford and Salop. | 16. Dalton, Westmorland |
| 5. Walcot, Salop. | 17. Kinver, Staffs. |
| 6. Clipstone, Derby, Notts. and Yorks. | 18. Gisburn, Yorks. |
| 7. Ennerdale, Cumberland | 19. Long Mynd, Salop. |
| 8. Hope, Derby | 20. Swynnerton, Staffs. |
| 9. Bawtry, Notts. | |
| 10. Sherwood, Notts. | |
| 11. Kershope, Cumberland | 21. Bagot, Staffs. |
| 12. Hardknott, Cumberland and Lancs. | 22. Longtown, Cumberland. |

New Units, 1949.

ENGLAND NORTH EAST CONSERVANCY

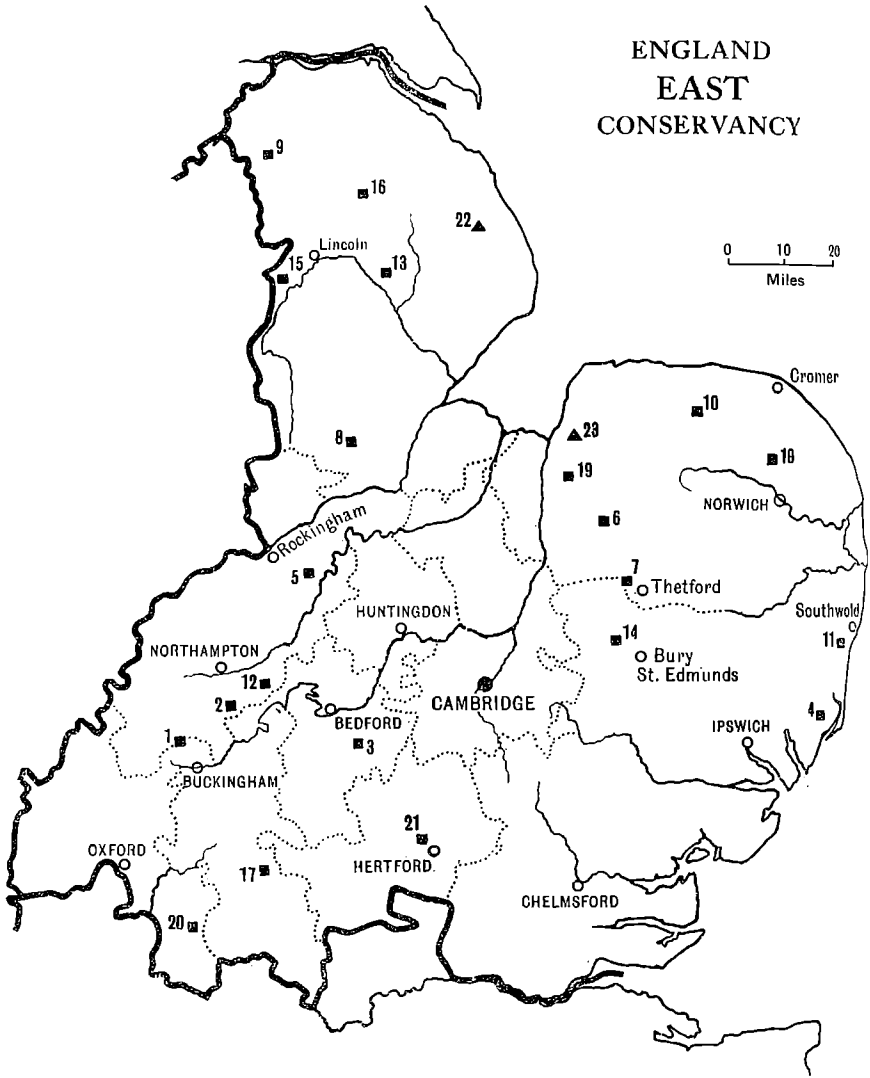


Conservator's Office: Briar House, Fulford Road, York (York 4684)

- | | |
|-----------------------------|-------------------------------|
| 1. Chopwell, Durham* | 11. Arkengarthdale, Yorks. |
| 2. Allerston, Yorks. | 12. Redesdale, Northumberland |
| 3. Rothbury, Northumberland | 13. Langdale, Yorks. |
| 4. Selby, Yorks. | 14. Widehaugh, Northumberland |
| 5. Kielder, Northumberland | 15. Wark, Northumberland |
| 6. Hamsterley, Durham | 16. Scardale, Yorks. |
| 7. Ampleforth, Yorks. | |
| 8. Rosedale, Yorks. | |
| 9. Harwood, Northumberland | |
| 10. Slaley, Northumberland | 17. York, Yorks. |

New Unit, 1949.

