FORESTRY COMMISSION

HISTORY

OF

GLENBRANTER

FOREST

W(S) CONSERVANCY

Glenbranter

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

H I S T O R Y

of

G L E N B R A N T E R F O R E S T

1921 - 1951

WEST (SCOTLAND) CONSERVANCY

HISTORY OF GLENBRANTER FOREST

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CHAIRMAN'S COMMENTS

Mr. Petrie has written a good and concise account of the Forest.

Undoubtedly the early rate of planting (P.22 438 acres, P.23 340 acres; and P.24 340 acres) was too rapid for good work especially in view of the difficult ground on parts of Glenshellish. Nevertheless when, with Mr. Hopkinson, I inspected the first year's work after a season's growth I was pleased with the work. We did not then realize the intensity of drainage which was necessary, nor the fact that flat-planted spruce often looked well for a year or so and then checked. The "inversion" of the Norway spruce and Sitka spruce zones also took place in other forests at this time. I myself knew that Sitka spruce stood more exposure but it took several years to get that knowledge to local officers.

As the technique of spruce planting was developed, new methods were applied at Glenbranter and my recollection is that (apart from vole damage) the rate of establishment of plantations improved greatly from P.27 onwards.

The period of vole damage was one of some anxiety to plantations in Cowal generally and led to a cessation of new planting in Glenbranter in 1934. No practical method of dealing with voles was discovered, in spite of much enquiry, but mercifully the epidemic, both here and at Lake Vyrnwy in Wales, came under natural control of some sort.

I am concerned at Mr. Petrie's comments on the thinning position. He says (page 11) "many of the plantations have reached a stage at which the crown depth is little more than a ninth to a tenth of the tree's total height....." It is of the first importance that such fast growing plantations, situated as they are in a wet and windy district, should consistently be kept well thinned, even if the resultant produce cannot be removed for a couple of years. The possibilities of that procedure, which has extraction advantages should be thoroughly investigated.

In spite of mistakes and voles Glenbranter is a very fine forest. In my last inspection (August 1951) I was able to get comprehensive views from the new roads and I went away well satisfied with what I had seen.

(Intd) R

22/2/52

DIRECTOR'S COMMENTS

1. The history gives a gloomy picture of arrears of brashing, thinning and drain maintenance piling up. Presumably plans have been made and steps taken to overtake these arrears and it would be well to complete the picture by adding a note on this point.

District Officer's Comments

The picture of arrears of maintenance work at Glenbranter is not now so gloomy. Standing sales are being worked over more speedily, our own thinning work has progressed satisfactorily of late and would have been well forward had we not unexpectedly had to cope with the trees blown by the gale of 30th December 1951. Additional female labour has meant that for the first time, brashing is definitely far ahead of thinning and we have approximately 100 acres of brashed crop in hand. Extra labour, better organisation of the work and the encouragement of piecework has greatly developed the forest and we are adhering as closely as possible to the plan of operations. Extraction by rope and caterpillar tractor has helped out the horse work and the large volume of pole length material in the plantations is being steadily reduced.

2. The description of the early treatment of "scrub" makes one shudder. The methods employed cannot be altogether attributed to financial reasons: there must have been a lack of appreciation of the silvicultural value of the "scrub" and an unreasoning desire to establish a pure conifer crop in one "jump". The methods used at Glenbranter were common elsewhere in scrub areas, but were particularly unfortunate at Glenbranter because some, at least, of the oak was of much too good quality to be classed as "scrub". It would be interesting to know if use can be made of the felled oak, "still lying, hard and fairly sound", and if any girdled oak can be sold at the time of first or second thinnings.

District Officer's Comments

It appears that in the early years of preparation of ground work scrub was completely cleared from the ground and there is evidence of this in the P.22, P.23, P.24 and P.26 areas. Cutting was complete or ringing was complete. I think there must have

been a lack of appreciation of the silcivultural value of the scrub because we should be glad of its presence today. A few strips or clumps of this hardwood crop would have been of great advantage in sheltering and stabilising these large conifer blocks. A good deal of the oak which was girdled was of too good a quality to be classed as scrub.

I am afraid my wording of "stems of felled oak are still lying hard and fairly sound, all over the forest floor" was somewhat exaggerated and was the result of seeing a few of those only. The better trees must have been extracted for splitting for fence stobs and for roadways in the old arboretum but there are in places, single pieces and heaps of old scrub lengths which are sound although outwardly soft and moss-covered. They are, however, too crooked, inaccessible and ancient to be worth extraction. It may be possible to sell some of the girdled oak in Compartments 63 and 64 at the time of the first thinning of silver fir there.

HISTORY OF GLENBRANTER FOREST

General Description of the Forest

Situation

The name of the Forest has been taken from that of the main glen in the area - Glenbranter. This was also the name given to the mansion house which was the residence of previous owners of the Estate.

