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# HISTORY

OF

DRUMMOND HILL

## FOREST

E (S) CONSERVANCY

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FORESTRY COMMISSION

HISTORY

of

DRUMMOND HILL FOREST

1923 - 1951

EAST (SCOTLAND) CONSERVANCY

# History of Drummond Hill Forest

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## HISTORY OF DRUMMOND HILL FOREST

### CHAIRMAN'S COMMENTS

The earliest inspection of which I have a record is that of April 12th 1926 in the company of Col. Fotheringham and J. M. Murray. I append a copy which covers black game damage and my own views as to choice of species.

The next inspection was 11 years later (1937) and the report on it with my comment is summarised in Appendix I. There were further inspections in 1942 and 1945 and 1947 which are summarised in the Appendix. My last visit was in 1949 on which apparently no report was furnished. Between 1947 and 1949 I was concerned chiefly with roads and reduction of costs of construction.

Drummond Hill suffered like some others from too ambitious planting programmes in the initial stages, so that there was little opportunity to rectify mistakes as they became obvious. The lower ground is "easy" and productive, the top very difficult and the intermediate ground, while safe enough, demanded care in its treatment. I think we would have done better if we had left the top land alone (except for experimental plots) and used a good deal less European larch on the intermediate. However, it is some years since I have been able to make a thorough inspection of such areas and I infer from the history that on the whole, and presumably as the result of thinning, they are now presentable.

R.

22/2/52

DRUMMOND HILL

Visit of Inspection April 12th 1926 (with Col. Fotheringham  
and Mr. J. M. Murray).

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1. Black Game: The damage done in the new larch plantations (P.23 and P.24) is very considerable, but is less in P.25 and P.26. The plantations will no doubt come away at length (and in fact are beginning to do so in patches), but meanwhile there is great loss under the following heads:

- (a) Deformation of plants and loss of growth.
- (b) Actual deaths and beating up costs.
- (c) Prolongation of weeding period.

There appears to be no specific remedy under the present state of the law but it would appear to be false economy to neglect any means, such as increasing the staff of keepers, etc., at any time when the black game are known to be actively at work.

2. Choice of Species: Broadly two species are being used: larch on the lower slope and Scots pine on the upper slopes and tops (average about 1,100 ft. elevation). I have never seen Scots pine do well at 1,100 ft. under these conditions but am informed that the old crop (at 120 years) contained some fair specimens. Corsican pine is no use here and the alternatives would appear to be spruce and Sitka. The arguments against these are that the site is too dry, that they will pump on a long rotation and that the existing vegetation is chiefly ling. Against this the rainfall is 35 in. which should be sufficient for spruces while it was only to be expected that the old spruce at 120 years would be largely pumped. My own observations tend to show that the theory that spruce and Sitka require decidedly wet sites tends to be overdone.

The best plan will be to lay down at once experimental areas of spruce and Sitka (pure and in mixture with pine as a nurse) on these difficult types of land and meanwhile to leave the planting of the bulk of it until the very last.

A careful examination should also be made to collect data from neighbouring woods as to the growth of spruce under similar conditions.

I am greatly afraid that if we plant large areas with Scots pine pure we shall get a great deal of snow-break and end up with very ragged slow-growing crops.

(Intd) R.L.R.

20/4/26

NOTE BY STATE FORESTS OFFICER

This history of Drummond Hill Forest has been prepared jointly by Messrs. Maxwell and Shaw.

The general impression conveyed by the history is that, with the exception of relatively small areas in the north face of Drummond Hill, the establishment of this forest has been very successful, and has been obtained without great difficulty.

I am sure that this is correct, and that perhaps the main problems will have to be faced after establishment.

For the past five years it has been noticeable that thinning has fallen behind silvicultural requirements.

To begin with, lack of roads was responsible for this. Now we have a fair mileage of roads, but it is evident that other methods of extraction, such as rope ways and chutes will have to be tried to augment the road system.

The new thinning plan if closely followed should ensure that all plantations requiring attention have been dealt with by 1953. Shortage of labour may make it difficult to adhere closely to the provisions of the plan, but if there is any danger of work falling behind, greater areas will have to be dealt with by standing sales.

Two new areas have been added to Drummond Hill Forest since this history was completed. These are 236.8 acres on the south side of Loch Tay and 24 acres known as the American Garden which lies within the main block of Drummond Hill Forest but was formerly excluded from it.



## HISTORY OF DRUMMOND HILL FOREST

### GENERAL DESCRIPTION OF THE FOREST

#### Situation

Drummond Hill Forest which consists of four sections, viz. Drummond Hill, Tirinie, Killiechassie and Boreland is situated in central Scotland on the northern shores of Loch Tay.

The main portion of the unit is in the Drummond Hill Section which is an oval-shaped hill rising from 400 ft. above sea level on the shores of Loch Tay to 1500 ft.

The origin of the name is obscure. Some historians believe that it derives from the Gaelic "Druim" meaning a large ridge, while others claim that it was so called because of its association with the Drummond family who owned the land before it passed into the hands of the Campbells, the Lords of Breadalbane, in the 15th Century.

#### Area and Utilisation

The total area of the forest is 5319 acres of which 115 acres were under forest at the time of acquisition, and 3626 acres have been planted by the Forestry Commission.

Details are given in Tables I and II.

#### Previous Utilisation

The south face of the Drummond Hill Section has carried a tree crop from early times, and there are historical records of oak and Scots pine being planted here in the 16th Century.

Successive crops of trees must have been grown, and it is believed that some of the first larches to be brought to this country were planted in this vicinity.

Larch trees attained great dimensions at Drummond Hill. Many of the largest were felled prior to, or during World War I, but one fine specimen was still standing when the Forestry Commission acquired the estate in 1922. It was 110 ft. high and had a volume of 724 cu.ft. The age of this tree was estimated at 150 years.

Formerly, the north face of Drummond Hill was a deer forest, and until planted by the Forestry Commission, had not grown a tree crop in historical times.

For a long period of years prior to acquisition, the Tirinie, Killiechassie and Boreland Sections were devoted to grazing. Scattered remnants of Scots pine and larch would seem to indicate, however, that the lower slopes of these areas had all, at one time, been under forest.

#### Sporting and Farming

The sporting rights on Drummond Hill and Tirinie have always remained in the hands of the Forestry Commission.

The shooting over the low ground at Boreland is disposed of by seasonal lets and the high ground on this section is rented to the tenant of Boreland on an annual basis.

At the time of acquisition, the sporting rights on the Killiechassie section were given on a 20 years lease. This lease expires in 1953.

The only farming tenancy is on the Boreland Section where 1500 acres of high ground were disposed to the Department of Agriculture for Scotland in 1948.