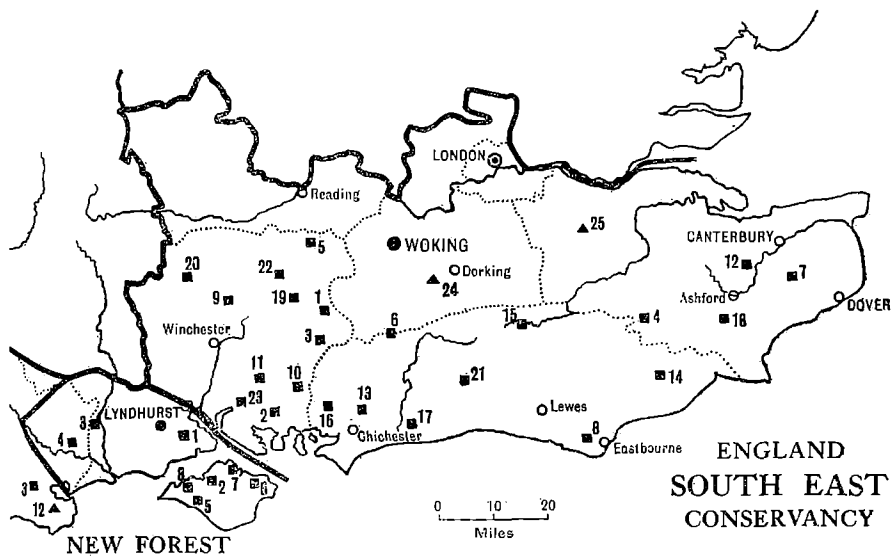
ENGLAND
EAST
CONSERVANCY



Conservator's Office: Brooklands Avenue, Cambridge (Cambridge 54495)

- | | |
|--|-------------------------------------|
| 1. Hazelborough, Bucks and Northants.* | 13. Bardney, Lincoln |
| 2. Salcey, Bucks. and Northants.* | 14. The King's Forest, Suffolk |
| 3. Ampthill, Beds. | 15. Wigsley, Lincoln and Nottingham |
| 4. Rendlesham, Suffolk | 16. Willingham, Lincoln |
| 5. Rockingham, Northampton | 17. Wendover, Bucks. |
| 6. Swaffham, Norfolk | 18. Hevingham, Norfolk |
| 7. Thetford Chase, Norfolk and Suffolk | 19. Shouldham, Norfolk |
| 8. Bourne, Lincoln and Rutland | 20. Watlington, Oxford |
| 9. Laughton, Lincoln | 21. Bramfield, Herts. |
| 10. Swanton, Norfolk | |
| 11. Dunwich, Suffolk | |
| 12. Yardley Chase, Bedford and Northampton | |
| | 22. Burwell, Lincs. |
| | 23. Gaywood, Norfolk: |

New Units, 1949.



SOUTH-EAST CONSERVANCY

Conservator's Office: Danesfield, Grange Road, Woking (Woking 2270)

- | | |
|------------------------------------|-------------------------|
| 1. Alice Holt, Hants.* | 15. Gravetye, Sussex |
| 2. Bere, Hants.* | 16. Marden, Sussex |
| 3. Woolmer, Hants.* | 17. Arundel, Sussex |
| 4. Bedgebury, Kent and Sussex* | 18. Orlestone, Kent |
| 5. Bramshill, Berks. and Hants. | 19. Alton, Hants |
| 6. Chiddingfold, Surrey and Sussex | 20. Andover, Hants. |
| 7. Lyminge, Kent | 21. Southwater, Sussex |
| 8. Friston, Sussex | 22. Basing, Hants. |
| 9. Micheldever, Hants. | 23. Bishopstoke, Hants. |
| 10. Buriton, Hants. and Sussex | |
| 11. Westbury, Hants. | |
| 12. Challock, Kent | |
| 13. Goodwood, Charlton, Sussex | |
| 14. Vinehall, Sussex | |

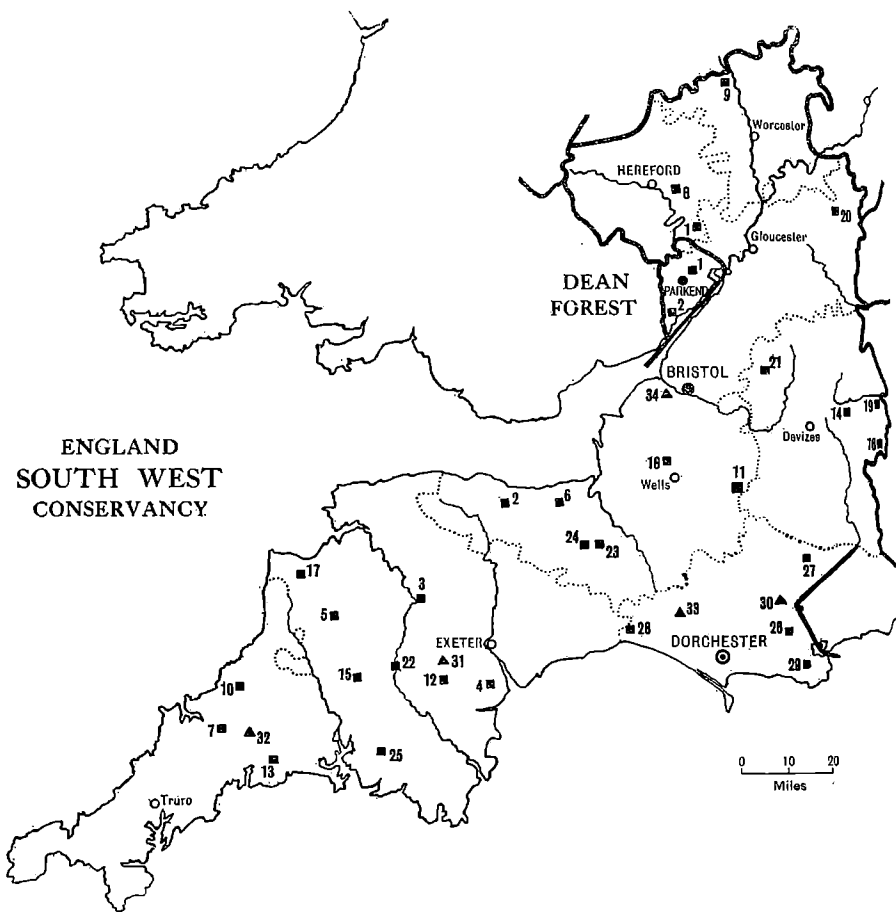
New Units, 1949.

