

FORESTRY  COMMISSION

HISTORY

OF

BLAIRADAM

FOREST

E(S) CONSERVANCY

LIBRARY
15
902 (410.14)
H.M. Forestry Commission

**FOR
REFERENCE ONLY**

Forestry Commission
ARCHIVE

400 80.57

FORESTRY COMMISSION

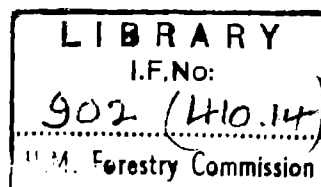
HISTORY

of

BLAIRADAM FOREST

1927 - 1951

EAST (SCOTLAND) CONSERVANCY



History of Blairadam Forest

CONTENTS

| | Page |
|--|---------|
| <u>DIRECTOR'S COMMENTS</u> | 1 |
| <u>STATE FORESTS OFFICER'S COMMENTS</u> | 2 |
| <u>GENERAL DESCRIPTION OF THE FOREST</u> | 5 |
| Situation and Name | 5 |
| Area and Utilisation | 5 |
| Former Utilisation | 8 |
| Physiography | 8 |
| Geology and Soil | 8 |
| Vegetation | 8 |
| Meteorology | 8 |
| Risks | 9 |
| Roads | 9 |
| Labour | 10 |
| <u>SILVICULTURE</u> | 10 |
| Preparation of Ground | 10 |
| Choice of Species | 10 |
| Planting | 12 |
| Ploughing | 12 |
| Beating Up | 13 |
| Weeding | 14 |
| Mixtures | 14 |
| Rates of Growth | 14 |
| Past Treatment of Established Plantations | 16 |
| Brashing, Thinning | 16 - 20 |
| Conclusions | 20 |
| <u>APPENDICES</u> I Notes from Inspection Reports | 22 |
| II Record of Supervisory Staff | 25 |
| III Notes of Interest | 26 |
| IV Map of the Forest | |

HISTORY OF BLAIRADAM FOREST

DIRECTOR'S COMMENTS

A good history. It is worthy of record that the family of Adams who owned the property has, as its most famous members, the two Adams brothers, architects and designers.

On the subject of the effect of coal mining on the forest, it is of interest that in 1947 or 1948 a new pit was sunk in the middle of the forest not far from the old shaft. This pit has caused remarkably little damage to the forest.

(Sgd) H. C. B. P.

18th January, 1952.

STATE FOREST OFFICER'S COMMENTS

Mr. Woodburn has prepared a comprehensive and accurate history for Blairadam and I agree to a great extent with his conclusions.

As this forest is now completely planted we must for this rotation, accept the species chosen by our predecessors. Any discussion of alternatives in this direction must, therefore, be largely academic.

It is already fairly evident, however, that on the heavy clay drift which is found overlying the carboniferous limestone, crops of pure Sitka spruce may be troublesome to manage on account of windblow. It is believed that happier results could have been obtained if some of the following alternatives had been adopted:-

- (1) Some of the pure blocks of Sitka spruce replaced with Japanese larch or Japanese larch planted in broad strips to act as windbreaks.
- (2) Scots pine and silver fir mixed with the spruce, either in groups or in a more intimate mixture.
- (3) Oak and sycamore, probably pedunculate oak, planted in groups through a matrix of spruce.

At this stage none of these safeguarding mixtures can be readily applied and the problems of the pure plantations of Sitka spruce which were planted prior to 1930 are serious. Fairly extensive windblows have already occurred.

Apart from choice of species, delayed thinning and faulty drainage appear to be the chief causes of windblow.

When this danger was first noticed, drastic steps were taken and contour drains were cut at one chain intervals through the older plantations which were most seriously affected.

The cutting of so many drains in crops over 20 years old has increased the windblow and the treatment has now been modified so that contour drains are limited to four to six chains apart and the existing "up and down" drains cleared. In a number of cases cleared lanes two chains apart had been cut before the State Forest Officer changed the policy with regard to contour drains. These cleared lanes, it is believed, will

act as severance fellings and further help to stabilise the crop.

At the same time, frequent light thinnings will have to be carried out in the older plantations and thinning in the younger plantations will be started earlier than was formerly the practice. Special attention will be paid to drain side dominants, which will be removed as early as possible.

Where gaps due to windblow exist, it is our intention to fill them up with silver fir and in some cases with oak and sycamore. This should be possible at Blairadam where the vermin position is not serious.

Although we cannot see the end of the windblow problem at Blairadam, we feel that we do know some of the causes and that by early and fairly heavy thinning, combined with intensive drainage, we shall grow a crop of spruce which may be somewhat deficient in quality but will remain standing.

The fall in height growth in the Sitka spruce plantations of 20 years and over mentioned by Mr. Woodburn in the section on Rates of Growth may be due, in part, to atmospheric pollution but is more likely to be the result of root competition. There are now slight indications of renewed vigour this year (1951) in stands which were thinned in F.Y.49. Aphis attack may have played some part in reducing the increment but this condition should also improve under the stimulus of increased growing space.

The pre-thinning described on page 16 was an original idea evolved to allow considerable areas in dire need of thinning to be treated without delay. As a regular operation to replace brashing, it is not promising.

In practice it was found difficult to sell the small-sized poles at a profit and as the work was largely uncontrolled, it did not have much silvicultural value.

The method now practised is to brash every fourth row of trees (one side of two rows) which gives a 25% brashing.

This has proved to be of more assistance both to those working the thinnings and to those felling and extracting them than did the pre-thinning. It is also cheaper, costing only 30/- per acre (1951).

One point about Blairadam which Mr. Woodburn has not emphasised is the ever present threat to our plantations from open cast coal mining. Some areas have already been leased for this purpose and prospecting is

taking place in others.

The Director may be able to supply details of areas already leased to the National Coal Board for this purpose, as complete records are not available in Aberdeen.

So far the clearing of trees for mining has taken place along the edge of the planted areas. This had contributed to some extent to the windblow in the older plantations.

(Sgd) H. A. MAXWELL.