The Forest lies round the head of Loch Eck, about three miles south of Strachur in the County of Argyll.

Area and Utilisation

The following table shows the areas of ground as acquired with dates:-

From	By	Date	Plantations Acquired	Plantable (ex. Col. 4)	Nurseries	Agricultural	F. W. H.	Unplantable	Total
Duncan McNab	Purchase	March 1926	-	1568	-	190	-	794	2552
Sir Harry Lauder	Feu	March 1921	14	2619	-	542	-	5188	8363
Totals			14	4187	-	732	-	5982	10915

Statement of areas at 30th September 1950.

TABLE II

(a) Plantations - Acquired		14		
Formed by Commission		3859		3873 acres
(b) In hand awaiting planting -				328 "
Other land				
(c) Nurseries				5½ "
(d) Agriculture - Number of tenancies	3	Area		4650½ "
(e) F.W.H. Number	19	Area		150 "
(f) Unplantable land in hand				1908 "
			Total	10915 acres

Prior to acquisition by the Forestry Commission, the area now known as Glenbranter Forest comprised six hill sheep farms each of which carried a stock of approximately 1,000 ewes from which a

crop of cross bred lambs was raised each spring, sale of the lambs taking place in the late autumn each year. These were the farms of Glenbranter, Glenshellish, Invernoaden, Ballimore, Island and Balliemeanach and they were tenanted by farmers who managed their farms on the general principles adopted in highland districts. The area of arable ground, except in the case of Balliemore, was small and was used for the support of a few milk cows and the raising of winter feed for stock. Today, three of these farms, Balliemore, Glenshellish and Invernoaden are still maintained, the first-named as a dairying and sheep unit and the latter two as hill sheep farms. Ewe stocks have had to be reduced considerably due to afforestation of the lower hill slopes and insufficient low ground was left for wintering purposes.

These farms are tenanted but are factored by the Commission and land is available for resumption at one year's notice.

There is very little game apart from grouse at the head of Glenbranter; red and roe deer are plentiful at certain seasons.

Physiography

The Forest is a compact block with the house of the Forester-in-Charge occupying a fairly central position for easy administration. The main block comprises Glenbranter running north-east and south-west and Glenshellish running north and south. Both sides of these glens are afforested. The Balliemeanach portion is a separate hill on the north side of the River Cur; it is bordered on the east side by Carnach Hill which comprises the greater portion of ground still to be afforested. The outlying block of Glensluan is on the north-west portion of the Estate and is separated from the main block by Balliemore Farm which is on lease to a tenant. The Glenbranter and Glenshellish portions are narrow glens typical of West Highland districts, with steep side slopes and without arable or farm ground on either side of the streams. Balliemeanach Hill rises to about 1,500 ft. above sea level with steeply sloping sides and an even gradient all round. It is completely afforested apart from the summit, and all aspects and degrees of exposure are represented. The Glensluan area has a moderate slope with a westerly aspect but is partly sheltered by rising ground on the west side.

Geology and Soils

The bedrocks are mainly metamorphic quartzites and schists with some igneous intrusions. The metamorphic rocks were originally sediments such as impure sandstones, shales, limestones, etc., but their mineral composition and structure has been greatly altered due to intense heat and pressure. They may be recognised by the presence of marked cleavage or foliation which causes them to split very readily in one direction.

The main soils are:-

(a) Deep fine loams derived direct from the parent rock.

(b) Gritty or rocky loams and clays of glacial origin.

(c) Peats generally shallow over gritty or rocky loams and clays.

Vegetation

Soil type (a) carries a vegetation of scrub, bracken and the finer grasses, type (b) Calluna and hill grasses, and type (c) Molinia/Juncus associations if of better quality and Scirpus, Erica and Vaccinium if of inferior quality.

Meteorology

The climate is typical of the western seaboard of Scotland with no extremes of heat or cold and very high rainfall. Annual figures show the average rainfall to be between 80 and 90 inches. Snow is infrequent and does not generally lie long below 1,000 ft. Any hard dry weather is generally experienced in the spring, thereby increasing the danger from fire. Late frosts are frequent and damaging. Winter gales are common and are to be feared from the thinning stage onwards due to the heavy rainfall and proximity of rock to the surface.

Exposure on western slopes can be very severe due to Atlantic gales and the western position of the district. There is no land mass between the majority of the forests and the Atlantic Ocean and therefore no break to the strong prevailing winds coming directly off the sea. The limit of planting is thereby much reduced in comparison with eastern localities and it is seldom possible to plant higher than 900 ft. even when the quality of the ground above that altitude is sufficiently good for conifer species.