- | |
|-----------------------|
| 24. Abinger, Surrey. |
| 25. Shipbourne, Kent. |

NEW FOREST

Deputy Surveyor's Office: The King's House, Lyndhurst (Lyndhurst 300)

- | | |
|--------------------------------|--------------------------------|
| 1. New Forest, Hants.* | 5. Brighthstone, Isle of Wight |
| 2. Parkhurst, Isle of Wight* | 6. Combley, Isle of Wight |
| 3. Ringwood, Dorset and Hants. | 7. Osborne, Isle of Wight |
| 4. Ferndown, Dorset | 8. Shalfeet, Isle of Wight |



SOUTH-WEST CONSERVANCY

Conservator's Office: Flowers Hill, Brislington, Bristol 4, (Bristol 78041)

- | | |
|-------------------------------------|----------------------------------|
| 1. Dymock, Gloucester and Hereford* | 20. Stanway, Gloucester |
| 2. Brendon, Somerset | 21. Braydon, Wilts. |
| 3. Eggesford, Devon | 22. Okehampton, Devon |
| 4. Haldon, Devon | 23. Neroche, Somerset |
| 5. Halwill, Devon | 24. Culmhead, Somerset |
| 6. Quantock, Somerset | 25. Plym, Devon |
| 7. Bodmin, Cornwall | 26. Wareham, Dorset. |
| 8. Haugh, Hereford | 27. Gardiner, Dorset and Wilts. |
| 9. Wyre, Worcester | 28. Charmouth, Devon and Dorset. |
| 10. Wilsey Down, Cornwall | 29. Purbeck, Dorset. |
| 11. Bruton, Somerset and Wilts. | |
| 12. Dartmoor, Devon | |
| 13. Herodsfoot, Cornwall | |
| 14. West Woods, Wilts. | |
| 15. Lydford, Devon | |
| 16. Collingbourne, Wilts. | |
| 17. Hartland, Devon | |
| 18. Mendip, Somerset | |
| 19. Savernake, Wilts. | |

New Units, 1949.

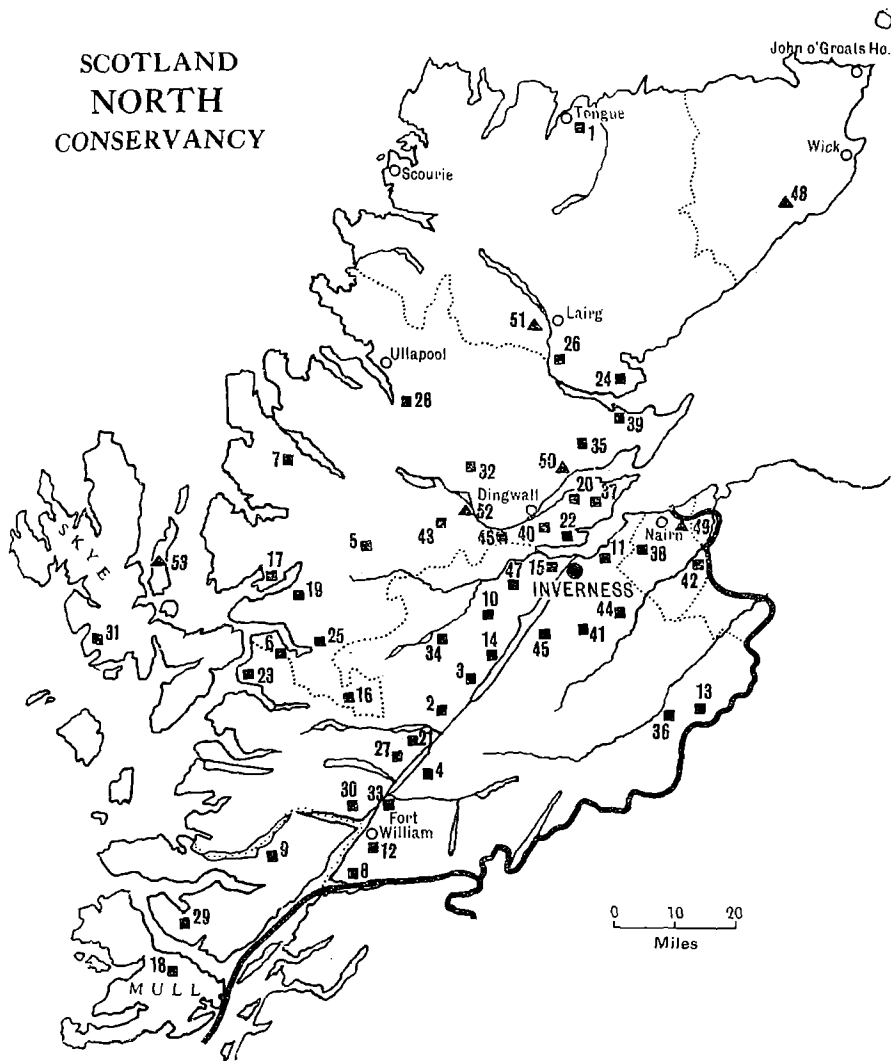
- | |
|---|
| 30. Blandford, Dorset. |
| 31. Fernworthy, Devon (formerly part of Dartmoor) |
| 32. Glynn, Cornwall (formerly part of Bodmin) |
| 33. Poorstock, Dorset. |
| 34. Stokeleigh, Somerset. |