TABLE I

From	By	Date	(4) Plantations Acquired.	(5) Plantable Excl. Col.4.	(6) Nurseries	(7) Agricultural	(8) F. W. H.	(9) Unplantable Excl. Col.4.	Other Land		Total
									(10) Description	(11) Acreage	
(1) Duncan McAlnsh and Thomas McAlnsh	(2) Feu	(3) 1923	140	2362	5	5			(10)	(11)	(12) 2512
Duncan Alexander Menzie	Disposition	1933		161							161
Capt. John E. B. Radcliffe	Feu	1933		162							162
Duncan Alexander Menzies	Disposition	1934		23							23
	Disposition	1936		78				4			82
	Disposition	1938	6.5	91.5				4			102
John Campbell	Disposition	1938		824		116		1292			2232
Trustees of Sir Edward Mortimer Mountain	Disposition	1950	4.7	2.3		38					45
	Totals		151.2	3703.8	5	159		1300			5319
<u>Later Acquisitions</u>											
William Francis McAlnsh				24							24
A. Duncan Miller			8	228.8							236.8

TABLE II

(a) <u>Plantations</u>			
Acquired	...	115.7	
Formed by Commission	...	3510.9	3626.6 acres
(b) <u>In hand, awaiting planting</u>			
Blanks after felling		2.3	
Burnt Areas			
Other land			2.3 acres
(c) <u>Nurseries</u>			
(d) <u>Agriculture</u>			
1 Tenancy			39 acres
(e) <u>F.W.H. Number 8</u>			29.2 acres
(f) <u>Unplantable land on Hand</u>			77.3 acres
(g) <u>At Disposal of Dept. of Agriculture</u>			1544.6 acres
		<u>Total</u>	<u>5319 acres</u>

### Physiography

The elevation of the forest varies from 400 ft. at Loch Tay to 1500 ft. on the summit of Drummond Hill.

Boreland, Tirinie and Killiechassie Sections are all south facing, and all rise steeply. On Drummond Hill itself all aspects are represented; the southern slope is very steep and the northern one much less so.

Nowhere on Drummond Hill is the exposure really severe.

### Geology and Soil

Dalradian is the principal geological formation. The underlying rock is for the most part mica schist with occasional garnetiferous bands. This mica schist breaks down into a good brown forest soil.

Parts of the Drummond Hill, Tirinie and Killiechassie are boulder covered, and peat forms on the upper slopes of all four sections.

### Vegetation

#### Drummond Hill Section

The lower slopes of the north face of Drummond Hill were covered with birch and hazel scrub which had to be cleared before planting was started. Above the scrub, rank heather (Calluna vulgaris) dominated the vegetation.

On the south face, bracken and rosebay willow herb occupied all the old woodland areas. On the higher rocky slopes there was much bell heather (Erica cinerea) in association with blaeberry (Vaccinium myrtillus) and some Calluna.

#### Tirinie and Killiechassie

The original vegetation on these two blocks was very similar; with bracken on the lower slopes and heather (Calluna vulgaris) at the higher elevations.

#### Boreland

From the shores of Loch Tay to the 800 ft. contour, there was a lush grass vegetation with considerable areas of Aira caespitosa and some Juncus communis. Above this line heather was beginning to intrude, and about the 1000. ft. contour the vegetation was almost pure heather (Calluna vulgaris) with some Erica tetralix and deer grass (Scirpus caespitosus).

### Meteorology

This forest, lying as it does in the centre of Scotland, has a climate midway between east and west coast conditions, and is in every respect ideal for tree growing.

The rainfall is from 36 in. to 40 in. per annum, and snow seldom lies long except on the highest elevations.

Winter frosts may be severe, but early or late frosts are uncommon. All sections are moderately sheltered except the north west shoulder of the main Drummond Hill Section.

### Risks

Fire risk is not high, as extensive belts of larch protect the southern face of the main block from the dangers inherent on a public road. The northern face, as well as the Tirinie and Killiechassie Sections, are isolated by arable land.

The greatest danger exists at the Boreland Section where the strong growth of grass presents a definite fire hazard in the early spring. This risk is minimised by the abundance of water always available from Loch Tay and from a few perennial springs within the forest.

### Pests

In the early life of the forest, capercaillie and black game did considerable damage. Though still present in small numbers, their effect on the crop is negligible.

Rabbits have always been plentiful, and are still present in too great numbers. Their complete elimination at the present time is hindered by the fact that they are inadequately controlled on the neighbouring agricultural properties.

Red deer, fallow deer and roe deer are all found within the boundaries of Drummond Hill and only persistent hunting keeps these animals in check.

A limited amount of damage is done each year, principally in the spruce plantations, by the red and fallow deer.

It may be of interest to record the numbers of vermin killed in the past 3 years.

<u>F.Y. 51</u>		
Rabbits	.....	4338
Red Deer	.....	13
Fallow Deer	.....	11
Roe Deer	.....	32
<u>F.Y. 50</u>		
Rabbits	.....	3464
Red Deer	.....	10
Fallow Deer	.....	4
Roe Deer	.....	12
<u>F.Y. 49</u>		
Rabbits	.....	3505
Red Deer	.....	10
Fallow Deer	.....	1
Roe Deer	.....	31

Spasmodic attacks of the Small Larch Saw Fly have been reported from Drummond Hill for a number of years.

#### Roads

At the end of World War II, it was realised that considerable areas of Drummond Hill were either approaching the thinning stage or were in urgent need of thinning. This fact, combined with the difficult nature of the ground, brought home to the authorities the necessity for forest roads.

Work began in 1947, but owing to the severity of the winter of that year, got off to a bad start and was both slow and expensive.

In March, 1948, the road work at Drummond Hill was re-organised and has progressed fairly satisfactorily up to the present time.

There are now over 10 miles of serviceable roads, and the main block has been encircled with all weather roads.

An annual programme of road construction for the unit has been prepared and is being adhered to as closely as possible.

Early construction of all weather roads proved very expensive and even with greatly improved organisation, it has been found difficult to prepare these at less than £2,200 per mile. The reasons for this may be summarised as follows :-

- (1) Fairly heavy rainfall.
- (2) The soil contains quite a high proportion of clay.
- (3) Suitable material for surfacing is hard to find.

An attempt has now been made to replace all weather roads with fair weather roads. This will result in a saving of capital outlay, but their success is still in doubt owing to the presence of clay and to the comparatively high rainfall.

To be thoroughly effective, roads at Drummond Hill have to be passable most of the year so that there is no hold up in the flow of thinnings.

### Labour

Up to 1951, there was an adequate supply of high quality labour available locally.

Recently the new Civil Defence School at Taymouth Castle and nearby hydro-electric schemes have attracted away some of the best workers. As a result of this, the squad has now been reduced to 30 men which is inadequate for the work to be done.

Drummond Hill is still regarded as a costing unit for the preparation of pitprops, so that it is not possible to economise on labour by selling all the thinnings standing.

Furthermore, this unit has come to be regarded as a reserve of labour for other units in the district where housing is inadequate and where large planting programmes have to be completed.

## SILVICULTURE

### Acquired Plantations

A total of 126.5 acres of standing woods were taken over at acquisition. Of these, 120 acres were on the main Drummond Hill Section and the balance at Tirinie. These woods have been reduced by war-time fellings to 115 acres situated in the north-east corner of the main block. The age of these acquired woods is about 37 years.

Scots pine occupies approximately one half of these woodlands. The pine is not of a particularly good type and has suffered from delayed thinning. The height of the main stems is about 30 ft. and the current annual increment in the neighbourhood of 12 in. If the crop as a whole



has suffered from lack of thinning, it has nevertheless produced some very finely branched trees. With careful subsequent treatment, it should be possible to produce a final crop of good quality.

Norway spruce, Douglas fir and European larch account for the rest of the 115 acres. Of these, the Norway spruce is the most promising. It has a top height of about 65 ft. and a current annual increment of 15 in. The stems are remarkable for their cleanness and light branching. Recent thinnings have shown them to be free from any signs of butt rot.