HISTORY OF BLAIRADAM FOREST

GENERAL DESCRIPTION OF THE FOREST

Situation and Name

Blairadam Forest is situated on the northern edge of the Fife coal-fields to the west and north of the town of Kelty. Its name is derived from the first and largest acquired property "Blairadam Estate". This property originally named "The Blair" had been owned for several centuries by the family of Adams. The name of the property and that of the owners were later combined to describe the estate.

Succeeding acquisitions have caused the forest to be composed of one large area, called for the purpose of this report the Blairadam Block and three outlying areas, "Binn Hill Wood, Benarty Hill Wood, Harran Hill Wood", collectively named the Benarty Hill block.

Area and Utilisation

Acquisition details and utilisation of ground data are given in the following tables (Tables I and II).

TABLE I

| From | By | Date | Plantations Acquired | Plantable (Excl. Col.4) | Nurseries | Agricultural | F. W. H. | Unplantable (Excl. Col.4) | Other Land | | | | Total |
|---|-----------------|-------------------|----------------------|----------------------------|-----------|--------------|--------------|------------------------------|---|---------------|---|---------------|----------------|
| | | | | | | | | | (10) Land Permanent- ly Transferred Descrip- tion | (11) Acres | (12) Land Temporary Transferred Descrip- tion | (13) Acres | |
| (1) Charles Keith Adam and Thomas Place | (2) Purchase | (3) June, 1927 | (4) | (5) 881 | (6) | (7) | (8) 24.75 | (9) | (10) | (11) | (12) | (13) | (14) 905.75 |
| Thomas Place | Purchase | March, 1929 | | 230.5 | | | | | | | | | 230.5 |
| Thomas Place | Purchase | May, 1928 | | | | | 44 | | | | | | 44 |
| Thomas Miller Tod | Purchase | Sept. 1928 | | 58 | | | | | | | | | 58 |
| Fife Coal Company Ltd. | Ren | Nov. 1930 | | 215.75 | | | | | | | | | 215.75 |
| Geoffrey Louis Leslie Smith | Purchase | Feb. 1937 | | 24.5 | | 5 | | 16 | | | | | 266 |
| Totals: | | | | 1630.25 | | 5 | 68.75 | 16 | | | | | 1720 |

TABLE II

| | | | |
|-----|-----------------------------------|-------------|-------------------|
| (a) | <u>Plantations</u> | | |
| | Acquired | | |
| | Formed by Commission | <u>1463</u> | 1463 acres |
| (b) | <u>In hand, awaiting planting</u> | | |
| | Blanks after felling | | |
| | Burnt Areas | | |
| | Other land | <u>62.5</u> | 62.5 acres |
| (c) | <u>Nurseries</u> | | |
| (d) | <u>Agricultural</u> | | |
| | Tenancies (D.O.A.S.) | | |
| | Tenancies (F.C.) | 130 | 130 acres |
| (e) | <u>F.W.H.</u> | 5 tenancies | 43.5 acres |
| (f) | <u>Unplantable land in hand</u> | | 21 acres |
| (g) | <u>Other Land</u> | | |
| | Houses, gardens, etc. | | |
| | | Total: | <u>1720 acres</u> |

Many disposals took place subsequent to acquisition and details of these can, if necessary, be supplied by the Director of Forestry for Scotland.

Former Utilisation

Blairadam Estate, Binn Wood, Benarty Wood and Harran Hill Wood were formerly all woodlands, hardwoods and conifers, but all were clear felled or being clear felled at the time of acquisition.

Thornton, Blairenbathie and Dullomuir Fields were old agricultural lands which had reverted to sheep grazing when acquired by the Commission.

Physiography

The elevation varies between 400 ft. and 1000 ft. the bulk of the plantations being between 500 ft. and 700 ft. The general aspect is south. Exposure to the south-west prevailing winds is severe. Degree of relief and slope varies with the geology. South of the Pieries Burn, which bisect the main forest block, the hills are smooth and slopes gentle. North of the burn, and including the detached forest blocks on Benarty Hill, the ground is more broken and slopes steeper.

Geology and Soil

South of the Pieries and Kelty Burns the underlying rock is limestone of the Carboniferous Series. North of these burns and at Benarty Hill the underlying rock is Volcanic Quartz Dolerite. On Benarty Hill the soil, which is a light brown loam, has directly formed from the breakdown of the underlying rock. Elsewhere, with the exception of some knolls, glacial drift has covered both the sedimentary and igneous rocks, and given rise to a heavy clay soil. Above 600 ft. peat has formed on top of the clay.

Vegetation

The 800 ft. contour roughly delineates the area of Calluna, Scirpus caespitosa and Sphagnum moss. Below that contour the vegetation was a mixture of Vaccinium and fine grasses on the felled woodlands, a Juncus/fine grass mixture on the grazing areas, and a heavy growth of bracken on the Benarty Hill plantations. Heather has come in strongly where the growth of spruce has been slow.

Meteorology

The average annual rainfall is about 40 in. spread unevenly over the year. The main block is subject to frost damage. Strong south-west

winds are common in the spring and autumn.

Risks

Being in close proximity to an industrial area, the forest attracts many pedestrians with the attendant risk of fire. Since the forest has become established, pedestrians remain on the footpaths, thereby reducing the risk slightly. There is one coal mine within the forest. The road and railway leading to it are a constant source of danger. Two new housing estates built within recent years close to the plantations have caused an increase in trespass, especially by children. There is no danger of fire from muirburning on adjoining properties.

Heavy smoke fumes have coated the spruce leaves and shoots with a soot deposit and this probably has an adverse effect on growth.

Rabbits once numerous, are now scarce. Roe deer are present in small numbers. Grey squirrels introduced into Scotland at Dunfermline Park have been noticed at the forest for many years. Sitka spruce has suffered in recent years from Neomyzaphis. Considering that much of the ground was formerly under hardwoods, honey fungus has done little damage.

None of the above risks have been a deterrent to growth compared to the serious windblow which has occurred within the last two years amongst Sitka spruce. Delayed thinning has, to a certain extent, contributed to this, but in addition, effective drainage of the impermeable clay soils has not been obtained by the old-fashioned drainage system.