DEAN FOREST

Deputy Surveyor's Office: Whitmead Park, Parkend, nr. Lydney (Whitecroft 305)

- | | |
|---|-------------------------------|
| 1. Dean Forest, Gloucester, Hereford, and Monmouth* | 2. Tidenham Chase, Gloucester |
|---|-------------------------------|

SCOTLAND NORTH CONSERVANCY

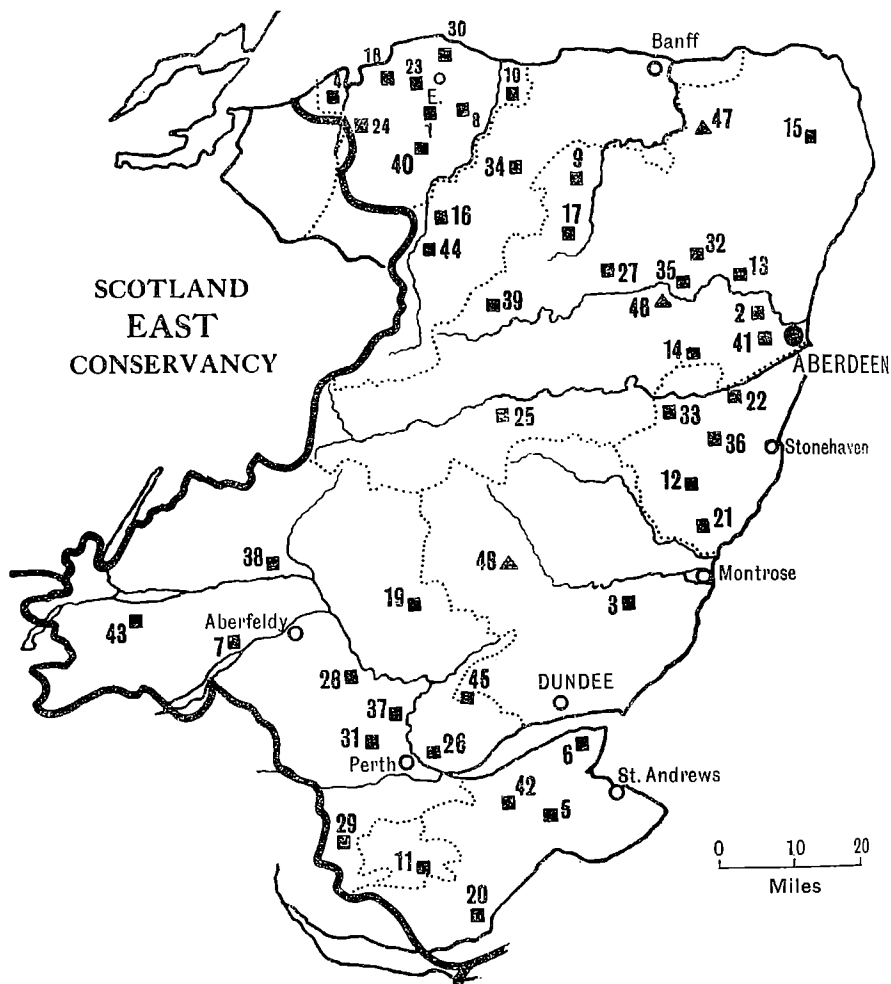


Conservator's Office: 60, Church Street, Inverness (Inverness 223)

- | | |
|-----------------------------------|--------------------------------|
| 1. Borgie, Sutherland | 29. Fiunary, Argyll |
| 2. Inchnacardoch, Inverness | 30. Glen Loy, Inverness |
| 3. Portclair, Inverness | 31. Glen Brittle, Isle of Skye |
| 4. South Laggan, Inverness | 32. Longart, Ross |
| 5. Achnashellach, Ross | 33. Leanachan, Inverness |
| 6. Ratagan, Inverness and Ross | 34. Guisachan, Inverness |
| 7. Slattadale, Ross | 35. Ardross, Ross |
| 8. Glen Righ, Inverness | 36. Inshriach, Inverness |
| 9. Glen Hurich, Argyll | 37. Millbuie, Ross |
| 10. Glen Urquhart, Inverness | 38. Assich, Nairn |
| 11. Culloden, Inverness | 39. Morangie, Ross |
| 12. Nevis, Inverness | 40. Kilcoy, Ross |
| 13. The Queen's Forest, Inverness | 41. Strath Nairn, Inverness |
| 14. Craig nan Eun, Inverness | 42. Ferness, Nairn |
| 15. Craig Phadrig, Inverness | 43. Strath Conon, Ross |
| 16. Glen Shiel, Ross | 44. Strath Dearn, Inverness |
| 17. North Strome, Ross | 45. Farigaig, Inverness |
| 18. Salen, Isle of Mull | 46. Urray, Ross |
| 19. South Strome, Ross | 47. Battan, Inverness |
| 20. Findon, Ross | |
| 21. Glen Garry, Inverness | |
| 22. Kessock, Ross | |
| 23. Eilanreach, Inverness | |
| 24. Dornoch, Sutherland | |
| 25. Inverinate, Ross | |
| 26. Balblair, Sutherland | |
| 27. Clunes, Inverness | |
| 28. Lael, Ross | |