The Research Branch have interesting thinning and high pruning experiments in this acquired spruce plantation.

The Douglas fir is more vigorous than the spruce with a top height of over 70 ft. and a current annual measurement of 20 in. The proportion of rough trees has been high but these are gradually being eliminated and the final crop should be a valuable one. Unfortunately much of the Douglas fir is growing on sites which are too wet for the safety of this species and unless the utmost care is taken with drainage, it will be difficult to grow the fir to maturity.

The European larch has produced the poorest of the acquired woods and still shows signs of fairly high canker infection and possible "die-back" in youth. It has a top height of about 40 ft. and the current annual height increment is about 10 in. The origin of this larch is not known, but it appears to be of poorer quality than most of the European larch planted by the Commission on Drummond Hill.

#### Work done by Forestry Commission

Planting started at the north-east corner of the main block in F.Y.23. The north face was dealt with first and the greater part of the area, excluding some small blocks of hardwoods, was completed by F.Y.34.

The Tirinie and Killiechassie Sections were planted concurrently during the period F.Y.35 to F.Y.41 and the Boreland Section from F.Y.41 - F.Y.49.

#### Preparation of Ground

As far as can now be ascertained, the preparation of ground for planting did not present many difficulties. The main problem appears to have been the disposal of brushwood on the southern face, and the felling of birch and hazel on the lower slopes of the north face.

All sections had to be rabbit fenced, and the northern boundaries of Drummond Hill and Boreland were fenced against deer.

Except at Boreland very little draining was done. As far as the northern face of Drummond Hill was concerned, this was probably an error of judgment as subsequent experience has shown this section to be much wetter than it was originally thought to be.

#### Choice of Species

In pre-Commission days, magnificent European larch had been grown on the south face of Drummond Hill. It was therefore natural and good forestry practice that a high proportion of this species be used again.

On the Drummond Hill, Tirinie and Killiechassie Section, 45% of the total area has been planted with larch of which 90% is European and 10% Japanese and hybrid in almost equal proportions.

Of the balance, 35% comprising mainly the higher and drier ridges, were planted with Scots pine, and over the remaining ground Norway spruce, Sitka spruce, Douglas fir and hardwoods were used.

On the Boreland Section, spruce is rightly the principal species, with Norway spruce occupying all the lower slopes and Sitka spruce on the higher ground.

On the deep loams by the northern shores of Loch Tay, natural hardwoods, mainly beech and sycamore have been retained, and some oak and grey alder planted.

A few groups of birch were kept at Tirinie. These have been carefully tended and have developed into stands of really high quality. If some of the birch, which was cleared from the north face of Drummond Hill had been retained, it might have been equally satisfactory.

Results to date have, broadly speaking, justified the original choice of species, though with the greater knowledge now available, it is probable that certain changes would have been made.

On the north face where some difficulty has been experienced with the European larch, it is reasonable to suggest that Norway spruce which grows so well at Drummond Hill, could have been extended much further up the slopes, and perhaps 50% of the Scots pine on the exposed ridges would have been replaced either with Japanese or hybrid larch and with Sitka spruce in

mixture with pine - probably Pinus contorta.

On the drier southern face, more hardwoods could have been used, and Scots pine might have been a better choice than European larch where this latter species is now showing signs of rot which may be due to lack of moisture (Compartments 46 to 52).

### Planting

#### (a) Spacing

All the larches were planted at 6 ft. on the instruction of the Divisional Officer, Mr. Murray. Spruces and pines were planted at 5 ft. spacing.

#### (b) Type of plants used and Source of Supply

The commonest type of plant used was the 2 + 1 and indeed fully 90% of the stocks used were of this age. The balance, mainly the spruces, were 2 + 2 or 3 + 2s.

Up to 1933 when Drummond Hill was a part of the South West Division, most of the plants needed were produced at Tulliallan Nursery. After this date until the last planting at Boreland in 1948, Newton nursery became the principal supplier though a proportion was still obtained from Tulliallan.

#### (c) Methods of Planting

The early planting of all species except Douglas fir was either by T or L notch after screefing. Douglas fir was "pitted".

At Boreland the spruces were turf planted on the wet flushes, elsewhere they were notched with satisfactory results.

#### (d) Rate of Planting

During the first year of active operations i.e. 1923, 400 acres were planted. After that, until 1934 when the main block was completed, the programme was 200 acres per year.

Planting at Boreland began in 1940 with 150 acres per annum but was stopped from 1941 until 1946 for the duration of the war. It was completed in 1949, and the post war rate was approximately 170 acres per annum.

#### (e) Manuring

4 acres of Sitka spruce in Compartment 40 were given an application of 4 ozs. of basic slag per plant.

Apart from this, no manuring was done at Drummond Hill.

(f) Success of Establishment (Seedlings and Transplants)

As previously mentioned in this history, establishment was remarkably successful over the entire area except in the very early years when black game and capercaillie did considerable damage necessitating beating up.

Transplants were used throughout.

Ploughing

No ploughing was done. It is interesting to speculate on the results which might have been obtained if the plateau on the top of the main block had been ploughed.

At Boreland, too, under present conditions most of the area would have been ploughed before planting.

Beating Up

In the early life of the unit damage from red deer and black game was unusually severe and beating up was high. It was generally carried out two years after planting and invariably the same species was used for "Beating Up" as had been originally planted.

For the most part the plants used for beating up were 2 + 1s but the records show that occasionally 2 + 2s were employed for this purpose.

The most extensive beating up had to be done in the P.23 and 24 areas on the northern face where today the plantations show signs of an unfortunate start.

Beating up in the south face of Drummond Hill and on the other sections was normal and indeed negligible on the Boreland Section.

There are no past records of additional drains having been put in subsequent to planting, though this matter is now receiving attention in the north face of Drummond Hill.

Weeding

Bracken and grass were troublesome on the lower slopes of all sections, but as tree growth was rapid it was seldom necessary to prolong weeding beyond the fourth or fifth year after planting.

The Boreland Section has proved the most difficult section in this respect where the lush grass on the lower ground and heavy bracken on the higher slopes has resulted in high weeding costs.

Throughout its history, it has been possible to employ sufficient labour to keep weeding under control, and no apparent damage has resulted from this cause.

#### Mixtures

The only mixtures planted were on the south face of the Drummond Hill and Boreland Sections where oak was planted in mixture with grey alder and with European larch. In both cases, these mixtures have been unsuccessful, at Drummond Hill because the grey alder soon suppressed the oak, and at Boreland because the oak suffered from extensive vermin damage.

Throughout the unit, however, advanced growth of hardwoods, mainly ash, sycamore, beech and birch has been retained. The result is now a spasmodic mixture of hardwoods through the European larch which is most effective. Apart from the possible production of some fair ash and sycamore, the soil improvement which should result from the presence of these hardwoods, particularly the beech, should be considerable.

#### Rates of Growth

Measurements were made in a number of compartments both on the north and south facing slopes of Drummond Hill. These were designed to cover all the main species and different elevations.