Roads

The Blairadam property had formerly an extensive road layout through the former crop, some of the roads being roughly metalled. Most of these tracks were retained as compartment boundaries and rides, and facilitated the transport of plants, fencing materials etc. to the planting site. The Engineering Branch metalled and surfaced a considerable mileage of these tracks in 1946 and 1947. Mr. James Macdonald on his visit on the 7th April 1948 commented that the forest was probably better supplied with roads than any other in the country. Road construction re-commenced in 1951, based on the rule that the maximum extraction distance to road-side is 300 yards. Construction is mainly by machinery, with a minimum of manual labour.

Labour

From 1928 there has been a nucleus of 5 skilled forest workers who reside in Forestry Commission houses. Although the average labour force has been maintained at 10 - 12, the balance has been recruited from casual unskilled labour, principally unemployed miners.

SILVICULTURE

Preparation of Ground

On the felled woodlands, a considerable amount of brushwood had to be burnt before planting. Coppice growth, which was abundant, was clear felled as a general rule, but in some of the thickest growth, lanes 5 ft. apart only were opened and the remainder cut back when it interfered with the growth of the conifers.

Scrub birch was also clear felled with the exception of a small area in Compartment 25, P.37, underplanted with beech, and an area in Compartment 32, P.39, underplanted with Norway spruce and Sitka spruce. A half acre of natural regenerated sycamore in Compartment 35 was retained and is now the best hardwood stand in the forest. Some large beech left in Compartment 32 by the timber merchant were girdled at planting time in 1939.

Heather was burnt over before planting in 1927 only in Compartments 1 and 2. Fencing against rabbits and stock was the general rule from the initial planting.

Choice of Species

General. Although the previous crop was principally hardwoods, conifers form the bulk of the Commission plantations.

On the main Blairadam block the soil is a stiff wet clay mostly overlain with a skin of peat 6 in. to 9 in. in depth. There is an exceptional area in the north-east corner in Compartments 20 - 22 and 25 - 27 where the soil is more loamy, and is akin to the light loam on the Benarty Hill plantations.

These peaty clay areas on the Blairadam block were planted from 1927 to 1935, again in 1938 and 1939, and from 1942 to 1949. Since much of this block is exposed, Sitka spruce was the principal species used. In the first year of planting the Sitka was planted in mixture with Scots pine in

the proportion of three to one, since it was thought that the Sitka spruce would be checked by frost damage and would need to be nursed by the pine. In 1928 and succeeding years it was planted pure. When the degree of shelter warranted its use, Norway spruce was substituted for Sitka. Thus the Norway have been planted on the sheltered sloping ground north and south of the Kelty and Pieries Burns, and Scots pine was planted on hard heathery knolls. In 1928 and 1929, 17 acres in Compartments 8 and 9 were planted with groups of oak, beech, ash and sycamore, on a clay soil where bracken was the dominant vegetation and gave indication of a slightly freer soil.

The growth of the Sitka spruce has been satisfactory. The mean annual height increment in Compartment 4, P.27 is 18 in. but in the older areas there has been a very marked falling off in height growth in the last three years. Frost damage did, in fact, cause a slight check in the early years but this had been generally overcome, since Mr. Murray commented on the satisfactory growth in 1938. There are still a few checked areas of Sitka spruce in frost hollows in P.30 and 31, which are only now coming out of check helped by the shelter accorded by adjoining successful spruce trees. Fumes have not had the adverse effect on growth as was originally expected. Honey fungus damage has been uncommon. Norway spruce with a mean annual height growth of $17\frac{1}{2}$ in. has been slower than Sitka, but its general appearance is healthy. The Scots pine has also grown satisfactorily when planted pure. Of the hardwood species, only the oak has grown vigorously. The others have grown very slowly and their form is bad.

A greater variety of species has been planted on the Benarty Hill areas and on the north-east corner of the Blairadam block mentioned above. These areas were planted in the years 1935, 1936, 1941 and 1942.

Sitka spruce was again chosen for the exposed high ground on peat.

On the lower slopes, with a rich loam soil and bracken dominant in the vegetation, beech and Japanese larch were planted. On dry heather-covered ground Scots and Corsican pine were used, it being thought that Corsican pine would be more resistant to atmospheric pollution. Other conifers planted on a small scale were European larch, and Abies grandis, and of hardwoods, ash and Oregon alder in a moist sheltered site at low elevation. Some naturally regenerated sycamore stands were retained.

The beech have been slow to start and losses were heavy, being caused by rabbits and the heavy weed growth. The Oregon alder was severely frosted at an early stage and few of these remain. All other species have grown well.

Natural regeneration and coppice growth of hardwoods are noticeably absent in this felled woodland area. Only amongst the Norway spruce does birch coppice appear in any quantity. The best coppice stems are being retained to break up the top canopy of the spruce and reduce the possibility of windblow.

Planting

- (a) Spacing. The planting distance was the normal one for each species.
- (b) Large transplants, 2 + 1 and 2 + 2s were the most common type of plant used. 2 yr. seedlings of Sitka spruce were planted on ploughed ground in Compartment 34, P.33, and have grown well without serious losses.
- (c) Methods of Planting. In the early years of the forest, pines were L notched into the ground and spruces pit planted using a semi-circular spade. In 1930 turf planting of spruces started. The use of the semi-circular spade was stopped, but pines, hardwoods and larches continued to be L notched on drier ground.
- (d) Annual rate of planting varied between 70 and 100 acres.
- (e) A checked area of Sitka spruce on very poor peat in Compartment 6, P.29 was manured with basic slag. This area was subsequently disposed to National Coal Board for open cast mining.
- (f) All conifer species, seedlings and transplants have become established successfully. There are a few localised areas of checked Sitka spruce in frost hollows in P.30 and 31, but in recent years the shelter from surrounding successful growth is assisting the checked trees to get above the frost layer. Hardwoods in general have been very slow to become established.

Ploughing

The felled woodland areas on Blairadam had been formerly extensively drained. Preparation of ground therefore required only the cleaning out

of these and cutting new drains between them for turfs. Neither the old drains nor the intermediary drains were cut on the contour.

In 1933, 16 acres in Compartment 34 were ploughed by a horse-drawn agricultural plough to prepare a suitable turf for the planting of seedlings. The spacing was 5 ft. and the ground was ploughed twice to throw up a large turf.