New Units, 1949.

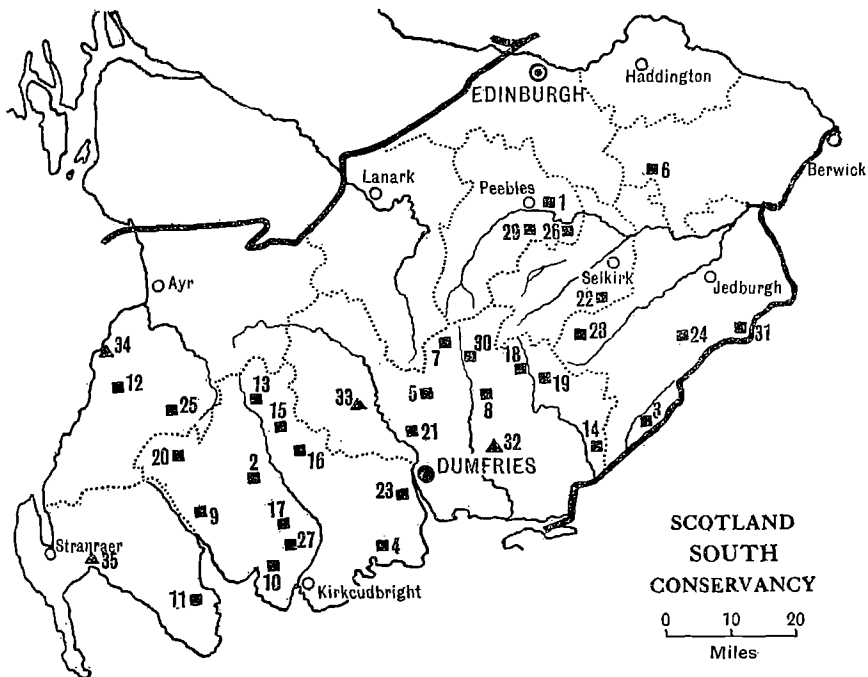
- | |
|-----------------------------|
| 48. Rumster, Caithness. |
| 49. Laiken, Nairn. |
| 50. Clach Liath, Ross. |
| 51. Shin, Sutherland. |
| 52. Torrachilty, Ross. |
| 53. Raasay, Isle of Raasay. |



Conservator's Office: 6, Queen's Gate, Aberdeen (Aberdeen 33361)

- | | |
|--|-----------------------------------|
| 1. Monaughty, Moray | 26. Kinfauns, Perth |
| 2. Kirkhill, Aberdeen | 27. Whitehaugh, Aberdeen |
| 3. Montreathmont, Angus | 28. Craig Vinean, Perth |
| 4. Culbin, Moray and Nairn | 29. Glen Devon, Perth |
| 5. Edensmuir, Fife | 30. Lossie, Moray |
| 6. Tentsmuir, Fife | 31. Keillour, Perth |
| 7. Drummond Hill, Perth | 32. Tilliefoure, Aberdeen |
| 8. Teindland, Moray | 33. Blackhall, Kincardine |
| 9. The Bin, Aberdeen | 34. Rosarie, Banff |
| 10. Speymouth, Moray | 35. Pitfichie, Aberdeen |
| 11. Blairadam, Fife and Kinross | 36. Fetteresso, Kincardine |
| 12. Drumtochty, Kincardine | 37. Strathord, Perth |
| 13. Kemnay, Aberdeen | 38. Allean, Perth |
| 14. Midmar, Aberdeen | 39. Auchernach, Aberdeen |
| 15. Deer, Aberdeen | 40. Dallas, Moray |
| 16. Scootmore, Banff and Moray. | 41. Countesswells, Aberdeen |
| 17. Clashindarroch, Aberdeen (includes Gartly Moor). | 42. Pitmedden, Fife |
| 18. Roseisle, Moray | 43. Rannoch, Perth |
| 19. Blackcraig, Perth | 44. Tomintoul, Banff |
| 20. Carden, Fife | 45. Hallyburton, Angus and Perth. |
| 21. Inglismaldie, Kincardine | |
| 22. Durriss, Kincardine | |
| 23. Newton, Moray | |
| 24. Newtyle, Moray | |
| 25. Alltcailleach, Aberdeen | |
| | 46. Corrennie, Aberdeen. |
| | 47. Delgaty, Aberdeen. |
| | 48. Glen Isla, Angus. |

New Units, 1949.