A summary of these measurements follows :-

Rates of Growth

Compt.	Species	P.Yr.	Age	Geology and Soil	(a) Altitude (b) Aspect (c) Slope (d) Exposure	Mean Height of Dominants	Mean Annual Height Increment
1	S.S.	23	28	Mica Schist dark to light brown sandy loam with many stones.	(a) 400 ft. (b) N. (c) 15° (d) Slight	55 ft.	1 ft. 11 in.
1	N.S.	23	28	As above	As above	52 ft.	1 ft. 10. in.
18	S.P.	31	20	Boulder clay over Mica Schist podsolised reddish brown sandy loam with stones.	(a) 700 ft. - 1100 ft. (b) N. (c) 20° (d) Exposed	34 ft. - 15 ft.	1 ft. 8 in. - 9 in.
35	E.L.	25	26	Boulder clay over Mica Schist. Brown clay loam with boulders.	(a) 600 ft. (b) W. (c) 15° (d) Exposed	37 ft.	1 ft. 5 in.
Note: This stand suffered from severe die-back in youth							
35	S.P.	25	26	Boulder clay over Mica Schist. Reddish brown loam with stones. Slightly podsolised.	(a) 800 ft. (b) W. (c) 20° (d) Exposed	30 ft.	1 ft. 1 in.
48	D.F.	27	24	Mica Schist dark sandy loam to light brown sandy loam with many stones.	(a) 420 ft. (b) S. (c) 20° (d) Sheltered	54 ft.	2 ft. 3 in.
49	E.L.	26	25	Mica Schist dark brown sandy loam above light red sandy loam with stones.	(a) 1020 ft. (b) S.E. (c) 25° (d) Mod. Exposed.	36½ ft.	1 ft. 2 in.
49	H.L.	26	25	As above	(a) 970 ft. (b) S.E. (c) 16° (d) Mod. Exposed	50 ft.	1 ft. 8 in.
49	J.L.	26	25	As above	(a) 900 ft. (b) S.E. (c) 15° (d) Mod. Exposed	48 ft.	1 ft. 6 in.
64	E.L.	34	17	Mica Schist 2 in. Med. brown loam over red brown loam with stones.	(a) 650 ft. (b) S.S.E. (c) 31° (d) Mod. Exposed	31½ ft.	1 ft. 11 in.
87	Grey Alder	33	18	Epidionite and Hornblend Schist Med. brown loam to 6 in. over light brown loam.	(a) 400 ft. (b) E. (c) Gentle (d) Sheltered	52 ft.	2 ft. 10 in.

Although the figures give some picture of the rates of growth, they do not bring out any point of great significance except that growth is satisfactory everywhere but falls off with height and exposure as would be expected.

The exceptions to this generalisation that all species grow well in Drummond Hill are to be found in (a) the Scots pine planted in full exposure on the main ridge. Some 50 acres of this species remain stunted and in check (b) the European larch on the lower slopes of the north face in P.23, P.24 and P.25. These plantations suffered severely from "die-back" in their early days and are now understocked.

Traces of "pumping" are to be found in most of the bigger stems and all the European larch plantations may have to be felled at an early age.

These two minor failures may be a result of a wrong choice of species, which is discussed more fully in the section on "Choice of Species"

#### Past Treatment of Established Plantations

##### Thinning

The 115 acres of acquired woodlands have been thinned since they came under Forestry Commission management in 1922.

Unfortunately the early thinnings of these woods tended to be on the light side but this is now being corrected.

The thinning of the Forestry Commission plantations began in 1939, but was stopped by the outbreak of war. Owing to the shortage of labour, it was possible to treat only very small areas during the period from 1940 - 1945.

In 1945 a thinning programme was drawn up to include all areas in P.23, P.24 and P.25 which had reached the thinning stage as well as the acquired plantations.

Difficult extraction and lack of essential roads hampered the work, and it was not until road construction got under way in 1948 that thinning in proportion to the needs of the forest was carried out.

The volume felled each year for the past three years is of interest.

1948	.....	62,358 cu.ft.
1949	.....	43,058 "
1950	.....	72,677 "

During the F.Y. 51 a Thinning Plan was prepared. This allows for the thinning of all plantations on a three year cycle in the first instance though after the first thinning the Scots pine will normally receive treatment only every sixth year. For the purpose of this Plan, the plantations which have reached the thinning stage have been divided into three blocks of approximately equal productivity.

Outside the Research Plots, comparatively little brashing has been done on Drummond Hill.

Before the last war some high pruning of selected stems of Scots pine was attempted in the acquired plantations (Compartments 93 - 96).

During the post war period most of the thinning has been done without brashing. The wisdom of this, both from an economic and a silvicultural point of view may be questioned, and the writer feels that a limited brashing of all plantations at the time of first thinning would be sound.

#### Utilisation of Produce

Present proposals are to deal with rather less than one half of the thinnings by means of standing sales. As Drummond Hill is still regarded as a costing unit for the preparation of pitprops, it is necessary to continue to work a high proportion of the thinning departmentally.

The bulk of the smaller thinnings felled by the Commission will be converted into props, but Drummond Hill will remain an important source of supply of fencing material for the southern half of the Conservancy.

According to the provisions of the feu charter, Mr. McAinsh, Timber Merchant, has to be given first refusal of all material removed from the acquired plantations. On this account the thinnings from these woods will normally be offered for sale, standing.

Although new roads have greatly improved the extraction position at Drummond Hill, the working of timber over extensive areas will always remain difficult and to some extent must reduce the value of the growing stock.

The most difficult extraction areas are on the south face of the main block and in the Tirnie and Killiechassie Sections. Here, road-making is limited by steep scree slopes and some form of aerial ropeway will have to be found.



## RESEARCH

### Note by the Research Branch

Drummond Hill Forest is one of the main centres where experimental work on the seed provenance of European larch has been carried out. The first trial of larches of different continental and Scottish origins was planted in 1926. It included three comparable plots of Japanese larch, first generation hybrid larch (i.e. Japanese mother and European father) and second generation larch (i.e. of hybrid larch parentage). The first generation hybrid larch has a slight advantage in both height and crop volume. The Japanese larch although a good stand, is slightly less tall and of smaller volume than either of the hybrid plots.

There are also examples of western American larch (Larix occidentalis) from British Columbia, Canada, Larix potanini from Shansi, China and Larix siberica from seed received via Canada, but none of these are growing well. European larch from Poland and the Tatra Mountains of Czechoslovakia is also included, but not on a scale large enough to be able to compare growth satisfactorily.

An experiment with Japanese larch was planted in 1931 to compare seed received from thirteen different places scattered over the native home of the larch in Nagano Province in Japan. It has shown no consistent differences between provenances although useful information on the comparative growth of the plots in this forest and at Knapdale and Strathyre forests is being obtained. Plots of European larch of numerous Scottish origins were also planted in that year and annually thereafter. The seed was obtained from trees or stands of great age or known good quality to perpetuate these good characteristics. They do not, however, exhibit any obvious differences between provenances.

Larch sample plots Nos. 103 A & B and 104 A & B were established in December 1933 in a 20 year old block of European larch in the acquired Breadalbane plantations. The purpose of these plots was to study the increment and growth of European larch at high elevations and to compare the effect, if any, of the heavy low (D grade) thinnings in plots 104 A & B with the moderately heavy low (C grade) thinnings of Plots 103 A & B.

After five thinnings the plots are almost identical in distribution and character, for the C grade thinnings could not be maintained and they are now typical of D grade, the heavy low thinning.

In 1951 when the crop was 37 years of age the total volume production was almost equal in all plots, being approximately 2100 cu. ft. Q.G.U.B. per acre. Despite the 950 ft. elevation and consequent exposure, the Quality Class is II, with a top height of 55 ft. at 35 years of age. Crowns are symmetrical and deep and the crown per cent has been almost constant at 40% during the past 12 years.