From 1942 to 1947, the ground on the Thornton area was ploughed at 5 ft. spacing and rather shallow depth by tractor and Solotrac plough. In 1948 and 1949, the ploughing was done by tractor and a Cuthbertson double furrow plough. There was an excessive growth of grass subsequent to the latter type of ploughing.

In 1942, plants were L notched into the top of the turf. Thereafter, however, the turf was cut right through from the side to the centre, and the roots of the plant spread below between the two layers of vegetation.

Transplants only 12 in. - 18 in. in size have been planted on the ploughed ground. The trees have become established on ploughed areas without suffering any marked check in growth.

Beating Up

Beating up was maintained very thoroughly as shown by the complete stocking of plantations with the one exception of Harren Hill Wood, Compartments 37 and 38. In these Compartments, the beech was badly attacked by rabbits. It was beaten up, first with beech and then with Japanese larch, but the stocking is still poor because of the heavy weed growth. Oak in Compartment 7, P.28, was beat up with beech several years after planting. The beech grew successfully in the shelter of the oak and to reduce competition for growing space, the beech were cut back in 1944.

Beat ups were normally introduced in the second year after planting. In the 1935 Silvicultural Note there is a remark to the effect that Sitka spruce, persistently frosted in regular frost hollows, were to be replaced with Scots pine in future.

Failed beech areas have been beaten up with Japanese larch as a normal rule. There is no record of manuring of beat up plants or inter-planting. Transplants of average size have been the type of plants used.

Weeding

On heather ground weeding was not intense and three years' duration was sufficient to allow plants to establish themselves. On Juncus/grass vegetation there was a more intensive cleaning around plants and weeding lasted from four years to five years. On bracken and willow herb areas, where hardwoods were planted, weeding was done for seven years after planting.

Mixtures

The mixture of a Scots pine nurse with Sitka spruce in Compartments 4 and 5, P.27, is the only one on record.

Rates of Growth

Rates of growth for each of the species planted in the forest are tabulated overleaf. The species selected for measurement have been taken from the oldest stands of their kind at the forest.

| Cpt. | Species | P. Year | Age | Geology and Soil | (a) Altitude (b) Aspect (c) Slope (d) Exposure | Mean Ht. of Dominants | Mean Annual Height Increment | Current Annual Ht. Increment during last 5 years. |
|------|------------------|---------|-----|---|---|-----------------------------|---------------------------------------|---|
| 4 | S.S. | 27 | 24 | Volcanic Dolerite, Overlain with Boulder Clay. Soil heavy clay with skin of peat. | (a) 800 ft. (b) S. (c) Moderate (d) Exposed | 36'8" | 18" | 18" |
| 5 | N.S. | 28 | 23 | As above | (a) 750 ft. (b) S. (c) Moderate (d) Exposed | 35' | 17½" | 22" |
| 4 | S.P. | 27 | 24 | As above | (a) 800 ft. (b) S. (c) Moderate (d) Exposed | 27'6" | 14" | 17" |
| 37 | C.P. | 36 | 15 | Volcanic Dolerite Sandy Loam | (a) 600 ft. (b) S.W. (c) Moderate (d) Exposed | 19'6" | 15" | 21" |
| 35 | E.L. | 35 | 16 | As above | (a) 700 ft. (b) S.W. (c) Steep (d) Exposed | 26' | 19½" | 25" |
| 37 | J.L. | 36 | 15 | As above | (a) 550 ft. (b) N.E. (c) Steep (d) Sheltered | 29' | 23½" | 19½" |
| 36 | Abies grandis | 35 | 16 | As above | (a) 500 ft. (b) S. (c) Level (d) Exposed | 21' | 16" | 23" |
| 8 | Oak | 29 | 21 | Volcanic Dolerite overlain with Boulder Clay Heavy Clay Soil | (a) 600 ft. (b) N. (c) Moderate (d) Sheltered | 24' | 14" | |
| 8 | Beech | 29 | 21 | As above | (a) 600 ft. (b) S. (c) Moderate (d) Sheltered | 22'6" | 13" | |
| 8 | Ash | 29 | 21 | As above | As above | 21' | 12" | |
| 8 | Syc. | 29 | 21 | As above | As above | 24' | 14" | |

The falling off in height growth in the Sitka spruce sample trees during the last five years is very marked. The age/height graph of this tree obtained from stem analysis (See Appendix IV) shows that the Sitka spruce is Quality Class IV of the preliminary Sitka spruce Yield Tables.

The graph does not show the marked fall off in the last three years. Although the average growth over the past five years was 18 in. there was a sharp fall off from 1949 to 1951.

A severe aphid attack was noted in the report of the Chairman's visit to Blairadam dated June, 1949. This was followed by a further severe attack in 1950, and a milder infestation in 1951.

From the coincidence of the fall off in height growth and the aphid attack in the last three years, it is probably justifiable to conclude that the aphid attack has been a factor in the fall off in the growth of the Sitka spruce.

Mr. James Macdonald remarked on 7th April 1948 that a close watch will have to be kept on the spruce in relation to atmospheric pollution which will probably increase, and that Blairadam may be a forest in which a short rotation may be advisable.

Past Treatment of Established Plantations

Brashing of every third row in Compartments 4 and 5 was started in 1944 and some complete brashing along road and railway sides done later in P.32 and 33, Compartments 13 and 14, but little more was done until 1949. In 1949 the need for thinning was imperative since windblow was increasing in Sitka spruce at an alarming rate. To avoid further delay in waiting for the customary brashing to be completed, Mr. Watt, the District Officer, introduced a pre-thinning operation, which would eliminate brashing and provide sufficient access to encourage timber merchants to buy thinnings standing.

Briefly, the operation involved forest workers entering the unbranched spruce to fell and extract to roadside light spruce poles suitable for sale as sheep stakes, hen run poles and stack props. The operation was done on piece work. One of the merits of this operation was that no prior marking was done by supervisory staff, the men having been shown the sizes to be cut beforehand. The trees removed were of a size which did not touch

on silvicultural needs.