SCOTLAND
SOUTH
CONSERVANCY

0 10 20
Miles

Conservator's Office: Greystone Park, Moffat Road, Dumfries (Dumfries 1156)

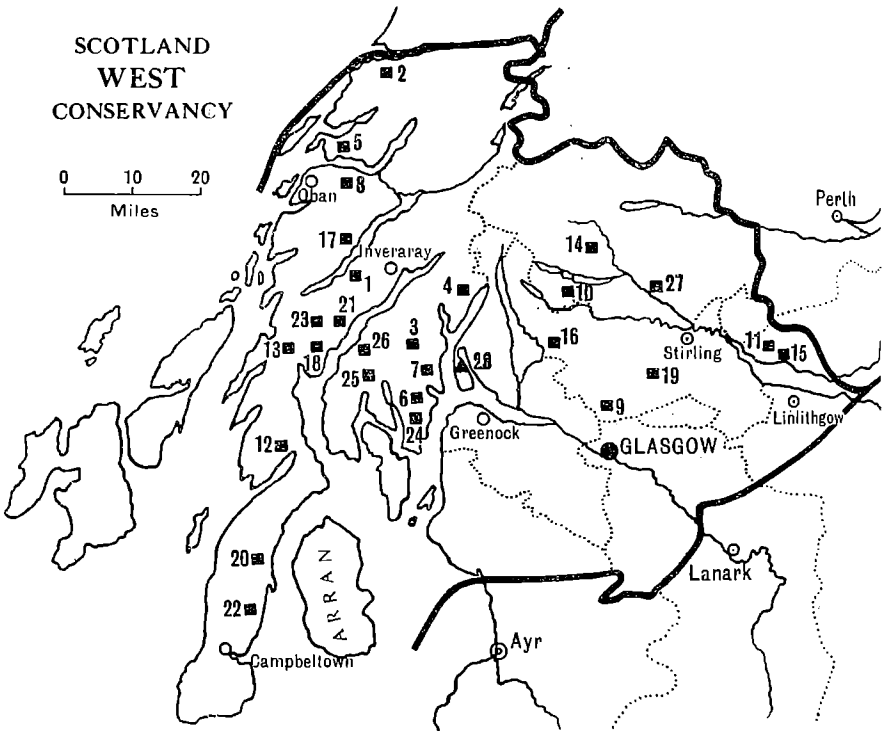
- | | |
|---------------------------------------|------------------------------|
| 1. Glentress, Peebles | 20. Glen Trool, Kirkcubright |
| 2. Cairn Edward, Kirkcubright | 21. Clauchrie, Dumfries |
| 3. Newcastleton, Roxburgh | 22. Shielswood, Selkirk |
| 4. Dalbeattie, Kirkcubright | 23. Mabie, Kirkcubright |
| 5. Forest of Ae, Dumfries | 24. Wauchope, Roxburgh |
| 6. Edgarhope, Berwick | 25. Carrick, Ayr |
| 7. Greskine, Dumfries | 26. Elibank, Peebles |
| 8. Auchenroddan, Dumfries | 27. Glen Gap, Kirkcubright |
| 9. Kirroughtree, Kirkcubright | 28. Craik, Roxburgh |
| 10. Fleet, Kirkcubright | 29. Cardrona, Peebles |
| 11. Kilsture, Wigtown | 30. Craigieburn, Dumfries |
| 12. Changue, Ayr | 31. Leithope, Roxburgh |
| 13. Dundough, Kirkcubright | |
| 14. Tinnisburn, Dumfries and Roxburgh | |
| 15. Corriedoo, Kirkcubright | |
| 16. Garcrogo, Kirkcubright | |
| 17. Laurieston, Kirkcubright | |
| 18. Twiglees, Dumfries | |
| 19. Castle O'er, Dumfries | |

New Units, 1949.

- | |
|----------------------------|
| 32. Brownmoor, Dumfries. |
| 33. Dalmacallan, Dumfries. |
| 34. Kilgrammie, Ayr. |
| 35. Bareagle, Wigtown. |