Comparative experiments with larch of Scottish, Silesian or Sudeten, and Alpine provenances were planted in 1931, 1935 and 1938. The first of these also included a comparison between both seedlings and transplants raised from the same seed, and the differences resulting from the sowing of the seed in six different nurseries scattered throughout Scotland have also been compared.

These experiments and collections of larch plots have also been repeated in a more favourable climate at Lael forest and on a marginal larch site at Clashindarroch forest. Drummond Hill is an intermediate example.

The general conclusion to be drawn from these experiments is that the growth, disease resistance and general quality of larch of Scottish provenance is almost invariably the best, Silesian or Sudeten larch is also good and may outstrip Scottish larch in growth, at least in early youth. The Alpine larch is less satisfactory, and certain provenances are growing poorly with severe frost damage, while others at Drummond Hill are reasonably good. (At Lael forest all provenances do almost equally well, but at Clashindarroch forest the growth of Alpine larch may only be half that of Scottish larch, and even the latter is much lower).

Further experiments with hybrid larch and Japanese larch were laid down in 1936 and 1937. In these plants from seed collected in various Atholl hybrid larch woods (i.e. second generation) were compared with seed collected from a second generation wood (i.e. third generation plants) and also with the progeny of seed collected from Japanese larch woods adjacent to European larch and which is probably hybridised. It appears that the

first generation hybrid is the best, but that after the removal of the poor trees from second generation crops the remaining trees may well yield equally good crops. The third generation crops appear definitely inferior although even in them there are many trees of excellent vigour and form.

In 1938 an experiment and thinning of Norway spruce was commenced, selected trees (at the rate of approximately 480 per acre) were pruned with varying degrees of intensity over the next twelve years up to a height of thirty feet. The pruned plots were subjected to a light crown thinning together with one pruning treatment and normal low thinning, a treatment including pruning of dead branches only, and an unpruned control. The success of the pruning treatments will be estimated when the trees are felled. Signs of canker were apparent at the start of pruning but have since lessened.

In May 1948, Plot 167 Douglas fir, Plot 168 Tsuga heterophylla and Plot 169 grey alder, were established. The first two in 21 year old Compartment 48 and the latter in Compartment 87, then 15 years of age.

A top height of 58 ft. and average girth of  $24\frac{1}{2}$  in. at 24 years of age indicate the excellent growth of the Douglas fir. Although total production from thinnings has already been 1847 cu.ft. Q.G.U.B. per acre, thinning will be again necessary in 1953.

The Tsuga heterophylla are at an elevation of 930 ft. that is over 500 ft. higher than the Douglas fir and this no doubt accounts for their comparatively slow growth and top height of 37 ft. Their total basal area production has, however, almost equalled that of the Douglas fir and in the last three year period they averaged 9.6 sq.ft. per acre per annum as against 9.0 by the Douglas fir.

The special thinning grade for the grey alder prescribed complete crown room and to provide this it has been necessary to thin annually. This treatment has reduced the number of trees per acre from 644 in 1948 to a present stocking of 158 and produced in thinnings a total volume of 1650 cu.ft. Q.G.U.B.

These trees now 19 years old have an average girth of 23 in. and mean height of 55 ft.

In 1947 one replication of the International Larch Provenance

experiment which extends over several forests in England and a number on the continent was planted in the new Boreland section. It is too early yet to assess results but it will be of great interest to compare results here with those in many other countries.

In subsequent years the collection of plots of well known Scottish provenances and some from the continent has been continued and a start made in growing grafts from some of the finest trees in Scotland. These will be of interest in the future in comparison with the progeny of the seed collections.

### Conclusions.

Drummond Hill is a forest where natural conditions favour tree growth, and with careful management there should be no impediment to the production of a large volume of good quality timber.

The very fact that growth in this region is rapid has resulted in the thinning of some plantations being delayed. It is most important that this is avoided and that an adequate and skilled forest staff be maintained at Drummond Hill.

A careful watch will have to be kept on the larch plantations in the north face of the main block. Any increase in the incidence of "pumping" might call for a fairly short rotation here.

The possibility of introducing another species, possibly Sitka spruce, into the very slow growing Scots pine on the high and exposed sites should be considered.

The maintenance and extension of drains on the north face of Drummond Hill and at Boreland should be kept constantly under review.

Difficult extraction on the south face of Drummond Hill and on the other detached sections must not be permitted to hamper thinning operations, and these areas provide a wide field for the Forest Engineers to experiment with new methods of extraction, such as skylines and chutes.

When the time comes to replace the existing crops on the north face of Drummond Hill the great possibilities of Norway spruce should not be forgotten. This applies with equal force to new acquisitions of similar ground in central Perthshire.

Natural regeneration may be a practical proposition in some parts of

Drummond Hill and where conditions appear favourable, the management should be carried out with this in view. For this and other reasons there should be no let up in the war against vermin.

APPENDIX I

Notes from Inspection Reports

Visit of Chairman and Assistant Commissioner to  
Drummond Hill on the 13th and 14th September, 1937.

The Boreland Section, the north face of Drummond Hill at the Fearnan end and the acquired plantations were inspected.

The Chairman stressed the importance of early brashing of European larch to let in air and limit canker.

The choice of species was discussed and it was agreed that Japanese larch might have replaced much of the pine on the north face and that Norway spruce might have been extended up the hill on to ground now planted with European larch.

The Chairman in a personal note has written:-

"No doubt if we were planting this area again we would use a good deal less European larch. Some of it looks ragged at this stage but that is not uncommon with European larch of this age. Parts may not form a satisfactory crop.

The Thinning Plan here will require careful consideration. We must not be late in getting into the larch."

Visit of the Acting Assistant Commissioner on  
9th - 10th December, 1942.

Boreland, Tirinie and Drummond Hill were visited.

The Acting Assistant Commissioner emphasised the necessity for the retention and careful thinning of acquired hardwoods in the Tirinie Section.

He urged a speed-up and the intensifying of the thinning on the main stock and advised against the brashing of European larch prior to thinning. Mr. Gosling considered this operation a waste of time.

Visit of The Chairman and Mr. A. H. Gosling on  
8th January, 1944.

From the notes of this visit it would appear that the inspection was confined mainly to the extraction of thinnings and the manufacture of pit-props.

Visit of Chairman and Mr. W. L. Taylor on  
8th March, 1945

Current thinnings in Compartments 47 to 56 were inspected. The chief item of discussion was the best method of extraction from the precipitous south face and the Chairman stated that

- (a) there should be at least three permanent aerial ropeways or chutes on the south face of the hill.
- (b) and for a new extraction road joining the service road with the main road below.

Note: A new road has since been constructed on the south face but there is still a case for aerial ropeways or chutes in this section.

(Sgd) H. A. MAXWELL.

Visit of Chairman on 6th September, 1947

The areas inspected included P.26 and 27 (Compartments 48 and 51) and P.23 and P.24.

The Chairman instructed:

- (1) that the area to be thinned should be greatly increased as much of the European larch was now ready for treatment.
- (2) that new extraction roads be built at once to deal with the increased thinning programme.
- (3) that three plots of underplanting be tried without fencing in P.23. Species to be used, Douglas fir, Tsuga and beech.
- (4) that enquiries be made to find out if the 10 unoccupied houses at Achloe could be acquired for forest workers.