The sizes of the various type of produce produced are:-

| | |
|---------------|---|
| Sheep Stakes | 5 ft. length by 1 in. - 2 in. top diameter. |
| Hen Run Poles | 7 ft. - 8 ft. " by 1 in. - 1½ in. " |
| Stack Props | 7 ft. - 8 ft. - 9 ft. " by 2 in. - 2½ in. " |

As a result of the pre-thinning operations, considerable stocks of these poles accumulated. There were ready sales during the first year 1950 for the heavier stack props, but sales were slower in the second year, after the initial demand was met. Great difficulty was found in disposing of the light stakes and hen run poles.

The reactions of merchants to working thinnings in the unbrushed plantations left after the removal of small stuff have not yet been fully gauged. In October, 1951, a standing sale of thinnings extending over 112 acres was bought by a timber merchant. Half of this area had been brushed along every third row and pre-thinned. The remainder had been pre-thinned only. The sale having been advertised after the 1951 increase in pitwood prices, fetched a good price. Judging by the difficulties which the merchant is now experiencing in retaining felling contractors to work in these woods he may have underestimated the difficulties, which may be reflected in future offers.

Operations now are directed towards the removal of the saleable poles only, that is the stack props. Since the number of trees or poles removed per acre is less, the degree of access or openness in the Sitka spruce is reduced, and since extraction of thinnings is the operation most hindered by the unbrushed state of the woods, brushing of every fourth row is now being done along with pre-thinning.

Thinnings commenced in Compartments 1 and 4, P.27 in 1948, and continued in P.28 and P.29 during 1949 and 1950. Because of the difficult soil conditions at Blairadam it was felt at first that thinnings would have to be moderate and frequent. When it became noticeable, however, that the earliest thinned areas were becoming unstable, it was felt that thinnings may have to be done early and heavily enough to ensure that the remaining trees carry a heavy crown and a correspondingly wide root system.

Two compartments were sold standing to a timber merchant early in 1951. A thinning plan, based on a three year thinning cycle was started

after this sale. The prescribed area for F.Y.51 was sold standing and the F.Y.52 prescribed area is now being marked for thinning, which it is hoped to offer for sale before the end of 1951. The F.Y.52 thinning includes areas which are being marked at an earlier stage than hitherto.

Outturns, types of produce and areas thinned yearly are shown below.

| Yr. | Departmental Thinning | | | | Total Vol. | Standing Sales | | Total Vol. in Year. |
|---------|-----------------------|---------|----------|--------|------------|----------------|-------|---------------------|
| | Area | Pitwood | Pulpwood | Stakes | | Area | Vol. | |
| 1948 | 5 | 1437 | | 200 | 1637 | | | 1637 |
| 1949 | 20 | 6477 | | 500 | 6977 | | | 6977 |
| 1950 | 50 | 9145 | | 894 | 10039 | | | 10039 |
| 1951 | 20 | 5379 | 2207 | 617 | 8203 | 40 | 8250 | 16453 |
| 1952 | | | | | | 112 | 20329 | 20329 |
| Totals: | 95 | 22438 | 2207 | 2211 | 26856 | 152 | 28579 | 55435 |

≡

≡ F.Y.51 Thinning Area Sold in F.Y.52 (October 1951).

Wind Blow

It became apparent in 1949 that the oldest Sitka spruce stands were subject to windblow after thinning. It was also apparent in the oldest Sitka spruce stands that the annual height growth had been falling off rapidly during the last four years. This may have been due to restriction in crown development before thinning. Since thinning some of these stands, however, there has been no marked increase in height growth, which may indicate that the trees have not had sufficient time to develop their crowns again, or it may indicate that the falling off in growth is due to the wet intractable soil conditions alone.

Although drain maintenance had fallen into arrears, it was felt that the original drainage system running across the contour did not satisfactorily drain the ground. In November, 1950, therefore, it was decided to cut contour drains throughout the forest where necessary. The contour lines were marked out and the trees along them felled and removed. In younger areas the Cuthbertson draining unit uprooted the stumps and cut out the drain formation in one operation. The bulk of the work in the younger plantations has now been done, leaving only some hand finishing of the drains. In older plantations the operation is being done in two stages. The stumps are first uprooted by tine plough and then the drains are cut out by Cuthbertson plough. This latter work is still in progress.

There has, so far, been no windblow in Norway spruce stands, the oldest of which are now being thinned. Since they have been slower growing than Sitka spruce and as the Norway does not react so quickly to restriction in crown development it is hoped to avoid windblow by timely thinning.

The first gaps created by windblow occurred in F.Y. 50 amongst Sitka spruce age P.27 in Compartment 4. There were two gaps each one quarter of an acre in extent, situated respectively in the north-east and south-east corner of the Compartment. The windblown timber, which amounted to 728 cu.ft. was cleared departmentally.

Throughout F.Y. 51 no new gaps appeared, but individual trees all Sitka spruce in the group of compartments surrounding Compartment 4, viz. Compartments 1, 2, 3, 5 and 6, aged P.27 and P.28, became unstable, some being blown down, but mostly leaning. Considerable instability occurred

along the western edge of Compartments 3, 4 and 6, left exposed after the clear felling in 1950 for open cast mining. The blown and leaning trees throughout these compartments were sold as part of the standing sale of thinnings and amounted to 4150 cu.ft.

The severe gales in January, 1952, increased the damage. Compartments 3 and 4 suffered the most heavily. The two original gaps in Compartment 4 increased to about half an acre each in extent. Smaller gaps ranging from a few trees up to 40 - 50 trees appeared throughout the remainder of these two compartments. When measured, the damage amounted to:-

| | | | |
|---------------|-------------|-------------|----------------|
| Compartment 3 | 1,272 trees | 2199 cu.ft. | Area 1.5 acres |
| " 4 | 3,355 " | 5947 " | Area 5 " |

Three small gaps each of a quarter of an acre in extent appeared in Compartments 2, 5 and 6, and the damage amounted to 1,000 cu.ft.

Individual trees also continued to be blown in all the compartments already mentioned. The signs of instability, i.e. leaning partly blown trees, appeared after the gale in Sitka spruce in some younger-aged compartments, viz. 8, 9, 11 and 33 P.29, 30 and 31.

These leaning trees were marked for removal in the F.Y.52 standing sale of thinnings but not assessed separately. Their volume is estimated to be 3,500 cu.ft.