SCOTLAND
WEST
CONSERVANCY

0 10 20
Miles

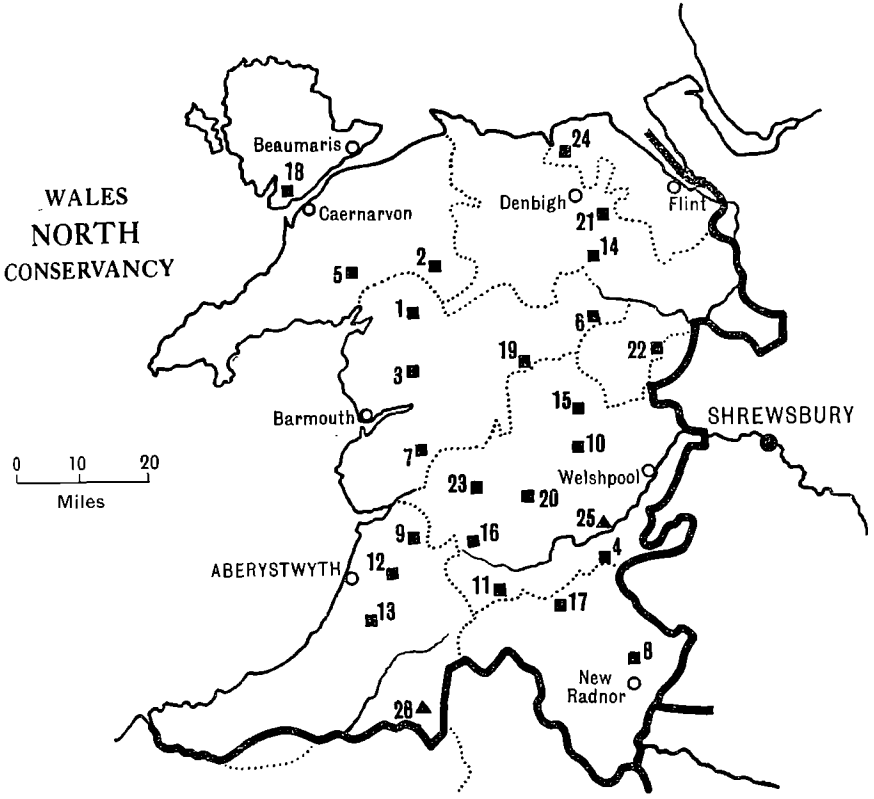


Conservator's Office: 53, Bothwell Street, Glasgow, C.2 (Central 6868)

- | | |
|---------------------------|-----------------------------|
| 1. Inverliever, Argyll* | 16. Garadhban, Stirling |
| 2. Glen Duror, Argyll | 17. Inverinan, Argyll |
| 3. Glen Branter, Argyll | 18. Asknish, Argyll |
| 4. Ardgartan, Argyll | 19. Carron Valley, Stirling |
| 5. Barcaldine, Argyll | 20. Carradale, Argyll |
| 6. Benmore, Argyll | 21. Minard, Argyll |
| 7. Glen Finart, Argyll | 22. Saddell, Argyll |
| 8. Fearnoch, Argyll | 23. Kilmichael, Argyll |
| 9. Lennox, Stirling | 24. Corlarach, Argyll |
| 10. Loch Ard, Perth | 25. Glendaruel, Argyll |
| 11. Devilla, Fife | 26. Strath Lachlan, Argyll |
| 12. Achaglachgach, Argyll | 27. Torrie, Perth |
| 13. Knapdale, Argyll | |
| 14. Strathyre, Perth | |
| 15. Tulliallan, Fife | |

New Unit, 1949.

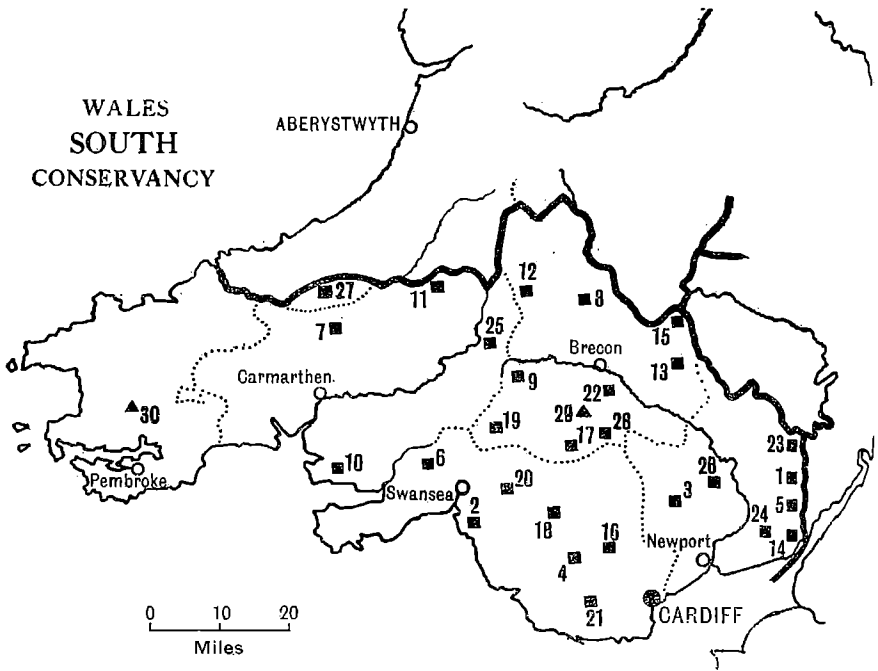
28. Garelochhead, Dunbarton.



Conservator's Office: 35, Hills Lane, Shrewsbury (Shrewsbury 4071)

- | | |
|--------------------------------------|-------------------------------------|
| 1. Hafod Fawr, Merioneth* | 15. Dyfnant, Montgomery |
| 2. Gwydyr, Caernarvon and Denbigh | 16. Hafren, Montgomery |
| 3. Coed y Brenin, Merioneth | 17. Coed Sarnau, Radnor |
| 4. Kerry, Montgomery and Salop | 18. Newborough, Anglesey |
| 5. Beddgelert, Caernarvon | 19. Aberhirnant, Merioneth |
| 6. Cynwyd, Merioneth | 20. Carno, Montgomery |
| 7. Dovey, Merioneth and Montgomery | 21. Coed Clwyd, Denbigh |
| 8. Radnor, Radnor | 22. Coed y Goror, Denbigh and Salop |
| 9. Cwmeinon, Cardigan | 23. Commins Coch, Montgomery |
| 10. Mathrafal, Montgomery | 24. St. Asaph, Denbigh and Flint |
| 11. Tarenig, Cardigan and Montgomery | |
| 12. Bryn Mawr, Cardigan | 25. Bechan, Montgomery. |
| 13. Myherin, Cardigan | 26. Towy, Cardigan and Brecon. |
| 14. Clocaenog, Denbigh and Merioneth | |

New Units, 1949.