Visit of Director and Silviculturist (N)  
on 29th April, 1948

Intensification of thinning of the larch urged. Damage during extraction of Norway spruce in the acquired plantations was pointed out.

The Director drew attention to the need for drainage in the spruce plantations on the north face of Drummond Hill.

Arrangements were made for the Research Branch to take over the grey alder in Compartment 87.

Visit of Chairman on 11th June, 1949.

From the notes available it seems that inspection of the road construction was the principal object of the visit.

Lord Robinson's comments were :-

- (1) Some of the roads still too wide.
- (2) The work done by the excavator was less satisfactory than where a bulldozer had been used.
- (3) As a trial, parts of the existing service road should be made up by applying gravel but without bulldozing.



Drummond Hill Forest

APPENDIX II

Supervisory Staff Records - 1922 - 1951

<u>Conservators</u>	H. Beresford Peirse	1946 - 1947
	F. Oliver	1947 - continuing
<u>Divisional Officers</u>	J. M. Murray	1922 - 1934
	H. M. Steven	1934 - 1938
	F. Scott	1938 - 1939
<u>Acting Divisional Officer</u>	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>	W. H. Whellens	1925 - 1933
	L. A. Newton	1933 - 1939
	I. Gillespie	1939 - 1940
	R. Shaw	1940 - continuing
<u>Foresters</u>	H. Watson	1922 - 1926
	W. L. Ross - Foreman -	1926 - 1927
	Forester -	1927 - continuing

### APPENDIX III

Photographs which would show in detail the growth of different species on Drummond Hill are unfortunately not available.

Four general views are, however, attached to this history.

These are :-

- (1) View of the western end of the south slope of the main block. This shows European larch over most of the area with Scots pine on the higher ridges.
- (2) The eastern end of the south slope of the main block, with European larch growing strongly. The plots in the left-hand corner of the picture are race plots of Japanese larch.

Some of the acquired European larch plantations can just be seen on the top right-hand corner of this photograph.

- (3) A general view of the main block looking eastwards from the Boreland Section.
- (4) On the left of the new forest road is one of the excellent acquired plantations of Norway spruce.

Drummond Hill

HISTORY OF DRUMMOND HILL FOREST



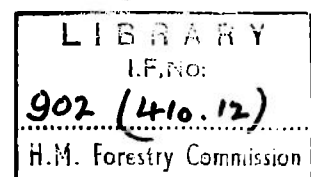
Photograph No. 1

The south west end of Drummond Hill Main Block with the Boreland Section (P.41) in the distance beneath the snow-covered hills.

This photograph includes Compartments 56-68 which were planted with European larch and Scots pine from 1927 - 1930.

Two of the new forest roads are just discernible on the right of the picture. Kenmore Village can be seen at the eastern end of Loch Tay.

4 Photos





Photograph No. 2.

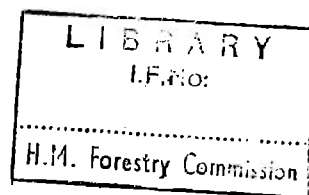
This photograph was taken from the Aberfeldy - Kenmore road and shows Compartments 77 to 84 which were planted in F.Y.'s 33 and 34 almost entirely with European larch.

On the left of the picture experimental plots of Japanese larch may be seen. They are of various seed lots supposed to have been collected from different parts of Japan. The seed was gifted by the Japanese Government.

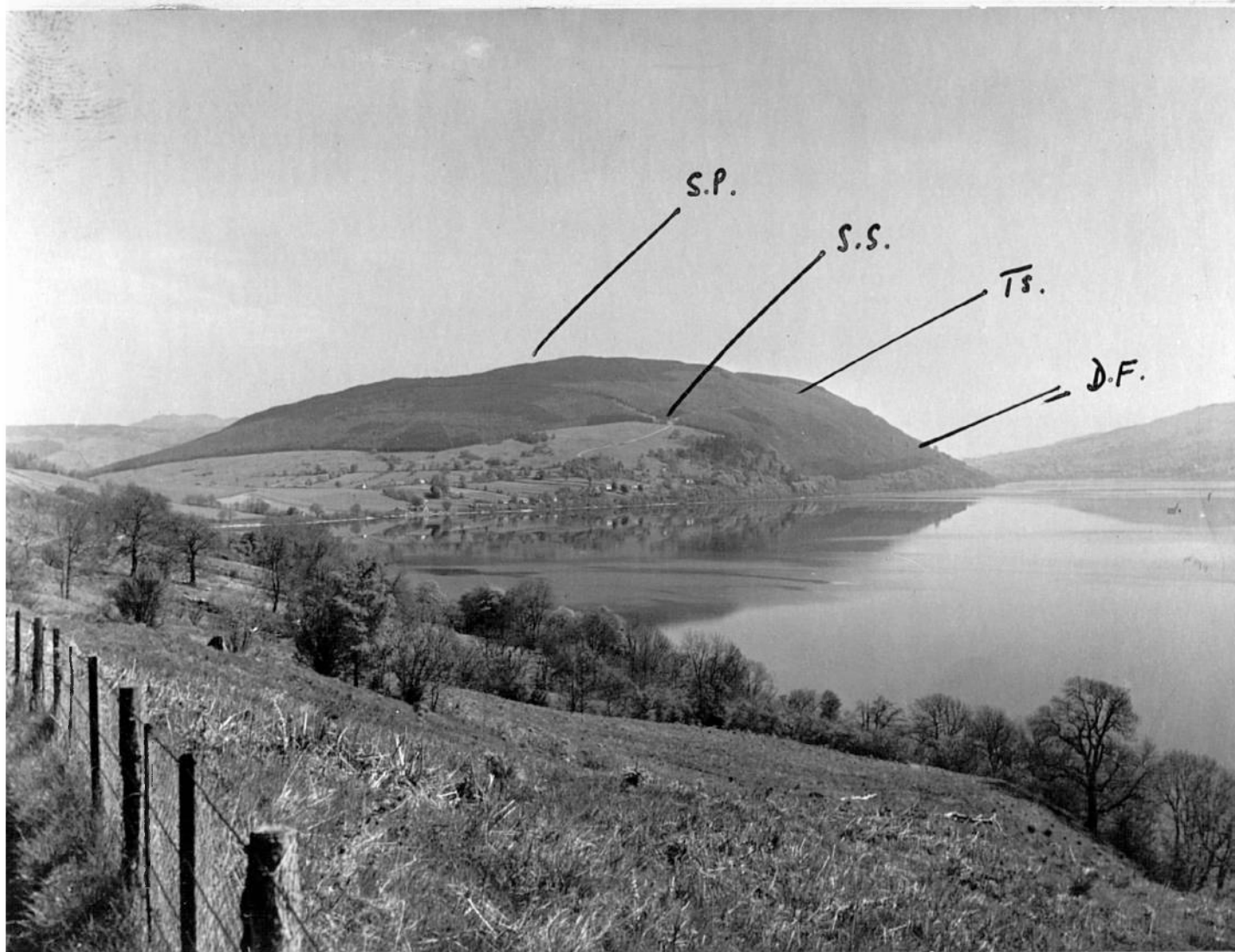
The Scots pine on the highest ground can be clearly seen, and on the right-hand top corner it is possible to pick out the oldest stand of European larch on the unit. This stand is part of the acquired Breadalbane plantations.

