F O R E S T R Y C O M M I S S I O N

REVIEW

OF THE

FIRST TWENTY-FIVE

YEARS WORK

1919 - 1944

LONDON

NOTE.- Owing to war-time difficulties this Review was not published.

Twenty-Fifth Annual Report of the Forestry Commissioners for the Year-ending 30th September, 1944.

With their 5th, 10th and 15th Annual Reports the Forestry Commissioners issued quinquennial reviews of their work and had intended to present a similar statement in 1939. With the outbreak of war the proposal had to be abandoned and further no Annual Reports have been printed since the 19th Report (for 1937/8) owing to shortage of paper. It is proposed therefore in this Report to review the 10 year period 1935-44, which divides itself naturally into one quinquennium of peace and one of war and at certain interesting points to cover the whole life of the Forestry Commission extending over the 25 years November 1919 to November 1944.

In their 15th Annual Report the Commissioners commented on the instability of its financial provisions and the resulting difficulties and inefficiencies. This state of affairs continued during the quinquennium 1935-39. The annual sums made available are stated below:

Financial Year.	Parliamentary Vote.	Working Receipts.	Total available for spending.
	£	£	£
1934-5	450,000	178,300	628,300
35-6	450,000	182,500	632,500
36-7	700,000	187,500	887,500
37-8	800,000	240,900	1,040,900
38-9	800,000	224,500	1,024,500
	3,200,000	1,013,700	4,213,700

At the commencement of the quinquennium the Commissioners were working under a five-year programme laid down by the Government at the time of the financial crisis in 1931. This programme provided for an annual grant from the Exchequer of £450,000 per annum for the financial years 1932 to 1936, and a planting programme of 20,000 acres per annum. In January 1935 the Commissioners represented to the Government that it was desirable to review the position generally, and recommended that the planting programme should be increased to 30,000 acres per annum in the course of the next four years and that, as a long-term policy, expansion should be continued up to a maximum of 45,000 acres per annum. In the course of 1935 the question of afforestation in relation to the Special Areas also received further consideration. On 20th February 1936 the Chancellor of the Exchequer stated in the House of Commons that he had agreed to recommend to the House that the annual grant-in-aid to the Forestry Fund for the next five years should be increased to £500,000 (sufficient, with increased working receipts, to enable the Commissioners to expand their normal planting programme to 30,000 acres per annum), and that in addition the Commissioners had been authorised to proceed with a first instalment of an afforestation and holdings scheme in the Special Areas estimated to cost about £1,650,000 in all. The additional sums provided for Special Areas during the quinquennium amounted to £200,000 in 1936 and £300,000 in each of the years 1937 and 1938.

At the outbreak of war the Commission's organisation was divided into two Departments, namely, Timber Supply and Forest Management and so continued until February, 1941, when the Timber Supply Department was transferred to the Ministry of Supply. A separate detailed Report will be published on the operations of that Department.

The Forest Management Department was charged with the care and maintenance of the existing State forests and also as a secondary role planting and re-planting on such scale as circumstances permitted. The money available is stated below:

Financial Year.	Parliamentary Vote.	Working Receipts.	Total available for spending.
	£	£	£
1939-40	650,000	193,200	843,200
40-41	450,000	553,900	1,003,900
41-42	400,000	553,000	953,000
42-43	625,000	632,300	1,257,300
43-44	550,000	943,400	1,493,400
	2,675,000	2,875,800	5,550,800

The great bulk of the working receipts came from the sale of timber, and in 1943 there was a special receipt of £104,000 in respect of compensation for the Commission's coal rights transferred to the Coal Commission under the Coal Act, 1938.

The table below, which shows for each quinquennium the average annual amount available for spending and the maximum annual variations over and under the average, illustrates the instability of the Commission's finances.

	Average Annual Amount available for spending.	Maximum Annual Variations over (+) and under (-) the Average.
	£	
1st Quinquennium	275,000	+ £198,000 - £174,000
2nd "	582,000	+ £143,000 - £155,000
3rd "	710,000	+ £287,000 - £162,000
4th "	843,000	+ £198,000 - £214,000
5th "	1,110,000	+ £383,000 - £267,000

Had the Commissioners been permitted to proceed with a steadily expanding programme of afforestation, as was originally intended, the annual funds available in each quinquennium would have been less than the average during the first few years and above the average during the succeeding years. This position however was completely reversed in the first and third quinquenniums. During the former, available funds exceeded the average by 72 per cent. in 1921 (when the Commissioners were asked to undertake schemes for relief of unemployment) and fell to 63 per cent. below the average in 1922 (following a crisis in national finances and a Government decision that the provision for 1922 and 1923 should be on a reduced scale). Finances followed a normal trend in the second quinquennium, when the Commissioners were authorised to return to an expanding programme, and the maximum annual variations were 27 per cent. below the average in 1925 and 25 per cent. above the average in 1927. During the third quinquennium funds exceeded the average by 40 per cent. in 1930 (following a Government decision to ask Parliament to vote approximately £9 millions over the ten financial years 1929 to 1938), and fell to 23 per cent. below the average in 1932 (following a further crisis in national finances and a Government decision to reduce the Exchequer grant to £450,000 per annum for a five-year period). During the fourth quinquennium, the Commissioners were again authorised (in 1936) to expand their normal planting programme and were at the same time asked to undertake work in the Special Areas; available funds were 25 per cent. below the average in 1934

and 23 per cent. above in 1937. Most of the fifth quinquennium falls within the war period, when finances were affected by the absence of any settled planting programme and steep rises in forest workers' wages, which rose from 38/- per week in 1939, to 42/- in January 1940, 48/- in July 1940, 60/- in December 1941 and 65/- in December 1943. Available funds were 24 per cent. below the average in 1939 and 35 per cent. above in 1943; in the latter year funds were swollen by the special receipt of £104,000, coal compensation, previously referred to.

Personnel of the Commission. A list of Commissioners who served within the 10-year period under review is given below. Sir Roy Robinson was Chairman and Mr. A.G. Herbert, Secretary, throughout.

		First Appointment as Commissioner.
*	Sir Roy Robinson (4th Chairman)	29th November, 1919.
	Sir Francis Acland, Bt., M.P. ø	do.
	Col. W. Steuart-Fothringham ø	do.
	Mr. W.R. Smith ø	27th February, 1925.
*	Col. Sir George Courthope, Bt. M.P.	11th October, 1927.
	Mr. D.R. Grenfell, M.P. ø	29th November, 1929.
*	Major Sir S. Strang Steel, Bt.	26th March, 1932.
	Sir Alexander Rodger ø	25th May, 1932.
	Sir John Sutherland ø	29th November, 1934.
*	Col. L. Ropner, M.P.	1st July, 1936.
*	Mr. W.L. Taylor	8th November, 1938.
*	Mr. M.P. Price, M.P.	23rd May, 1942.
*	Mr. D.J.K. Quibell, M.P.	do.
*	The Earl of Radnor	do.
*	Mr. J.M. Bannerman	18th November, 1942.
	The Earl of Moray ø	do.

* Member of the present Commission.

ø Sir Francis Acland, 29.11.19. to 9.6.39.
Colonel Steuart-Fothringham, 29.11.19 to 8.4.36.
Mr. W.R. Smith, 27.2.25. to 26.2.42.
Mr. D.R. Grenfell, 29.11.29 to 23.5.42.
Sir Alexander Rodger, 25.5.32 to 28.11.39.
Sir John Sutherland, 29.11.34 to 18.11.42.
The Earl of Moray, 18.11.42. to 9.7.43.

Mr. O.J. Sangar succeeded Mr. W.L. Taylor as Assistant Commissioner for England & Wales on the latter's promotion to be Commissioner on 8th November, 1938. Messrs. A.P. Long and A.H. Gosling were appointed Acting Assistant Commissioners on 1st January, 1940. Mr. J.M. Murray's death on 30th September, 1939, was a severe loss to the Commission.

FINANCE.

The total sum paid into the Forestry Fund from the Exchequer during the twenty-five financial years ended 31st March 1934 was £12,151,800, of which £3½ millions was the statutory provision made under the Forestry Act, 1919, for the first decade ended 31st March 1929, the sums totalling £8,651,800 were voted by Parliament during the subsequent fifteen years. Receipts from operations were also paid into the Fund, the total for the twenty-five years being £5,444,000, of which £784,000 was received in the first decade, £1,784,000 in the second decade and £2,876,000 in the next five years. The total funds available during the twenty-five years amounted therefore to £17,596,000. Payments out of the Forestry Fund amounted to £17,164,000, of which £4,148,000 was spent in the first decade, £7,836,000 in the second decade and £5,180,000 in the next five years.

Quinquennium	Funds available			Payments
	Parliamentary Votes.	Receipts from Operations.	Total	
	£	£	£	£
1919 - 1923	1,251,000	122,708	1,373,708	1,241,772
1924 - 1928	2,249,000	661,047	2,910,047	2,905,963
1929 - 1933	2,776,800	770,928	3,547,728	3,664,143
1934 - 1938	3,200,000	1,013,655	4,213,655	4,171,589
1939 - 1944	2,675,000	2,875,770	5,550,770	5,180,303
Total,25 years	12,151,800	5,444,108	17,595,908	17,163,770

Review of Receipts and Payments.