Conservator's Office: 166, Newport Road, Cardiff (Cardiff 44401)

- | | |
|-------------------------------------|----------------------------|
| 1. Tintern, Monmouth* | 17. Coed y Rhaiadr, Brecon |
| 2. Margam, Glamorgan | 18. Cwmogwr, Glamorgan |
| 3. Llanover, Monmouth | 19. Giedd, Brecon |
| 4. Llantrisant, Glamorgan | 20. Michaelston, Glamorgan |
| 5. Chepstow, Monmouth | 21. Tair Onen, Glamorgan |
| 6. Rheola, Glamorgan | 22. Usk, Brecon |
| 7. Brechfa, Carmarthen | 23. Monmouth, Monmouth |
| 8. Brecon, Brecon | 24. Wentwood, Monmouth |
| 9. Glasfynydd, Brecon | 25. Cilgwyn, Carmarthen |
| 10. Pembrey, Carmarthen | 26. Goytre, Monmouth |
| 11. Caio, Carmarthen | 27. Derry Ormond, Cardigan |
| 12. Crychan, Brecon and Carmarthen | 28. Taf Fechan, Brecon |
| 13. Mynydd Ddu, Brecon and Monmouth | |
| 14. Itton, Monmouth | |
| 15. Hay, Brecon and Hereford | |
| 16. St. Gwynno, Glamorgan | |

New Units, 1949.

- | |
|----------------------------|
| 29. Coed Caerdydd, Brecon. |
| 30. Slebech, Pembroke. |

PUBLICATIONS ISSUED 1919—1949

Appendix 17

Items marked * are now out of print

1. PARLIAMENTARY PUBLICATIONS

COMMAND PAPERS:

Post-War Forest Policy—Report by H.M. Forestry Commissioners. Cmd. 6447. 1943	2s. 0d.
Post-War Forestry Policy—Private Woodlands Supplementary Report by H.M. Forestry Commissioners. Cmd. 6500. 1944	2d.
Report of the New Forest Committee. Cmd. 7245. 1947	3s. 6d.

HOUSE OF COMMONS PAPERS:

ANNUAL REPORTS OF THE FORESTRY COMMISSIONERS:

*1920 (1st)	1935 ... ..	... ..	(16th)
*1921 (2nd)	1936 ... ..	... ..	(17th)
*1922 (3rd)	*1937 ... ..	... ..	(18th)
*1923 (4th)	1938 ... ..	... ..	(19th)
*1924 (5th)			
*1925 (6th)	(None published for the years 1939—1944 (20th—25th) inclusive.)		
*1926 (7th)			
*1927 (8th)			
1928 (9th)	1945		(26th)
*1929 (10th)	1946		(27th)
*1930 (11th)	1947		(28th)
*1931 (12th)	1948		(29th)
1932 (13th)			
1933 (14th)			
*1934 (15th)			

(Prices vary from 9d. to 2s. 0d.)

2. NON-PARLIAMENTARY PUBLICATIONS

GENERAL REPORTS:

*Report on Census of Woodlands and Census of Production of Home-grown Timber, 1924	1s. 9d.
*Report on Census of Production of Home-grown Timber, 1930	3d.
Interim Report of the Inter-Departmental Home-grown Timber Committee, 1933	4d.

REPORTS ON TIMBER UTILISATION:

*Demand for Timber for Box and Packing Case Manufacture in Great Britain	1934		9d.
*Demand for Timber in Coal Mining in England and Wales	1935	1s.	3d.
*Demand for Timber in Wood Turning in Great Britain	1936	1s.	3d.
*Demand for Timber in Shipbuilding and in Docks and Harbours	1938	1s.	3d.

REPORTS OF NATIONAL FOREST PARK COMMITTEES:

*Argyll	1935		6d.
*Snowdonia	1937		6d.
*Forest of Dean	1938		6d.
*Glen Trool	1945		9d.
*Hardknott	1945		4d.

NATIONAL FOREST PARK GUIDES:

Argyll	1938	1s.	6d.
Forest of Dean	1947	2s.	0d.
Snowdonia	1948	2s.	6d.
Glenmore	1949	2s.	0d.
Hardknott	1949	2s.	0d.

BRITAIN'S FORESTS:

Forest of Ae	1948		6d.
--------------	------	--	-----

DULLETINS:

* 1. Collection of Data as to Rate of Growth of Timber	1920		4d.
* 2. Survey of Forest Insect Conditions in the British Isles (1919)	1920	1s.	6d.
* 3. Rate of Growth of Conifers in the British Isles	1920	3s.	0d.
* 4. Douglas Fir Chermes (Chermes cooleyi)	1922	2s.	0d.