Old hardwoods, principally beech, ash and sycamore which are characteristic of this part of Drummond Hill, show up clearly.

In the foreground is Taymouth Castle, former seat of the Campbells, Lords of Breadalbane, now used as a Civil Defence Training School.



HISTORY OF DRUMMOND HILL FOREST



Photograph No. 3.

A view looking eastwards along Loch Tay and showing the west end and part of the south face of the Drummond Hill Main Block above Fearnan Village.

Compartments 33 - 56 which were planted from 1925-29 can be seen.

The forest which is lightly coloured on the photograph is European larch; that which appears black is Scots pine, Sitka spruce, Douglas fir and Tsuga.

The new forest road which runs from Fearnan Village along the south face to the eastern extremity of the forest is clearly shown.

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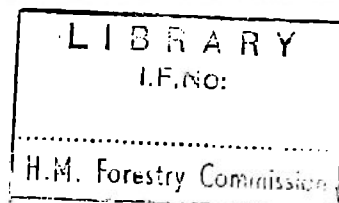


Photograph No. 4.

A new forest road which serves the north face of the main block of Drummond Hill, passing through acquired plantations of Norway spruce and Douglas fir.

These woods are in Compartment 90 and are 39 years old. The top height of the Norway spruce is 65 ft. and the Douglas fir 70 ft.

The aspect is north-east and the elevation 500 ft. Both species are growing on a rather heavy boulder clay.



## DRUMMOND HILL FOREST

1

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This photograph includes compartments 56 – 68 which were planted with European larch and Scots pine from 1927-1930

Two of the new forest roads are just discernible on the right of the picture. Kenmore Village can be seen at the eastern end of Loch Tay.

2

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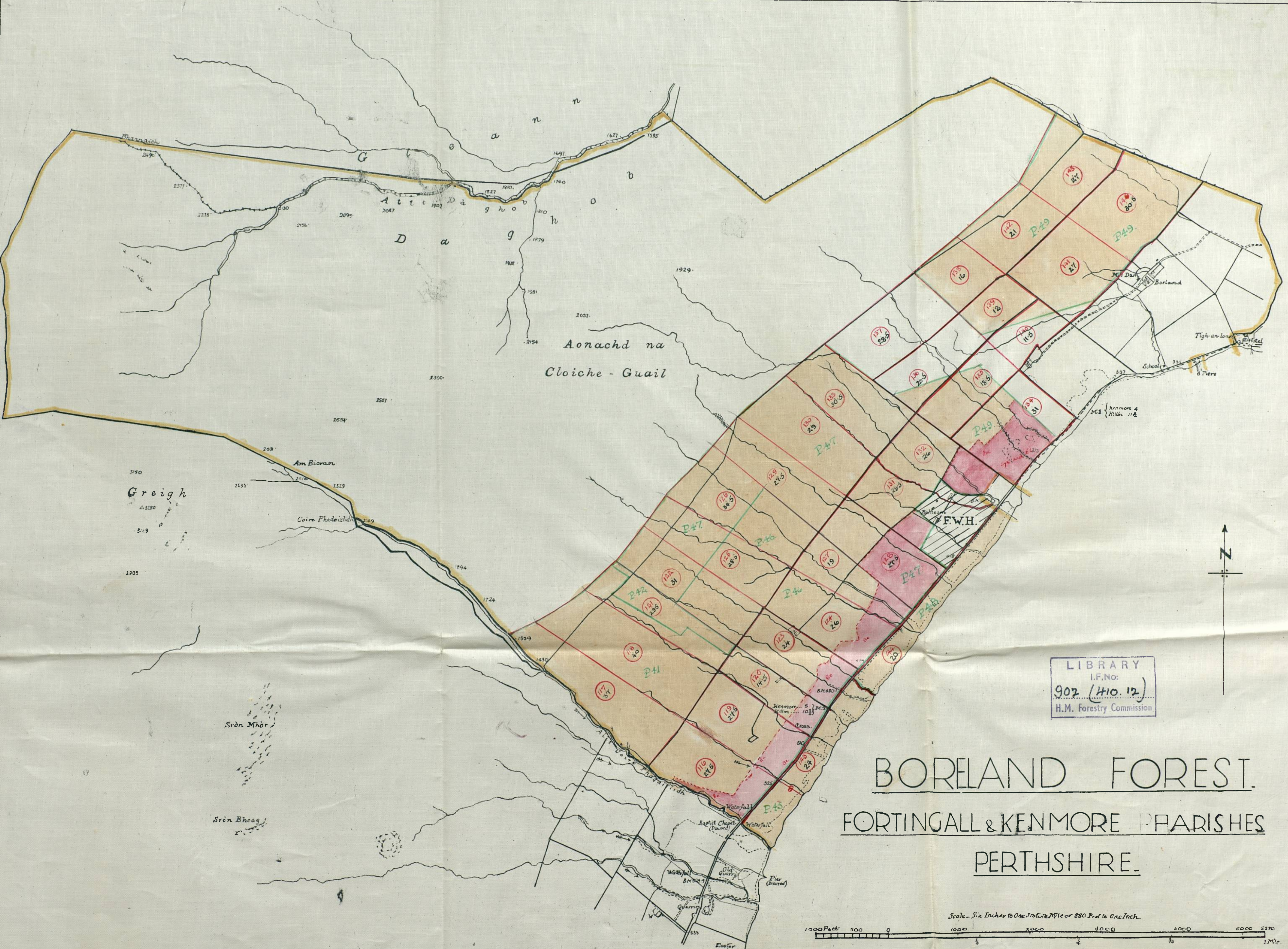
4