Over the three years, the area left unstocked through windblow is $7\frac{3}{4}$ acres. The quantity of windblow timber disposed of over the same period is 17,524 cu.ft.

Rehabilitation of Blown Areas

After the Director's Visit to Blairadam on 29th January, 1952, it was agreed that the first essential was to clear away the blown trees in Compartments 3, 4 and 6. Then when gaps were large enough, they would be fenced off, and a number of different species, such as pedunculate oak and Abies grandis, tried.

Conclusions

Despite the handicap of exposure, atmospheric pollution and for the most part difficult soil conditions, plantations have been established and until recent years have grown successfully.

The above review of the forest indicates certain main operations which should be followed if similar ground is acquired elsewhere.

Contour draining by ploughing would provide more effective drainage of these heavy clay soils.

The effects of exposure have been underestimated in the choice of hardwoods and their use should be limited to well-sheltered fertile sites. Of the hardwoods, oak and beech appear to be the species most likely to establish themselves successfully. The greater volume production of Sitka spruce and its ability to withstand exposure make it the obvious choice for exposed sites, but the recent signs of instability point to its use in mixture with a wind firm species. Hardwoods are desirable but are ruled out on the grounds of exposure and inability to compete in growth with spruce. The Scots pine has shown that it can maintain competition with Sitka spruce for a time. A more liberal mixture of Scots pine with Sitka spruce is indicated therefore, either in the three or four line mixture on the Allerston pattern or preferably an intimate mixture of three or four Scots pine to one Sitka spruce. The Scots pine would also provide the additional advantages of nursing Sitka spruce past the frost check and keeping it finely brashed in close canopy.

The present healthy appearance of Norway spruce warrants its retention wherever shelter is adequate.

The already keen demand from timber consuming industries in Fife shows that there will be no difficulty in disposing of the forest produce.

(Sgd). D. A. WOODBURN,

District Officer (East).

APPENDIX I

Notes from Inspection Reports

Sir Alexander Rodger, on 17th September, 1936

Sir Alexander Rodger's comments on certain areas were:-

Compartment 34, P.33.

Ploughed and planted with 2 + 1 and 2 yr. seedlings of Sitka. They have all done pretty well but the seedlings needed weeding. A patch of Picea omorika was seen. They looked very healthy and escaped severe damage by frost which was so bad for the other two spruces.

Compartments 4 and 5

Mixture of 25% Scots pine and 75% Sitka spruce. The Sitka spruce is doing better than the Scots pine but each has helped the other. The former will probably disappear.

He hoped that hardwoods would be used much more at Blairadam in future especially in view of the prevalence of smoke.

Mr. J. M. Murray, 22/4/38

Mr. J. M. Murray noted that there was a considerable improvement in the growth of plantations to the east of the forester's house in P.32 and 33, and that the earlier check had been overcome. He expected deaths from root fungi to occur and where any gaps were large enough, large plants of beech could be used to fill these gaps, waiting until the spruce provides some shelter from frost.

He remarked that some repair work may still be required in P.34 and recommended planting on large, solid, good quality turfs. He expected continuous trouble from frost in the latter area until the plants had grown above the frost level.

Sir Roy Robinson 9/6/44

Sir Roy Robinson inspected a mixture of oak and beech in Compartment 8 and advised that the beech be cut hard back wherever it interfered with the oak. He thought the oak looked quite encouraging. As regards the Sitka

spruce/Scots pine mixture in Compartment 4, P.27, the Chairman recommended that although most of the Scots pine would soon be outgrown by the Sitka spruce, any good Scots pine stems should be favoured when thinning commenced.

In general, the Chairman noted that development in the forest since his previous visit in 1936 had been better than expected and he thought a good forest should result.

Mr. A. H. Gosling, 9/6/44

Mr. Gosling on the same visit as the Chairman commented that the older plantations having outgrown the risk of frost damage are now putting on good growth and that despite the proximity of coalmines etc., fumes do not seem to be affecting growth seriously.

Mr. James Macdonald, 7/4/48

Mr. James Macdonald in the summary of his report on 7/4/48, states that the main block of the plantations has been well managed and is in excellent condition. He mentioned that some beating up and maintenance was required in Compartments 37 and 38 on the outlying Harran Hill Wood.

He felt that more Japanese larch might have been used in the main block, which is mainly spruce. He felt that damage from atmospheric pollution might increase in the future and suggested that a short rotation may be advisable at Blairadam. He thought that sycamore or a mixture of beech and sycamore might have grown better than the pure beech plantations.

He mentioned the need for a thinning plan which should be strictly adhered to.

Lord Robinson, 10/6/49

On his visit on 10/6/49, the Chairman inspected the Sitka areas where some wind blow had occurred after thinning. In the Chairman's opinion, the growth of the dominant Sitka was encouraging but that of the other poor, which suggested to him that a thinning could have been done about two years before to allow the crown to develop. He said that Sitka spruce did not give the appearance of being thoroughly at home in this area, in contrast to the Norway spruce. He advocated moderate and frequent thinnings and avoidance of drastic measures.

After inspecting Compartment 32 where there are plantations of Sitka spruce and Norway spruce under birch, the Chairman advised removal of those birch which were interfering with the growth of the spruce.

Because of the severe attack of Aphis on Sitka spruce, the Chairman recommended that yearly attacks should be recorded and where the attack was particularly severe the District Officer should make more detailed descriptions. In the same record the assessment of the frequency and prevalence of the ladybird larvae should be incorporated.

The Director (Scotland) in a footnote adds that these kind of investigations are best done by a specialist of the Research Branch.

Sir H.C. Beresford Peirse, 9/10/50.

The Director's comments (after some correspondence with the Conservator) on several of the main forest operations at Blairadam were:-

Pre-Thinning

The Director felt that this operation should not be run too long without a proper costing and that it may not sufficiently open up the plantations so that some brashing may be required subsequently.

Thinning

In the Director's opinion where the thinning was an ordinary one, it was satisfactory, but where a compartment was being opened up first for the removal of small-sized poles to meet a particular market and then subsequently gone over again to do a normal thinning, was not a satisfactory method.