As the financial year closes on March 31st when forestry operations are still proceeding actively, it has been found more convenient to adopt for accounting purposes the forest year ending September 30th. The main heads of revenue and expenditure

are therefore reviewed to 30th September 1944, covering a period of practically twenty-five forest years from the date of establishment of the Commission in November 1919.

Receipts from operations during the twenty-five years amounted to £5,826,000, of which the main items were:-

	£	Per cent.
Forestry Operations.		
Sales of land and buildings	144,900	2.5
Compensation for coal rights	103,700	1.8
Rents and mining royalties	1,465,600	25.2
Forest and nursery produce	3,220,300	55.3
Other sales (including live stock, farm produce, rabbits, etc.)	474,500	8.1
Forest Workers' Holdings.		
Rents	292,400	5.0

Payments amounted to £17,998,500, distributed according to accounting subheads as follows:-

	£	Per cent.
A. - Salaries, Wages and Allowances	1,639,700	9.1
B. - Headquarters' Charges	102,200	0.6
C. - Assistant Commissioners' Charges	110,400	0.6
D. - Divisional Officers' Charges	257,800	1.5
E. - Forestry Operations	14,144,800	78.6
F. - Advances for Afforestation Purposes	395,400	2.2
G. - Education	183,800	1.0
H. - Research and Experiment	168,900	0.9
J. - Agency and Advisory Services	91,900	0.5
K. - Special Services	38,300	0.2
L. - Forest Workers' Holdings	865,300	4.8
Total	17,998,500	100

Of the above subheads, A, B, C and D represent payments in connection with the staff (excluding foresters and foremen) and administration of the Commission. Subheads E (Forestry Operations) and L (Forest Workers' Holdings) represent the main effective functions of the Commissioners; G (Education), H (Research and Experiment) and K (Special Services) are of assistance in carrying out these main functions and also help

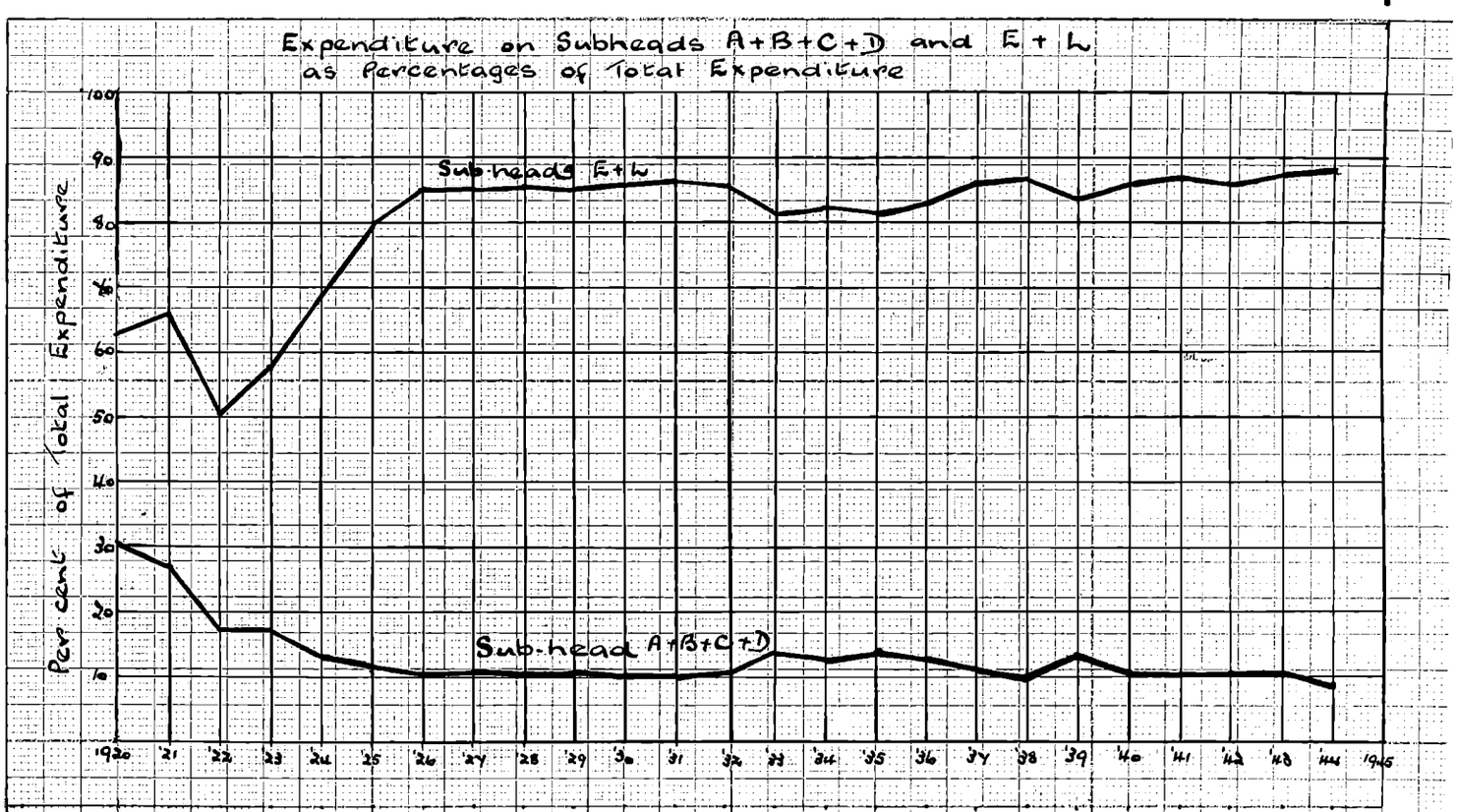
in the general development of forestry in this country, while F (Advances for Afforestation Purposes) and J (Agency and Advisory Services) serve only in the latter object.

The Commissioners have maintained their policy of devolving responsibility so far as consistent with efficiency, and thus keeping expenditure on staff and administration (subheads A, B, C and D) at the lowest possible figure. In the early stages when the work was in process of organisation and planting operations were small, the total of these subheads was necessarily high in proportion to the total expenditure on all heads. Subsequently, the proportion varied roughly according to funds made available year by year, falling when larger planting programmes were made possible by increased funds, and rising when funds and programmes were restricted. Thus, Subheads A to D accounted for 30.3 per cent. of the total expenditure in the forest year 1920, remained at 17.2 and 17.4 per cent. in 1922 and 1923, when grants were reduced, fell from 13.9 per cent. in 1924 to 10.1 per cent. in 1931, during which period grants were increased, rose from 10.8 per cent. in 1932 to 13.7 per cent. in 1935, when grants were again reduced, and fell from 12.9 per cent. in 1936 to 10.1 per cent. in 1938 when grants were again increased. In 1939 the proportion rose to 13 per cent. owing to a curtailment of operations on the outbreak of war, and subsequently diminished with rising expenditure due to increased wages of forest workers and increased fellings. In 1944, Subheads A to D accounted for 9.5 per cent. of the total expenditure and the average for the twenty-five years was 11.9 per cent.

The total of Subheads A to D may also be expressed as a percentage of turnover (payments plus receipts), to which they more properly relate, and on this basis the figures are 27.2

per cent. for 1920, 11.1 per cent. for 1924, 8.4 per cent. for 1931, 10.7 per cent. for 1935, 8.3 per cent. for 1938, 5.8 per cent. for 1944 and 8.9 per cent. for the average of the twenty-five years.

While the proportion of expenditure on staff and administration has fallen, that on the effective heads of E (Forestry Operations) and L (Forest Workers' Holdings) has, with the exception of a few years following a reduction of funds in 1931, increased. This is clearly brought out in the diagram below.



From 1920 to 1922, inclusive, the planting programme was on an expanding basis; for reasons of finance it then remained steady at approximately 10,000 acres per annum for two years, after which the expanding programme was resumed. In 1931 the area planted amounted to 25,630 acres, but in the following year restricted funds again brought about a curtailment and from 1932 to 1937 the planting programme was stabilised at about 21,000 per annum. Consequent on increased funds the expanding programme was again resumed in 1938 and reached 28,235 acres in 1939. During the war the planting programme was reduced from 27,288 acres in 1940 to 9,192 acres in 1944.

In 1924 the Crown Woods were transferred to the Commissioners and towards the end of that year the formation of forest workers' holdings was commenced. The number of holdings completed each year rose from 61 in 1925 to 264 in 1931, but fell to 115 in 1932 and to 15 in 1936; thereafter the numbers completed rose each year, reaching 95 in 1939. During the war the establishment of holdings was suspended, apart from the completion of 17 in 1940.