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Aonachd na  
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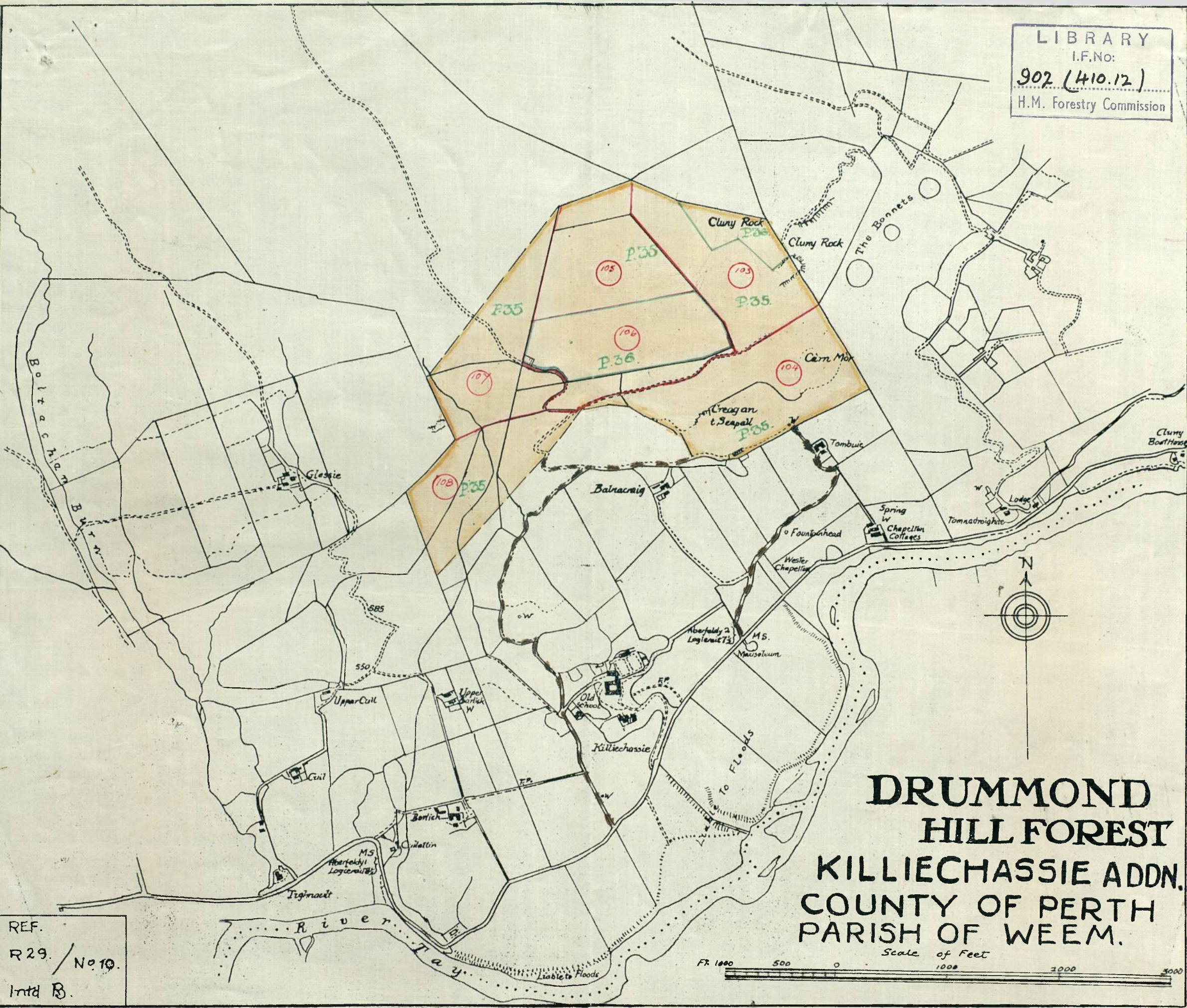
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BORELAND FOREST.  
FORTINGALL & KENMORE PARISHES  
PERTHSHIRE.

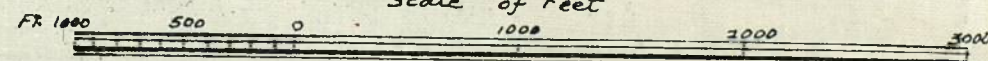
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**DRUMMOND  
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Scale of Feet

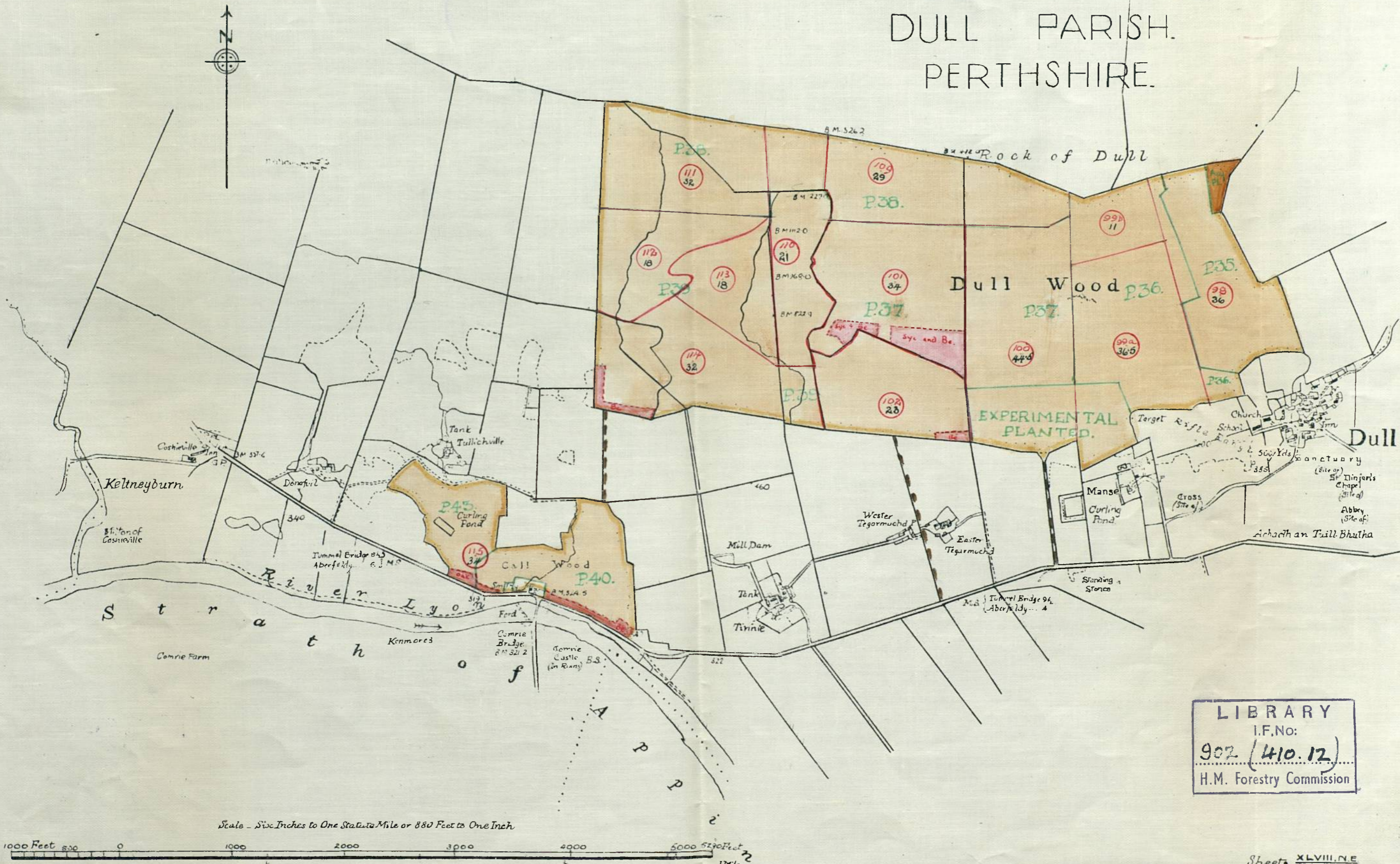


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# DRUMMOND HILL FOREST

## TIRINIE SECTION.

DULL PARISH.  
PERTHSHIRE.



Scale - Six Inches to One Statute Mile or 880 Feet to One Inch

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# DRUMMOND HILL FOREST

SCALE 6" = 1 mile (1/10560)  
 feet 1000 500 0 1000 2000 3000 4000 5000 6000 7000 feet


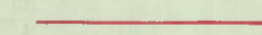

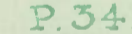
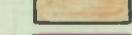
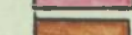
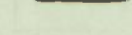

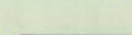


COUNTY OF PERTH  
 PARISH OF FORTINGALL

Fortingall

TAY  
 PARISH OF KENMORE

Loch

*Legend.*

-  Forestry Commission Boundary.
-  Compartment Boundaries.
-  Planting Lines
-  Planting Years
-  Planted Area (Conifers)
-  " (Hardwoods)
-  Acquired Plantation
-  Access Roads.
-  Public Roads
-  Commission Roads.
-  Commission Tracks.

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