Draining

Drainage maintenance work should be put into operation forthwith.

Beech

The Director considered that the beech were of extremely poor form, but where the stocking was reasonable, there was nothing to be done but to allow the crop to go on. Where the stocking was poor, he thought it worthwhile to fill up with conifers.

History of Blairadam Forest

APPENDIX II

Supervision

| | | | |
|---|------------------------|-------------------|-------------------|
| <u>Conservators</u> | H. C. Beresford Peirse | | 1946 - 1947 |
| | F. Oliver | | 1947 - continuing |
| <u>Divisional Officers</u> | J. M. Murray | | 1927 - 1934 |
| | H. M. Steven | | 1934 - 1938 |
| | F. Scott | | 1938 - 1939 |
| | L. A. Newton | | 1939 - 1946 |
| <u>Divisional Officers</u> (State Forests) | T. H. Woolridge | | 1948 - 1951 |
| | H. A. Maxwell | | 1951 - continuing |
| <u>District Officers</u> | L. A. Newton | | 1928 - 1929 |
| | G. Home | | 1929 - 1932 |
| | L. A. Newton | | 1933 - 1939 |
| | I. Gillespie | | 1939 - 1940 |
| | R. Shaw | | 1940 - 1946 |
| | B. R. Feaver | | 1946 - 1947 |
| | I. O. Robertson | | 1947 - 1949 |
| | R. Shaw | | 1948 - 1949 |
| | I. S. Watt | | 1949 - 1951 |
| D. A. Woodburn | | 1951 - continuing | |
| <u>Foresters and Foremen</u> | M. MacRae | Foreman | 1926 - 1928 |
| | | Forester | 1928 - 1931 |
| | M. A. Ritchie | Foreman | 1928 - 1931 |
| | | Forester | 1931 - 1951 |
| | R. Main Ellen | Forester | 1951 - continuing |

History of Blairadam Forest

APPENDIX III

Notes of Interest

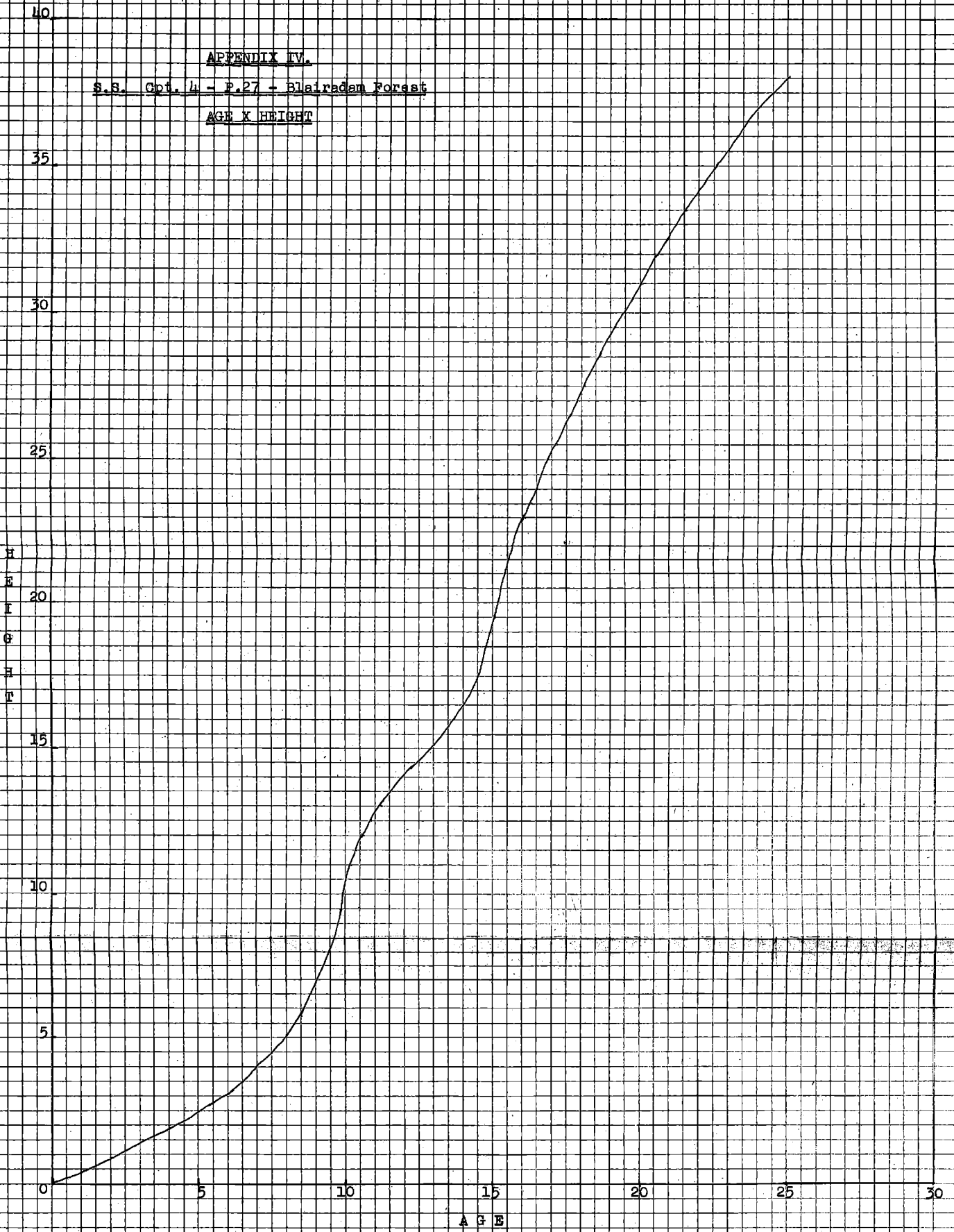
In an article appearing in the Scottish Forestry Journal, Vol. 49, Part 1, entitled "Forestry in Scotland to end of Nineteenth Century", and written by Mr. J. M. Murray, the following note concerning Blairadam Estate appears:

"Other improvers who worked from the middle of the century are too numerous to mention but the Adams who made the estate of Blairadam in Fife, deserve a special note if only on account of their working plan that was produced for the woods on their estate. Planting on Blairadam commenced in 1737. The work was done in a systematic manner, but the working plan, which is the earliest I have seen in Scotland was made in 1834. The plantations made between 1749 and 1759 developed slowly on account of the lack of skill in planting. In the later work, a notch system of planting was adopted and the plants were set at three to four feet apart. Pit planting was considered an unsatisfactory method. It is interesting to see also that in exposed places an oblique method of planting was adopted so that the tops of the plants were presented to the direction of the worst wind."