A clearer view of the objects on which expenditure has been incurred may be obtained from Table IIa (p.), in which the cost of staff and administration has been distributed over subheads E to L in order to arrive at the total cost of each service under these subheads. The table below shows the percentage distribution of expenditure for various years. Forestry Operations accounted for 86.6 per cent. of the total expenditure in 1920 and 75 per cent. in 1924 (in which year there was abnormal expenditure on another subhead, namely, Advances for Afforestation Purposes, in respect of relief of unemployment). Forestry Operations and Forest Workers'

Holdings together accounted for 94 per cent. of the expenditure in 1929, for 93.8 per cent. in 1934, for 94.6 per cent. in 1939, and for 97 per cent. in 1944.

Distribution of Expenditure - ~~based on Table IIa (p.)~~

Subhead	1920 and 1921	1924	1929	Average of 10 yrs	1934	Average of 15 yrs	1939	Average of 20 yrs.	1944	Average of 25 yrs.
	£	£	£	£	£	£	£	£	£	£
Total Expenditure	387,567	329,713	692,988	448,565	637,529	543,152	963,531	627,790	1,459,247	727,339
Allocation:	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Per cent	Per cent
E.-Forestry Operations	86.6	75.0	83.4	78.3	90.5	81.7	87.4	84.2	96.1	87.3
F.-Advances for Afforestation Purposes	0.4	14.3	2.2	5.4	2.6	4.0	1.6	3.2	.9	2.6
G.&H.-Education, Research and Experiment.	9.6	4.7	3.1	4.0	3.0	3.5	3.0	3.3	1.9	3.0
J.-Agency and Advisory Services.	2.0	1.1	0.2	2.2	0.2	1.3	.2	0.9	.1	0.6
K.-Special Services	1.4	3.1	0.5	1.4	0.4	0.9	.6	0.8	.1	0.6
L.-Forest Workers' Holdings.	-	1.8	10.6	8.7	3.3	8.6	7.2	7.6	.9	5.9
	100	100	100	100	100	100	100	100	100	100

As Forestry Operations and Forest Workers' Holdings form the bulk of the expenditure further details of these two subheads may be of interest. The following table shows that during the twenty-five years under review 16.7 per cent. of the expenditure on Forestry Operations was in respect of Overhead Charges and Supervision; 18.1 per cent., Acquisition of Land; 45.6 per cent. Cultural Operations; 5.4 per cent., Preparation and Sale of Produce; 3.1 per cent., Roads and Buildings, and 11.1 per cent., Stores and Miscellaneous (including rates and taxes, purchase of

sheep stock, farming and estate expenses and, during the war, balance of civil pay issued to forest workers serving with the Armed Forces). The first item (comprising Overhead Charges 4.6 per cent., Superior Supervision 4.9 per cent. and Local Supervision 7.2 per cent.) may appear high but it should be explained that much of this expenditure is not related to current planting operations but covers time spent on examining and reporting on land for acquisition and on collection of receipts from rents, sales of produce, etc.

Distribution of Expenditure on Subhead E - Forestry Operations
(Table E, p.)

	1920 and 1921	1925	1929	Average of 10 yrs	1934	Average of 15 yrs.	1939	Average of 20 yrs.	1944	Average of 25 yrs.
	£	£	£	£	£	£	£	£	£	£
Total Expenditure	334,148	405,972	577,836	351,258	576,853	443,659	842,079	528,458	1,401,825	635,049
Allocation:	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent.
Overhead Charges, Superior Supervision and Local Supervision	21.9	15.0	14.7	16.2	18.3	16.1	19.2	16.5	17.0	16.7
Acquisition of Land	37.8	25.0	25.9	22.4	16.5	23.2	10.8	22.0	20.4	18.1
Cultural Operations	31.5	40.4	41.0	43.0	46.0	42.8	47.9	43.4	40.9	45.6
Preparation and Sale of Produce.	0.6	3.9	3.6	3.4	5.4	3.6	7.0	4.5	8.2	5.4
Roads and Buildings.	2.8	4.6	2.9	3.3	3.2	3.5	4.1	3.4	2.5	3.1
Stores and Miscellaneous	5.4	11.1	11.9	11.7	10.6	10.8	11.0	10.2	11.0	11.1
	100	100	100	100	100	100	100	100	100	100

As regards Forest Workers' Holdings, 15.9 per cent. of the expenditure was on Overhead Charges and Superior Supervision (a considerable amount of building work was done by direct labour); 20.3 per cent. on Purchase and Rent of Land and Buildings; 57.2 per cent. on Buildings (new buildings, adaptations and repairs); 4.7 per cent. on Fencing, Drainage and other permanent improvements, and 1.9 per cent. on Rates, Taxes, etc.

It should be noted that charges for overheads and superior supervision also cover collection of rents, and over the twenty-five years averaged 12.4 per cent. of expenditure and income combined.

Distribution of Expenditure on Subhead L. - Forest Workers' Holdings (Table L, p.)

	1925	1929	Average 1924-29	1934	Average 1924-34	1939	Average 1924-39	1944	Average 1924-44
	£	£	£	£	£	£	£	£	£
Total Expenditure:	56,522	73,214	64,980	21,417	64,063	69,679	59,735	13,789	50,888
Allocation:	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Overhead Charges and Superior Supervision.	6.5	12.3	9.2	34.9	11.7	17.8	13.6	15.4	15.9
Purchase and Rent of Land, Buildings, etc.	68.4	10.6	26.7	21.2	23.2	5.5	22.3	13.3	20.3
Buildings (new, adaptations and repairs).	41.6	67.7	58.6	34.0	58.7	69.5	57.9	56.6	57.2
Fencing, Drainage, etc.	1.1	8.6	4.5	5.8	5.2	5.2	4.8	3.6	4.7
Rates, Taxes and other.	2.4	0.8	1.0	4.1	1.2	2.0	1.4	11.1	1.9
	100	100	100	100	100	100	100	100	100

FOREST POLICY.

The Acland Report of 1916 remained the basis of Forest Policy during the quinquennium 1935-39 but there were distinct indications that the proposals were becoming threadbare or had been allowed to get so far into arrears that a new Statement of Policy was required.

Briefly the basis of the Acland Report was the maintenance in a productive state of the 1916 woodlands (estimated at 3,000,000 acres) plus the afforestation with conifers of a further 1,776,000 acres in the course of the succeeding 80 years. An ultimate forest area of 4,776,000 acres was consequently envisaged, of which approximately 2,900,000 acres were to begin with in private ownership and were dependent on the future production on private initiative. The Acland Committee allocated to the first decade (1919-29) a State planting programme of 150,000 acres and to the first four decades (1919-1959), 1,180,000 acres. It can be inferred from the Report, though not specifically stated, that the quota for each of the 5-year periods 1935-39 and 1939-44 was approximately 171,000 acres. The land required for these programmes had to be acquired as planting proceeded.

It must be pointed out that the simple proposal to restrict State planting to afforestation of bare land and the improvement of existing woodlands mainly to private owners has been impossible in practice. Where it was obvious that derelict and felled woodlands would not be planted the Commissioners have acquired them, by negotiation, and set about replanting. Incidentally it has sometimes been necessary to acquire standing plantations which formed part of the unit so acquired.

It will be convenient now to trace separately the development of State and Private Forestry.

STATE FORESTRY.

In January, 1935, the Commissioners submitted the following proposals for action:*

(1) Immediately to speed up the acquisition of land and the supply of plants.

(2) Over the succeeding 4 years to work up the planting programme gradually to 30,000 acres per annum.

(3) Thereafter to continue expanding the planting programme up to a maximum of 45,000 acres per annum.

These proposals received some support in connection with the efforts being made to relieve unemployment in the "Special Areas". The results up to the outbreak of war are stated in the table below:

Year	Acquisition of Plantable Land (acres)	Area Planted (acres)		
		New Planting	Re-placements	Total
1933-4	28,886	20,355	1,302	21,657
4-5	14,040	20,773	719	21,492
5-6	18,244	19,500	1,081	20,581
6-7	42,295	19,324	783	20,107
7-8	64,095	23,404	685	24,089
8-9	32,207	26,717	1,518	28,235

At the outbreak of war the Commission's nurseries were very well stocked with excellent plants and every effort was made to plant out in the forests all those of suitable size. As the war developed emphasis on planting declined and the major attention was concentrated on the protection and maintenance of existing plantations.

The acquisition and planting accomplished are as stated below:

* Fifteenth Annual Report of the Forestry Commissioners. H.M.S.O. price 2s.0d.

Year	Acquisition of Plantable Land (acres)	Area Planted (acres)		
		New Planting	Re-placements	Total
1939-40	31,634	26,411	877	27,288
40-41	12,450	25,644	1,223	26,867
41-42	8,149	16,045	701	16,746
42-43	12,419	11,671	1,741	13,412
43-44	10,345	7,270	1,935	9,205

Maintenance included the beating up and weeding of very young plantations and thinning of the older. The area thinned year by year over the whole decade is stated below:

Year.	Area thinned. (acres)		
	England & Wales.	Scotland.	Total.
1934-5	2,450	488	2,938
5-6	3,017	563.9	3,580.9
6-7	3,536	649.2	4,185.2
7-8	3,818	1,131.6	4,949.6
8-9	4,549	1,166	5,715
9-40	3,751	1,083	4,834
40-1	3,089	992	4,081
1-2	6,418	1,759	8,177
2-3	6,505	2,052	8,557
3-4	5,935	2,418	8,353
	43,068	12,302.7	55,370.7

On the whole it has been found possible to keep thinnings reasonably up-to-date.

Quin.	Acquisition of Plantable Land (acres)	Area Planted (acres)		
		New Planting	Re-placements	Total
1st Quin.	136,604*	132,809	5,462	36,772
2nd "	173,626			101,499
3rd "	173,876	108,346	7,757	116,103
4th "	170,881	109,718	4,786	114,504
5th "	74,997	87,041	6,477	93,518

* In addition 4,866 acres were acquired and 1,697 acres planted in Ireland to March 31st 1922.

THE COMMISSIONERS' ESTATES.

At 30th September 1944 the Commissioners had under their charge approximately 1,270,000 acres of land against 1,144,000 acres at the corresponding date of 1939 and 909,000 acres in 1934. The broad utilisation of the land at those dates is shown in the Table below:

Forestry Commissioners' Estates: Utilisation of Land.

	England & Wales.	Scotland	Total Great Britain		
At September 30th	1944	1944	1944	1939	1934
Forest Land.	(acres)	(acres)	(acres)	(acres)	(acres)
Acquired Plantations.	46,000	10,000	56,000	73,000	66,000
Planted by Forestry Commission.	275,000	163,000	438,000	361,000	250,000
To be Planted	143,000	153,000	296,000	280,000	228,000
Total	464,000	326,000	790,000	714,000	544,000
Nurseries	1,000	500	1,500	1,000	801
Agricultural	28,000	23,000	51,000	43,000	29,000
Forest Workers' Holdings	11,000	3,500	14,500	16,000	11,600
Unplantable and Miscellaneous	131,000	282,000	413,000	370,000	324,000
Grand Total	635,000	635,000	1,270,000	1,144,000	909,000

Subjects and Rentals at September 30th 1944.

Property other than Forest.

Property other than Forest.- The estates acquired by the Commissioners include many subjects other than forests. The table below gives a list, exclusive of forest workers' holdings, of subjects and rentals at September 30th 1944. The total number of lettings was 6,249 of an annual value of £84,226.

Description	England & Wales		Scotland		Total Great Britain	
	No.	Rental	No.	Rental	No.	Rental
		£		£		£
Agricultural Holdings:-						
Under £20 p.a.	824	5,073	445	3,199	1269	8,272
Over £20 p.a.	433	26,381	260	16,917	693	43,298
Foresters' Houses, etc.	122	383	76	-	198	383
Cottages	392	3,714	316	1,904	708	5,618
Residential and Sporting	351	13,122	251	5,061	602	18,183
Site Rents and Feus	-	-	235	650	235	650
Other (easements, permissions, minerals, &c.	2,190	5,395	354	2,427	2,544	7,822
Totals	4,312	54,068	1,937	30,158	6,249	84,226

The agricultural holdings have been acquired with plantable land and are retained pending re-distribution of the land when planting commences, for possible sub-division into forest workers' holdings, or for sale.

The subjects described as "other" in the table include a great number of easements incidental to the ownership of land; many of them relate to the New Forest and Forest of Dean and are of long standing.

A separate section of this report is devoted to forest workers' holdings (p.). The total number of holdings at September 30th 1944 was 1,506. The total expenditure on these holdings amounted to £865,300 and the gross rental to £

Mines and Quarries.

In view of the provisions of the Coal (Registration of Ownership) Act 1937 steps were taken to examine and register the interests of the Commissioners in the coal underlying their properties and at a later date the Estimates of Value required to be rendered to the Regional Valuation Boards by virtue of the provisions of the 1938 Act were prepared and submitted to those Boards. By far the largest coal interest was that of the Forest of Dean and Hundred of St. Briavels which is subject to the rights of the Freeminers, unique rights not applicable to any other coalfield in the country and not affected by the provisions of the Coal Act. The furnishing of the Estimates of Value brought to light an intricate point on the treatment of Income Tax in assessing the Value in those cases where the coal owner was not subject to Tax and following discussion of the matter with the appropriate authorities a Rule was made by the Central Valuation Board setting out the method to be adopted by the Regional Boards in dealing with Tax. By this means uniformity was obtained.

As at 1st July, 1942, all coal was vested in the Coal Commission but in accordance with Section 43 of the Coal Act 1938 the Forestry Commissioners continue, as regards the Forest of Dean only, to exercise the powers previously vested in them, i.e. they manage the coal but on behalf of the Coal Commission who have paid over to them the net receipts.

For the purposes of the Coal Act 1938 the country was divided into 10 Valuation Regions in each of which a Regional Valuation Board was set up and the total compensation of £66,450,000 allowed by the Act was divided between these Regions. When all the claims in a particular Region had been settled the total thereof was related to the sum available for distribution and payment of individual claims made in the proportion that the sum available vore to the total claims. The Forest of Dean coal-field was in the Southern Regional Board's area and in this area the compensation paid was a little under three fourths of the valuation as agreed with the Board. As a result only £99,099.1.5d. was received as compensation for the Forest of Dean (excluding Highmeadow) compared with an agreed valuation of £137,239. The Forestry Commissioners were not concerned with the allocation of the global figure between the Regions and it was unfortunate from their point of view that their main holding should be in the Southern Region bearing in mind that in another Region the compensation was approximately one and a fifth times the valuation.

The compensation received to 30th September 1944 amounted to £103,700.

The Forests.

The total area of plantations at September 30th 1944 was 494,000 acres, including 438,000 acres planted or replanted by the Commissioners, and 56,000 acres acquired and transferred under the Transfer of Woods Act, 1923. There are also some 296,000 acres awaiting planting. The ultimate forest area is, consequently, 790,000 acres which compares with 714,000 acres at the beginning of the war and with 544,000 acres ten years previously.

The total number of forest units was 264, an increase of 78 in ten years. The rate of increase has diminished partly owing to the fact that it has often been possible to add new acquisitions to existing units and partly owing to the war. Of the 264 units, 107 are in England, 35 in Wales, and 122 in Scotland.

In England and Wales there are now eleven forests each over 10,000 acres in extent, the most recent to have reached that size being Hafren Forest in Mid-Wales which was started in 1937 and which, being situated in the Plynlimon district, offers possibilities of extension. The principle adopted by the Commissioners in building up a unit can be illustrated by Gwydyr Forest in North Wales, where in 1920 a start was made with the nucleus of a block of old woodlands which has gradually been extended until a forest unit of nearly 18,000 acres in extent has been secured; the major portion of this unit is in two blocks and the same process of extension will continue until the intervening gaps are acquired to form one large forest. In East Anglia where acquisitions commenced a year later than at Gwydyr a similar process has been adopted; the type of country is entirely different, being the flat-sandy land of the Brecklands which had proved unprofitable under agriculture. Thetford Forest itself consists of 46,000 acres almost within a ring fence, but with other forests immediately to the North

and South and with further extensions it may easily rank at least second in size to any other unit in the country.

At the conclusion of the Commissioners first twenty-five years of progress the largest single forest is to be found in Northern England. This forest, Kielder, extends now to 68,000 acres and planting first commenced in 1926. It is linked with three other forests which combine to make one large forest area of 106,000 acres, and marching with them and separated only by the Border are large forest areas in Scotland. This area is not likely to be exceeded in size elsewhere.

In Scotland there are eight forests each containing over 6,000 acres of plantable land. They are: Fiunary (6,500 acres); Clashindarroch (8,500 acres); Inverinan (6,000 acres); Knapdale (6,500 acres); Loch Ard (12,500 acres); Ae (6,500 acres); Cairn Edward (9,000 acres); and Glentrool (12,000 acres). The most noteworthy developments have been in Argyll, where the Commissioners now own 212,000 acres, and in Galloway where a total area of 80,000 acres has been acquired.

Progress of the Plantations.

Unfortunately it has not been possible, owing to war conditions, to make a stock-taking of the plantations established by the Commission. Of the total area of 447,815 acres the theoretical age classes (assuming no felling had taken place) would have been:

	Acres	Per Cent.
1 - 5 years old ...	94,020	21.0
6 - 10 " " ...	112,634	25.1
11 - 15 " " ...	109,183	24.4
16 - 20 " " ...	96,567	21.5
21 - 25 " " ...	35,411	8.0
Total ...	447,815	100.0

Of this total area some 2,100 acres of the oldest age class has been written off as a failure and the area has been further reduced by fellings and fires. Failures which occurred were due to lack of necessary preparatory work, such as draining, unsuitable choice of species, and, occasionally, to planting at too high an elevation. There was in the early years of the Commission's work a lack of evidence and knowledge of the problems of afforesting poor land and this led to an over-optimistic view being taken. Gradually knowledge has been built up and a technique developed which enables a satisfactory crop to be established on land where the trees have hitherto failed to grow.