APPENDIX IV.

S.S. Cpt. 4 - P.27 - Blairadam Forest

AGE X HEIGHT

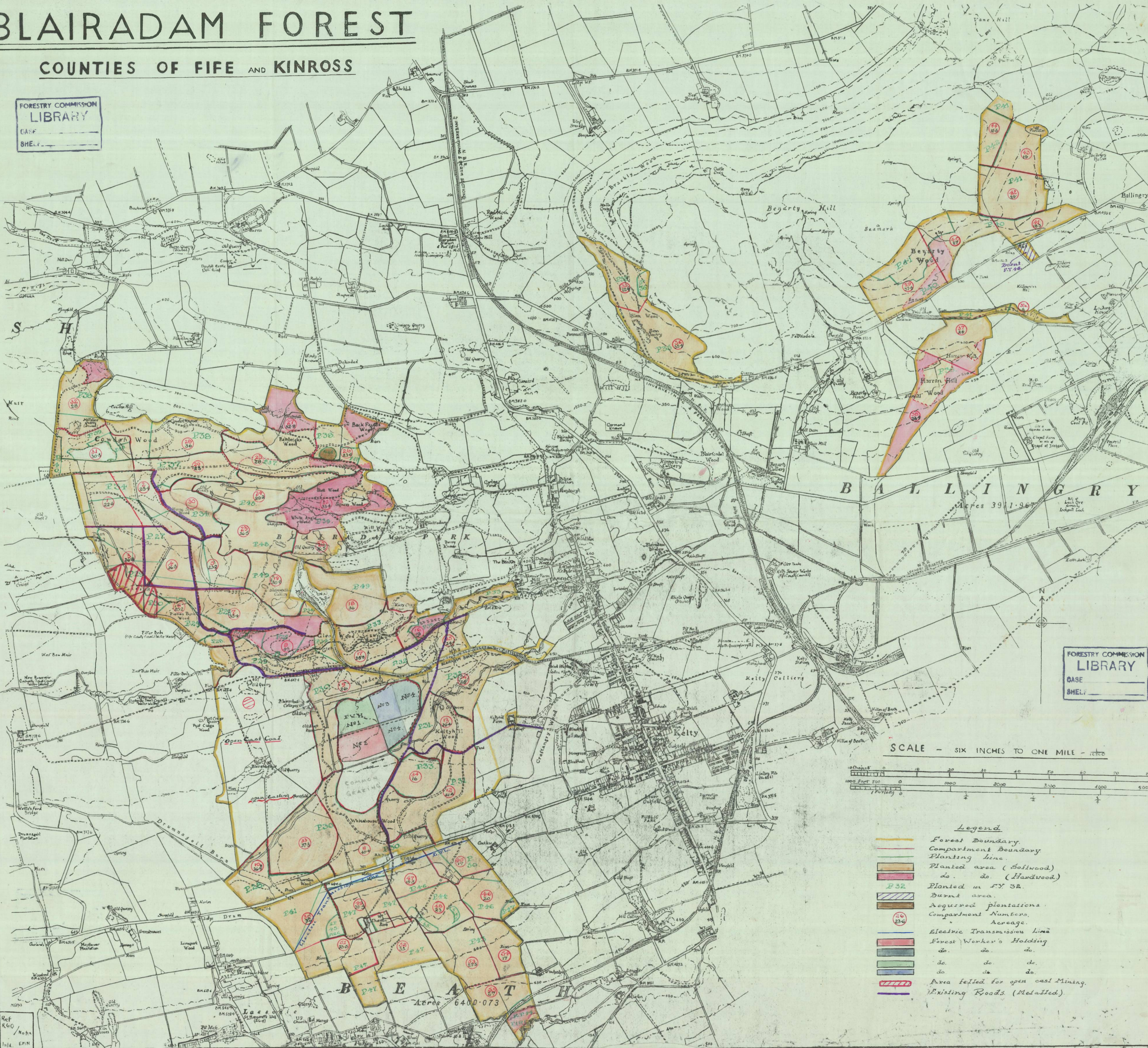


Blairadam

BLAIRADAM FOREST

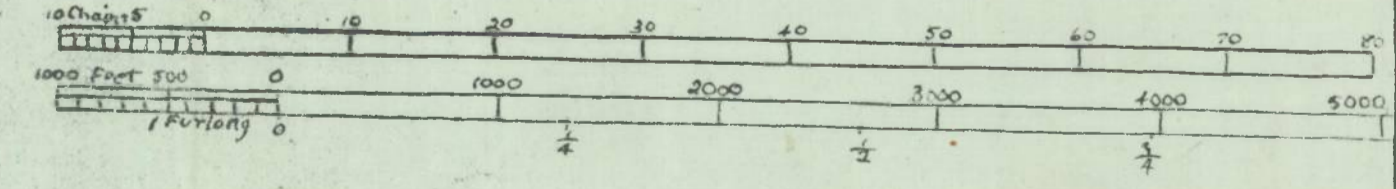
COUNTIES OF FIFE AND KINROSS

FORESTRY COMMISSION
LIBRARY
CASE
SHELF



FORESTRY COMMISSION
LIBRARY
CASE
SHELF

SCALE - SIX INCHES TO ONE MILE - 1:36000



- Legend**
- Forest Boundary
 - Compartment Boundary
 - Planting line
 - Planted area (Softwood)
 - do. do. (Hardwood)
 - Planted in FY 32
 - Burnt area
 - Acquired plantations
 - Compartment Numbers
 - Acreage
 - Electric Transmission Lines
 - Forest Worker's Holding
 - do. do. do.
 - do. do. do.
 - do. do. do.
 - Area telled for open cast Mining
 - Existing Roads (Metalled)

Ref
R60
No. 4
Inf. EPN