Developments in Forest Technique.

The most important developments have been in ploughing land preparatory to planting and in the use of mixtures in place of forming pure plantations.

Ploughing. It has taken foresters a long time to appreciate the value of cultivation in the raising of tree crops on a large scale. There are records of ploughing by oxen in preparation for planting nearly 100 years ago, and of ploughing in Germany towards the end of the last century, and of ploughing in Eastern Counties at the beginning of this century. These however are isolated instances and it has taken many years for a technique to be built up in this country owing largely to the fact that the areas planted by the Commissioners are of such a nature as to require much heavier implements than were in general use.

Early in the Commission's history ploughing was resorted to in Eastern England and consisted of ploughing shallow furrows at 4'6" apart representing the distance of planting. This method was most successful but it really consisted of a mechanical form of preparation or screefing, and is different in principle from the present conception, although undoubtedly it was instrumental in leading up to it. Having secured good results the principle of ploughing single furrows at prescribed distances apart was applied to the Yorkshire Moors in 1923/4. The soil here had a top layer of peat and the furrows tended to become water channels during the winter, with the result that the newly exposed soil was quickly covered with a vegetable slime to the detriment of the young trees which consequently did not succeed. In course of time it was realised that this latter state of conditions was induced by the presence of pan which prevented water from making its escape and there followed a series of trials with a view to

breaking up the pan. Attempts were made by setting the plough at a deeper level or laternatively by attaching a sub-soil tine to the plough. This proved to be ineffective, partly because in the case of the plough no tractor sufficiently powerful enough to keep the plough in the ground could be found, and, in the case of the sub-soil tine, the narrow channel was quickly filled by infiltrating peat laden water which, to all intents and purposes, closed it, giving much the same conditions as after the first ploughing referred to. From that time onwards there was a serious attempt to evolve a plough strong enough to stand up to the severe demands. Simultaneously a Caterpillar system of traction became better established in this country and this proved to be the solution of the power element in the problem which the Commissioners were trying to solve.

Simultaneously in other parts of the country experiments were being conducted with the same object of finding suitable implements and gradually a robust plough capable of ploughing to a considerable depth and of withstanding reasonable sized bolders was evolved. A hardened bar point was attached to the plough and from that point onwards very considerable advances have been made. The pan frequently lies between 1 ft. and 18" below the surface and to obtain this greater depth it was necessary to re-design the plough in order to obtain the additional strength required to turn out the very large furrow slices necessary to secure the depth. This resulted during the war in the trying out of an entirely new type of plough which has proved very satisfactory and which, with the use of the hardened steel which will become available after the war, should meet most of the demands made upon it.

Results obtained from the use of the plough now in operation have demonstrated the value of cultivation. The number of losses

have been reduced tremendously, weeding has been virtually eliminated and newly planted trees get away briskly from the start. Apart, therefore, from an improvement in growth, the plough has been the means of very considerable economies in establishing plantations.

Earlier reports have referred to the success which has attended the method of turf planting in peaty areas. The plough is now used as a mechanical means of turfing and economies are obtained in this direction also.

Reference to other systems of land culture serves to point a notable difference between the cultivation of forest areas and cultivation for agricultural and other crops. The outstanding difference is that a crop of trees is content with only partial cultivation. Experiments have shown that when complete cultivation is resorted to the area very quickly settles down again and there is very little advantage to be obtained; also, in high rainfall areas, it is next to impossible to control the run of water.

The new ploughing has demonstrated that considerable areas which were previously thought to be unplantable can now be planted and the Commissioners believe that they have not yet reached the limit of conversion of unplantable land to plantable. It has been proved that in ploughed areas newly planted trees not only survive better but grow more satisfactorily in exposed conditions and there is every indication that the plough will be the means of bringing considerable areas of land into the plantable category.

Draining. Drainage leads to aeration of the soil and is therefore a form of cultivation. "Contour" drains which cut off the water before it invades the lower land have been found most effective in hill country, and the Commissioners' practice

is now to maintain drains at a much higher state of efficiency than was previously the case. Accompanying the annual process of planting, draining is often carried out on a large scale to provide a general and detailed drainage system.

Norway and Sitka spruce are the species normally planted on bare sites which require intensive drainage. The "turf-planting" of spruces, a method which was introduced by the Commissioners about twenty years ago and described in previous reports, was gradually developed until it is now possible on the majority of sites to combine intensive draining with the new ploughing technique and to lay continuous lines of turf ready for planting.

Choice of Species. The species mainly in use for planting are: Conifers:- Norway and Sitka spruce; European and Japanese larch; Corsican pine; Scots pine; and Douglas fir. Broadleaved:- Oak; Ash; and Beech. There are nevertheless a number of subsidiary species in use for special purposes in addition to the seven softwoods and the three hardwood species named. The Commissioners have been fortunate in being able to secure good strains for reproduction of nearly all species. Two species which it was thought might become useful in the South of England, namely, Nothofagus obliqua and N. procera, both beeches of the Southern Hemisphere, have proved disappointing owing to lack of hardiness; Oregon alder is in the same category. The status of Pinus contorta (Murrayana) from British Columbia is still uncertain; it is a rapid starter on poor soils but is prone to attack by the pine tortrix in districts where that insect is common. Tsuga, more commonly known as the Hemlook spruce, has been used for planting in increasing quantities and the evidence is that on selected sites this species will give a heavy production of useful timber. It possesses the added advantage that it is a graceful tree.

Although it is less difficult to plant pure plantations and they are at all stages more easy to manage than mixtures the use of the latter has increased, especially in the raising of tender and difficult species such as beech and in the afforestation of low-grade sites. In the case of pine/spruce mixtures, pine/Douglas fir, and pine/beech the growth of the second-named species has often been markedly increased. As to the actual reasons for this there is still a lot to be learned, but the beneficial effect of the shelter from a well-established plant is relished by a tender species, such as the beech, while the mechanical effect of a coarse-feeding deep-rooting tree like the pine on the soil is welcomed by a surface rooting species, such as the Sitka spruce. There may well be some virtue in a mixture of trees which root at different levels which would react in relation to the availability of food on the one hand, or moisture on the other. In recent years the biological effect of one tree upon wnother has been put forward as a possible explanation.

In the case of hardwoods many of the oak plantations formed by the Commissioners in the earlier years made a slow start, as is the habit with oak, but are now growing freely. The oak demands light in the early stages and there is little evidence to show that side-shade helps to draw it up. Where nurse-species, such as alder or larch, have been planted in mixture with the oak, or when coppice has been left in the hope of drawing up the young oak, the result in the Commissioners' experience has been generally harmful. There is also clear evidence that overhead shade renders young oak plants spindly and weakly.

The growth of beech varies greatly. Where overhead protection has been afforded as in thin birch woods on the chalk or where coniferous nurses have succeeded the beech have done very well, planted in the open, development is slow. Ash has proved a most difficult species to grow in pure woods as it is very exacting as regards soil and shelter. The most successful plantations are those grown in carefully selected groups. Sycamore is similarly difficult.

The improvement of devastated woodlands is a difficult problem to which no cheap solution has yet been found. Experiments with planting the broadleaved species in groups have proved very successful and have helped to reduce the costs of clearing and weeding. The groups are about twelve feet square, or in drifts about the same width, so that about half the area is planted in the first instance and the remainder left under coppice or weed growth for nursing purposes.

Nurseries. During the war there has been a shortage of labour and a decline in the quality. Coincident with this there has been the need to carry for post-war purposes an even larger stock of young trees in the nurseries than was usual in pre-war days. It has therefore been necessary to find some means of speeding up nursery work and developments have occurred in the direction of mechanisation. These are in a very elementary stage at present but there seems to be little question that they must inevitably be developed very considerably during the next few years.

A number of old nurseries have shown considerable evidence of poverty both in the quality of the trees produced and in the increase of pests of various kinds. Remedies for this stage of things have progressed on two parallel lines: (1) Attempts

have been made to restore the fertility of old nurseries by incorporating increased quantities of humus. From the point of view of fertility and mechanical condition the presence of an adequate quantity of humus is now admitted on all sides and recent work with humus and composts indicate that there may be other factors involved such as the biological factors. (2) Restoration of the fertility of an old worked out nursery has not only been expensive but apart from taking a number of years it does not always seem to be effective by ordinary agricultural methods or even by the increase of humus content. Side by side with this it has been found that under certain conditions land which has never before carried a crop of trees and which by ordinary agricultural standards would be considered very unsuitable as a nursery subject can produce really remarkable results in seedlings both as to quality and numbers. During recent years therefore much has been done to extend the number of new nurseries. Although conflicting results have been obtained almost every season this line of work holds out considerable promise.

Thinning. The area thinned annually in the Commissioners' woods already amounts to over 8.500 acres. Some of the plantations formed since 1919 have been thinned twice and even three times, and individual areas have yielded during the war years more produce by volume by judicious thinning than existed in the total contents of the growing crop in September, 1939.

Thinning is the most important cultural operation in the life history of a plantation. It is necessary for the health and development of the individual trees and in the wet and windy British climate for ensuring the stability of the crop as a whole. The general procedure in young plantations is to

thin to moderate intensity but also to pay special attention to the removal of "wolf" trees.

Thinnings are of great importance also in the economics of timber production. The total volume of timber so removed from an 80-year plantation may be as great or greater than the final crop, the material is utilisable at all stages and finally the financial prospects are greatly improved when thinnings can be marketed at a profit.

Owing, among other reasons, to the lack of remunerative markets for the produce, thinnings were generally in arrears before the war throughout the country. A scheme for building up a reserve of peeled pitprops from thinnings was started by the Commissioners in 1938-39 but it had made little progress when war was declared.

Shortage of labour during the war and economy in its use has made clear-felling the imperative rule and large areas for which the correct silvicultural treatment was thinning have disappeared. The further these war-time processes proceeded the more important it became from the point of view of our future timber supply that the remaining plantations should be carefully tended.

The Commissioners have in hand the preparation of a pamphlet on thinning procedure which will be published as a guide for woodland owners. They consider that it is of outstanding importance for the long-term development of British forestry that an assured market should be found in our own collieries for all the pit-props which can be produced in this country.

Pruning. The operation of pruning improves the quality of timber. Experiments carried out by the Commission's Research

officers have brought out a number of interesting points such as the importance of rate of growth in producing rapid occlusion of wounds, the quicker healing over of live-pruned wounds as compared with the pruning of dead branches, and the crucial need for close pruning.

Only the best trees in a crop are selected for pruning and the general response has been eminently satisfactory. As yet it is too soon to assess with certainty the results obtained by the experiments or to detail the species of trees which derive most benefit from the operation. In general it may be said that it is important to restrict pruning to rapidly growing stems and to commence the work at an early stage.

SOME NATURAL PHENOMENA AFFECTING THE FORMATION AND PROTECTION OF PLANTATIONS.

Weather.

In the late spring and early summer months some damage is to be expected from frosts, not only in the nurseries but in young plantations. The damage done by these "late" frosts in the middle of May 1935 was one of the outstanding features during the past 25 years. Both in point of severity and widespread occurrence they appeared to be unprecedented. In the night of 14th/15th May screen temperatures below 25° F. were common and in the following nights grass minima of 9°F. and 12° F. were recorded. These frosts persisted until the 22nd of the month and few parts of the country escaped, the damage done being most serious in the East and North of England and in Scotland.

It will be of interest to note those tree species which have proved particularly frost-tender. In order of susceptibility they are: Conifers.- Abies grandis, Sitka spruce,

Norway spruce, Douglas fir, Japanese and European larches; Broadleaved.- Walnut, ash, Oregon alder, sweet chestnut, pedunculate and sessile oaks, beech. Moderately resistant are: horse chestnut, sycamore, Pinus contorta, Corsican pine. Those species least affected are: poplar, mountain ash, birch, hornbeam, lime, elm, and Scots pine.

In a normal year the distribution of late frosts is relatively local and affected by local factors of topography. The detection of "frost hollows" is therefore a matter of great importance when setting out or forming new plantations.

There occurred in February 1937 a gale accompanied by snow coming from the unusual direction of the North-East. In many parts of the country this caused serious wind-blow in old plantations. The worst instance known was in the Lake Vyrnwy plantations owned by the Corporation of Liverpool where apart from quite considerable isolated damage throughout an area of nearly 1,000 acres of plantations, approximately 40 acres of 30-35 years' old plantations were almost completely destroyed. The normally unstable Douglas fir was the greatest sufferer as might be expected and quite a considerable proportion of the 40 acres mentioned was irrevocably damaged by wind-blow. The falling trees naturally broke others and most species were affected.

In January 1940 there occurred a most unusual meteorological phenomenon over a considerable area of England and Wales. This was a glazed frost, exceptional because of its wide distribution and enormous damage was done to forest trees in addition to telephone wires and electric cables. Such a frost is usually caused by rain falling when the air temperature is below

freezing point. The area most severely affected was that part of the country South-West of line drawn from North Wales to Kent. The greatest damage occurred in young plantations 15-35 ft. high and in older woods and shelter belts 35-70 ft. high. It was most severe in (a) isolated or widely spaced old hardwoods; (b) densely stocked young plantations or plantations which had just been heavily thinned; (c) young saplings at very wide spacing; and (d) middle-aged plantations inadequately thinned. Trees below 8 feet in height were seldom seriously damaged. Of the hardwoods poplar was the tree most seriously affected while birch, sycamore, ash, alder and beech were severely smashed or broken. Japanese larch and Douglas fir were the two coniferous species which received most damage closely followed by European larch and Sitka spruce. In the Commissioners' woods more than 500 acres were so severely damaged as to necessitate replanting, and a further 1,500 acres suffered severely but not so as to justify clearing and replanting. A much larger area suffered damage in a lesser degree. Fortunately for British forestry a glazed frost of the intensity experienced in 1940 may be regarded as an extremely rare phenomenon.

SEED SUPPLY.

Trees do not produce abundant crops of seed every year although some species are more accommodating than others. This variability is more marked with broadleaved species than with conifers but, in both cases, the forester who has to plan ahead and work to a regular planting programme frequently finds that he is left with a surplus or a deficiency of the species he requires. The difficulty is met to some extent by storage of the seed in air-tight containers.

In a normal year the seed supply is drawn from many parts of the world. So far as possible the Commissioners have relied on home sources for Scots pine, oak, ash, beech, sycamore and chestnut, supplemented in the case of beech by supplies from the Continent. Supplies of Sitka spruce and Douglas fir come from Canada and the U.S.A; Japanese larch from Japan; European larch from Switzerland, Austria, and occasionally Silesia; Corsican pine from Corsica; Norway spruce from Germany and Austria.

During the war arrangements have been made to collect every available lb. of home-produced seed of the chief conifer species. Imports of Norway spruce, European and Japanese larch seeds ceased almost entirely, and Corsica fell into enemy hands. Supplies of Sitka spruce and Douglas fir seed from Canada and the U.S.A. have still been available although not always in sufficient quantities to meet all requirements. The Commissioners have made every effort to meet deficiencies not only in order to keep their nurseries adequately stocked to meet post-war demands but also because of the heavy toll war fellings have taken of seed trees.

The record of seed years for the past 25 years are shown in Table (p.). The conclusion may roughly be drawn that Scots pine produces a sufficiency of new seed in four years out of five; Corsican pine and Sitka spruce one out of two; Douglas fir and Japanese larch two out of five; oak three out of five;

and beech, irregularly, every third or fourth year. The problem of securing a continuous supply of beech seed is still unsolved because the seed does not lend itself to storage. It will be seen from the table that for the past eight years the crop has either been poor or has failed altogether.

SEED SUPPLY - TABLE .

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

Species		Year of Crop																							
		1919	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
Scots pine		g	g	a	a	p	p	a	g	p	a	a	a	a	a	a	a	g	f	g	g	p	g	g	g	p
Corsican pine		p	p	a	a	g	f	p	a	g	a	g	p	p	a	a	p	g	p	p	p	a	-	p(x)	g(x)	p(x)
European larch:	Home	-	-	p	p	g	g	-	g	p	p	p	p	p	p	g	a	g	g	f	p	a	p	g	g	p
	Abroad	-	a	a	a	f	a	f	a	g	a	g	f	a	p	g	p	p	a	a	f	-	-	-	-	-
Japanese larch		f	f	a	f	f	f	a	f	p	f	f	a	f	p	g	a	f	p	a	g	f(x)	g(x)	p(x)	a(x)	p(x)
Douglas fir		p	g	a	f	a	f	f	p	f	f	f	p	p	g	p	g	p	g	f	g	g	-	g	g	f
Norway spruce		-	a	a	a	a	g	f	a	g	a	g	f	a	p	g	p	g	a	a	g	-	-	g(x)	a(x)	p(x)
Sitka spruce		-	f	a	f	a	f	p	a	a	p	a	p	p	p	f	p	a	g	g	f	g	g	g	g	g
Oak:	Home	f	f	g	a	p	a	a	g	g	g	g	p	p	g	g	g	g	g	-	p	a	p	f	a	g
	Abroad	-	-	-	-	-	a	a	a	-	-	-	a	a	a	a	a	a	a	a	-	-	-	-	-	-
Beech:	Home	p	g	f	a	f	a	f	g	f	p	a	f	p	p	p	g	g	p	f	p	p	p	p	p	f
	Abroad	-	-	-	-	-	g	g	-	-	-	-	-	a	a	a	p	p	p	f	p	-	-	-	-	-
Ash		-	-	g	-	-	-	-	g	g	p	p	p	a	p	f	g	p	g	g	g	g	p	p	g	a
Sycamore		-	-	g	g	g	g	g	g	g	g	a	g	g	g	g	g	-	g	g	g	g	p	p	g	g
Chestnut		-	-	g	f	f	-	p	g	p	p	a	p	p	g	g	g	-	g	g	g	g	p	p	g	g

(x) Relative to Home Crops only.

Insects and Fungi.

The control of injurious insects is one of the most important aspects of forest protection. Myelophilus piniperda, the pine shoot beetle, is one of the commonest and most destructive insects in pine woods in Britain and it is capable of causing enormous loss by attacking young pine crops under 30 years of age. Severe damage at this stage of growth may often ruin the chances of producing high-grade timber in subsequent years. The heavy fellings which have taken place during the war have provided exceptionally favourable conditions for the increase of this destructive forest insect and normal control measures have not always been possible.

Two other insects, the pine weevil (Hylobius abietis) and the black pine beetle (Hylastes) are both extremely important pests when conditions are favourable for their excessive increase, particularly when coniferous crops are felled and the ground has to be replanted. Both feed in the bark of the stumps and roots of felled trees and where extensive felling of coniferous areas has taken place it is not safe to replant with fresh coniferous crops until at least three or four years have elapsed. Even then care should be taken to see that the area is reasonably clear of weevils and Hylastes beetles, or the new crop may be completely destroyed.

Chermes and aphids (plant lice) are at times troublesome. Of these the green spruce aphis (Aphis abietina), Chermes pini, Chermes cooleyi, and Lachnus are of frequent occurrence. The last named has caused extensive defoliation in plantations of European larch but except in cases of very severe attack recovery occurs. Ladybirds are the principle controlling

agency. There has also been extensive defoliation of Sitka spruce by Aphis. These attacks, which may be repeated every few years, do not seem to have any serious or lasting effect; if very severe they cause a temporary slackening off in the rate of growth but the crop rapidly recovers.

FIRE FIGHTING.

Fires are a Forester's nightmare. Although plantations may be prone to fires at almost any stage in their lives there are two stages which are perhaps more vulnerable than others. (1) The first few years after planting whilst there is still an accumulation of dry grass and vegetation. (2) The thicket stage when the branches of the trees have just met and have killed the vegetation and it is impossible to get inside to weed.

During recent years fire protection has developed considerably with the object of rendering a plantation as safe as can be expected within a reasonable expenditure and to present a state of conditions in which a fire once started will be prevented from spreading rapidly and above all to prevent a ground fire becoming converted into a crown fire. The lines upon which prevention has proceeded therefore consist of reducing the amount of inflammable vegetation along the rides and in the outer margins of the plantations, sub-dividing the plantations into small blocks so that they are readily accessible and present many fronts where a fire can be stopped thereby confining a fire to the smallest possible limits.

Side by side with the development of protection in the plantations themselves the Commissioners have provided more look-out towers, telephones, warning systems, transport, fire fighting equipment and the rest, all designed to make it possible for efficient fire fighting units to reach any given site at the quickest possible speed, for perhaps the one lesson learned more thoroughly than any other is that speed is the essence of successful fire fighting. During the war years the N.F.S. Organisation has given commendable assistance.

Most of the State Forests are situated in districts where water supplies are limited or the nature of the ground prevents

full use being made of them. It has, therefore, been the Commissioners' practice to regard beating as the most important method of fire fighting. In 1928 experiments were started with a view to ascertaining the value of water in fire fighting and these tended to show that comparatively small quantities could be very effective if applied at pressure. It became important to design a method of conveying water to the scene of the fire and applying it in such small quantities as would give the maximum service from a limited volume. Proceeding by stages the point has now been reached where 500 gallons of water carried upon a lorry is applied to a fire by a small petrol pump at the rate of 17 - 20 gallons per minute at a pressure of 50 - 70 lbs. per square inch and this has been found to be very effective in many types of country. The absence of negotiable roads in many forests still puts water out of reach as the principal means of fire fighting and the equipment is as yet by no means perfect; but the day is rapidly approaching when this method will be far more general and the exhausting process of beating out a fire will be limited to a minority of areas.

DAMAGE BY FIRE.

During the twenty-five years ended 30th September, 1944, the total number of outbreaks reported was 10,240, including fires on adjoining land where they threatened to cause damage to Commission property. The area of Commission plantations burnt amounted to 27,665 acres and the total damage (including cost of extinguishing) to £485,750. Excluding natural regeneration and coppice, the planted area burnt represents the loss of 204,600 acre-years of growth (i.e. area multiplied by age of plantation). Details of quinquenniums and a summary by countries are given below:-

	Number of Fires	Planted area burnt.		Damage (including cost of extinguishing)	Loss in acre-years (excluding natural regeneration and coppice).
		Acres		£	Acre-years
1920 - 24	220	200	3	3,100	375
1925 - 29	970	5,570	54	53,850	19,300
1930 - 34	2,150	2,725	42	41,750	12,550
1935 - 39	2,860	5,000	86	86,300	34,275
1940 - 44	4,040	14,170	301	300,750	138,100
	10,240	27,665	486	485,750	204,600
45 - 49	4 412	4 340	128		
	14,652	32,005	614		
England & Wales	7,560	19,440		326,200	130,000
Scotland	2,680	8,225		159,550	74,600

Causes of Fires. The table below shows the number of fires and damage according to causes, which are divided into two sections, those normally experienced and others attributed to the war. Of the normal causes, the greatest number of outbreaks was due to railways (mainly sparks from engines) and amounted to 49 per cent. of the total; the damage however only amounted to 12 per cent. of the total, as the danger can be more readily foreseen, and guarded against, than in other cases. Fires which started on adjoining land caused the greatest damage (28 per cent.), although the number was only 11 per cent. of the total; a test analysis shows that approximately 30 per cent. of these fires were due to burning operations by farmers and 40 per cent. to the general public. Fires started by the general public other than on adjoining land accounted for 15 per cent. of the total number and 21 per cent. of the total damage. Fires due to unknown causes accounted for 18 per cent. of the total number and 24 per cent. of the total damage; it is probable that most of these fires were also caused by the general public.

Of the totals for all causes, fires due to war causes accounted for 5 per cent. of the number and 18 per cent. of the damage. The latter amounted to £91,350, of which £45,800 was due to troops and Royal Air Force planes, and £45,550 to enemy action.

	Number of Fires		Damage	
Normal Causes.		Per cent.	£	Per cent.
Railways	4,715	49	48,950	12
General public	1,415	15	83,550	21
Adjoining land	1,030	11	109,900	28
Incendiarism	240	2	14,100	4
Commission employees	195	2	24,900	6
Road engines	160	2	6,750	2
Miscellaneous	140	1	12,750	3
Unknown	1,795	18	93,500	24
Totals	9,690	100	394,400	100
War Causes.				
Troops and R.A.F.	445	-	45,800	-
Enemy action	105	-	45,550	-
Totals, all causes	10,240	-	485,750	-

14,652

Incidence. The table below shows the percentage of the total number of fires due to normal causes which occurred in each month of the year. On the average, very few fires occurred during October to January in England and Wales, and during August to January in Scotland. In both countries most of the fires occurred in March, April (peak month) and May. The number of fires in November and December was too small to throw up percentages.

Percentage of Total Number of Fires.

(Normal causes only)

	England & Wales	Scotland	Great Britain.
October	1	1	1
November	-	-	-
December	-	-	-
January	1	1	1
February	6	4	5
March	18	19	19
April	22	31	25
May	16	29	19
June	12	10	11
July	11	3	9
August	8	1	6
September	5	1	4
	100	100	100

If numbers of fires due to normal causes are grouped in four-year periods from 1923 (information prior to that year is fragmentary) they show that in each period there was one year when the number of outbreaks was very heavy and that, with one exception, the other three years comprised two when numbers may be regarded as normal and one when they were light; the exception (1935-38) comprised three "normal" years. The following table shows the number of outbreaks (normal causes only) per 10,000 acres of plantations at risk; statistics are not available for individual years prior to 1929, but in 1924 there was stated to be serious trouble from forest fires and it is assumed that outbreaks in that year were above the normal.

Four-year period.	Number of fires per 10,000 acres at risk			
	1st year	2nd year	3rd year	4th year
1923 - 26		Heavy		
1927 - 30			28	7
1931 - 34	9	14	24	19
1935 - 38	15	11	12	28
1939 - 42	8	12	13	25
1943 - 46	8	13		

On the average, fires occurred most frequently in plantations up to 11 years old, and thereafter decreased, although the average size and damage per fore continued to increase. The following table shows for plantations aged 0 (year of planting) to 23, the average annual number of fires (normal causes only) per 10,000 acres at risk and the average size and damage per fire; it should be borne in mind that as newly planted areas comprise the bulk of the Commission's plantations the statistics for ages 14 and over were practically confined to the last ten years and relate to a comparatively small proportion of the total area at risk.

Age of Plantation	Number of Fires per 10,000 acres at risk.	Per Fire	
		Size	Damage
Years		Acres	£
0 and 1	5	4	29
2 " 3	8	5	50
4 " 5	8	6	75
6 " 7	7	6	81
8 " 9	7	6	100
10 " 11	6	7	147
12 " 13	4	10	226
14 " 15	4	14	365
16 " 17	3	18	528
18 " 19	3	18	612
20 " 21	3	22	852
22 " 23	5	20	840
Old plantations	4	7	78

Note. As there were only fractional variations from one year to the next, ages are given in groups of two years and the figures shown against them relate to each of the two years.

Quinquennial Averages. The table below shows for each quinquennium from 1925 the number of fires per 10,000 acres at risk, the percentage extinguished without causing damage, and the average size and loss per fire causing damage. The figures are confined to fires due to normal causes. Details for the quinquennium 1920 to 1924 are not available. During the twenty years covered, the number of fires averaged annually 15 per 10,000 acres at risk, and 71 per cent. were extinguished without causing damage, the proportion having risen from 50 per cent. in 1925 to 1929 to 77 per cent. in 1940 to 1944. Of the fires causing damage, the average size per fire ranged from 4.1 acres in 1930 to 1934 to 12.8 acres in 1940 to 1944, with an average of 8.6 acres for the twenty years. The average loss per fire ranged from £62 in 1930 to 1934 to £265 in 1940 to 1944, with an average of £144 for the twenty years. The rise in the average size and loss per fire is due to the increasing age of the Commission's plantations; the largest fires occurred in plantations aged 14 years and older and the value per acre of a plantation increases each year. More intensive fire protection measures were introduced after 1929 and this may explain the somewhat high figures for average size and loss per fire in 1925 to 1929.

Quinquennium	Number of Fires		Fires causing Damage	
	Per 10,000 acres at risk.	Extinguished without causing damage	Average size per fire.	Average loss per fire.
		Per cent.	Acres	£
1925 - 29	12	50	11.6	112
1930 - 34	16	69	4.1	62
1935 - 39	15	73	6.4	110
1940 - 44	15	77	12.8	265
Averages	15	71	8.6	144

Wastage in Plantations due to Fires. Subject to the reservation that statistics for plantations aged 14 years and older are somewhat limited, it would appear that on the average approximately 10 per cent. of the area originally planted is lost by fire in the course of the first twenty years.

EDUCATION.

RESEARCH AND EXPERIMENT.

PROGRESS IN HOUSING.

In providing 3 bedroom cottages, with large living room, scullery, fitted bathroom and usual offices, each with hot and cold water supplies and indoor water carriage sanitation systems, the Commissioners have in a very large measure anticipated the recommended standards of the Dudley Report. Where there was the possibility of electric current being available, cottages have been suitable wired for light and power and in some cases current has been available and used for some years past.

In particular attention has been given to building technique, harmony of design, advancement in standards of accommodation, modern domestic facilities and conveniences together with the study of design in relation to utility.

The aim has been to produce a cottage modern in all respects and having low maintenance potentialities without offending the local traditional type of domestic architecture. Adaptations of existing houses and cottages have been in most cases governed by the general arrangement of the subject and financial limits imposed but with the desire to bring the standard of accommodation as nearly as possible up to that provided in the new cottages.

The improved type of foresters house giving the minimum standard of accommodation is generally considered progressive.

Practically all types of orthodox building materials have been used and a degree of standardisation in fittings and fixtures achieved. More recently both foresters' houses and forest workers' dwellings have been constructed in timber with Canadian Red Cedar weatherboard walls and roofed with shingles of that timber producing economical, comfortable and pleasing dwellings.

Forest Workers' Holdings.

In 1924 the Commissioners began the systematic establishment of forest workers' holdings. At first it was a scheme of land settlement but later this aspect receded into the background and new holdings have since been restricted to those essential to the work in the forests.

In the fifteen years 1924-39 nearly 1,500 holdings were established. During the war little development has been possible and there is now a shortage of 2,000 cottages required to house the Commission's employees.

Details of expenditure and income are given in Table L. (p.) from which it will be seen that expenditure has amounted to £767,160 and income to £301,488. The average pre-war cost of establishing a holding was £508, of which land accounted for £69, and cost of buildings, drainage, water supply, etc. £439. The average rent charged per holding was £13.15.0.

The scheme in its original form defined a forest worker's holding as a cottage and outbuildings with not more than 10 acres of agricultural or cultivatable land; the tenancy to be a short period (renewable), and the holders to be guaranteed a yearly minimum of 150 days' work in the forest, the remainder of their time being available for working the holdings or for additional work in the forest. As a result of experience gained in the past 20 years the Commissioners have proposed that, in future, holdings should be of two standardised types: (a) holdings of 10 acres or thereby, capable of providing milk for the local forest workers and horse labour for use in the forest; and (b) cottage holdings, with a garden or sufficient land to raise pigs, poultry and potatoes. The larger holdings will, undoubtedly, be invaluable, especially in districts remote from farms and villages.

Although capable of improvement the success of the scheme since it was instituted is marked by the fact that, whereas most of the holders possessed no capital to start with, they now own livestock to the value of more than £50,000. The success or failure of a forest holder is dependent on a number of factors. The most important factor for success lies in careful selection because the tenant, with his wife, must be adaptable to rural conditions. An enquiry recently instituted by the Commissioners in order to assess the past efficiency of the scheme revealed that the degree of success obtained amounted to 78 per cent. To be classified as successful a holding had to be properly cultivated and the holder to be one of the Commission's employees.

Forest workers' holdings help to build up a community identified with each State forest; in addition they provide a valuable nucleus of forest-minded workers, in time to become with their descendants skilled in forest crafts.

Census of Woodlands.

Prior to 1919 there were several attempts to assess the area of woodland in Great Britain but none of them met with much success. In 1905 and again in 1913 the Board of Agriculture collected data from woodland owners through the local officers of Customs and Excise. The information secured was meagre and in 1924 the Commissioners instituted a survey which it was hoped would provide more reliable information. The work was directed by voluntary county organisers and although valuable information was obtained the results were of varying and unknown accuracy, and could be used only as a rough guide to estimate the contents of private woodlands.

In order to have a solid groundwork on which to base a vigorous and fruitful policy of advice and encouragement to owners of woodland, and also to assist the timber trade in the normal marketing of timber, the Commissioners in 1938 embarked upon a new census. The two main objectives of this census were: (a) to ascertain the conditions of British woodlands, and (b) to obtain reliable estimates of stocks of standing timber for war purposes. In order to meet the first of these requirements it was necessary to know the types of woodland and their condition, and to record the latter in such a way as to give some indication of the reasons for an unsatisfactory condition. To meet the second requirement, as well as to help the first, the Commissioners needed details of volumes by categories of produce, particularly as to size (because this would be related to war utilisation), and species. In other words the Commissioners set out to make a complete physical stocktaking of British woodland. Every piece of homogeneous woodland of more than 5 acres in extent

was to be classified, mapped, and recorded, while the volume of merchantable timber was to be estimated in every such unit of woodland. Superimposed on this plan were considerations relative to (a) economy in staff, (b) speed in securing results, and above all (c) speed (in a national emergency) in analysing the data to facilitate planning and exploitation. These were the basic considerations which led to the adoption of the method employed and early in 1938 the Census was commenced. The survey was carried out by Forestry graduates and controlled by selected officers of the Commission. By September 1939 a total of 912,000 acres of private woodlands in various parts of Great Britain had been surveyed, which represented a sample of about 32 per cent. of the total area. There was evidence that this sample was representative of the whole, and speedy analysis of the data enabled estimates to be made of the quantities of timber which would be available for the war effort and it was possible to place an ordered plan before Government. The Census also provided the Commissioners with information as to silvicultural methods of management which was, in fact, invaluable in framing proposals for post-war forest policy.

Special Services.

Empire Forestry. Under the Forestry Act 1919 the Commissioners were charged *inter alia* with promoting the production of timber in His Majesty's Dominions. Their first step in this direction was to convene the first British Empire Forestry Conference in London in 1920. This was followed by further Conferences in Canada (1923), Australia and New Zealand (1928) and South Africa (1935). The fifth Conference was to meet in India 1940 but with the advent of war had to be postponed. The Conferences have done excellent work in collecting together data as to the resources and utilisation of the forests of the Empire, in developing education and research, and in reporting on local problems submitted to them. They are helped by a Standing Committee on Empire Forestry, presided over by Sir Roy Robinson, which meets periodically in London and on which there are representatives of the Dominions and Colonies. It has, therefore, been possible to work out guiding principles of forest policy and to develop research and education and the Committee have been able to report on local problems referred to them.

The Commissioners have been able to assist many of the Empire Forest Services in different ways and in return have been helped with their own problems; in particular by the provision of tree seeds of certain valuable species.

It has been decided to seek the acquiescence of the individual Governments of the Empire in a proposal to prepare a series of Statements on the part played in the War by the forests and forest products of the Empire.

PUBLICATIONS.

International Union of Forest Research Organisations.

The Commissioners received the Permanent Committee of this Union when they met in London in 1931 and again in 1939 and have afforded facilities for visits to forests and discussed problems involving international co-operation in forest research. Representatives of the Forestry Commission have also attended Congresses of the Unions abroad.