Risks

The main risk for many years was from fire but this has decreased now

as plantations near roads are reaching the thinning stage and have almost all been brashed. In the early stages, danger from fire in the spring months could be very acute due principally to tourist parties, picnic parties and holiday makers generally, and to heather burning by neighbouring farmers. The Forest occupies a position in a popular holiday district and is, in addition, a unit of the Argyll National Forest Park, and special precautions are necessary on account of the frequent presence of large numbers of the public.

Rabbits were never plentiful in this region due to the wet climate and nature of the ground. They occurred locally on drier slopes but were comparatively easily dealt with at the time of afforestation. They have been almost entirely exterminated.

Deer, both red and roe, have always been moderately abundant in this region and have to be constantly watched. They move over the entire Cowal peninsula at the dictates of the weather and the food supply. Damage from these animals is not serious, due principally to constant patrolling by two trappers but they are still to be met with regularly in the forest which now affords them shelter.

One of the chief troubles now is intrusion by sheep. Individual blocks of forest were not fenced off and almost the whole area was enclosed by a march fence from Loch Eck at Bernice to Glensluan on the boundary of Strachur Estate. As this fence is now very old and difficult to maintain, sheep trespass from adjoining ground is difficult to prevent and is at its worst in the early spring when grass on the hill is bare but is more plentiful in the vicinity of plantations.

Danger from wind has now to be feared when much of the area is at the thinning stage and where the ground is soft and peaty. Planting has been done almost entirely with spruce and the lack of other species, scrub belts and mixtures, makes plantations much more vulnerable to wind. One wind blow of an acre, just before first thinning, has already occurred.

The vole plague was serious in this forest as in others in the district particularly between the years 1930 and 1933. Since then only sporadic outbreaks confined to certain small localities have occurred.

The plague of 1930-32 was particularly bad in the P.22, 23 areas of Glenshellish. This was a backward area due to direct planting after insufficient draining and plants were very slow with the result that they could make little show of recovery from successive mice attacks. They were severely decimated.

The P.28-29 area on Stronchreich planted with silver fir was also severely attacked as was Glenbranter Glen itself, P.24 and P.26, but the vigour and rapid growth of the spruce there enabled them to keep ahead of the damage being inflicted. The P.31 acrea on Balliemeanach Hill was badly eaten.

The plague was so severe that walking over the hill, one could not avoid tramping on mice. Men on the hill at lunch time could feed the creatures on bread; mice ate the plants before the eyes of the men who had planted them so that beating up was required the following day. After reaching its height in 1932, the plague gradually died out, due possibly to disease among the over-crowded animals and since then there has not been a similar concentration in plantations of the lesser vermin with which it is so impossible to cope.

Damage from insects and fungal pests is practically negligible; spruce aphis occurs locally but is never severe, probably on account of the very heavy rainfall.

Roads

At the time of acquisition, the only road serving the forest was the main county road from Strachur to Dunoon which passes the entrance gate to Glenbranter House. This road only served a very small area of ground. The side road to the forester's house at Glenbranter Farm was also of little value. After the first World War, a camp was established at Balliemeanach by the Ministry of Labour for the relief of unemployment and two short lengths of road were constructed, one serving part of Balliemeanach hill and the other reaching from Glenshellish Farm to the head of Loch Eck.

Since the establishment of the Engineering Branch, a considerable amount of road construction has been carried out at the forest. Some ten miles of new road have been formed - four in Glenshellish, three in Glenbranter, two in Balliemeanach and one to the Loch Eckside block. These are gravel roads only, bottomed here and there as necessary and constructed over brushwood and tracking where the ground is soft and peaty.

These roads have made a vast difference to the management of the forest; fire protection is simplified, labour can be got quickly to work on outlying areas and a series of standing thinning sales has been made possible. Our own extraction and transport of produce has been greatly

speeded up by the near presence of roads on many areas.

Labour

During the early years of establishment of the forest, the labour supply from the locality and from the forest bothy was sufficient to cope with afforestation and maintenance work. A good type of country man was available, the type used to outdoor work on exposed hills and the large planting programmes were got through due to the hard work and virility of these men.

In the early years, the force was affected by relief schemes for unemployment and squads of men, chiefly engaged on roadmaking, were housed at Glenbranter and Balliemeanach Camps. It appears that the forest was started with a squad of eight men which quickly rose to between the 30 and 40 mark but fluctuated very much during the year as men came and went.

During the war years, the squad had to be considerably reduced; men were called to the Colours and to the production side of forestry work. Labour was sufficiently plentiful between the wars but since 1945, it has not been possible to get the numbers or the quality of labour which is desirable. The local population has dropped and it has been necessary to recruit men from the cities; these men, although willing to work, have not the skill or the hardiness of the rural worker. They require training and they are very inclined to change jobs at regular intervals. Immediately after the war, the labour position was helped a little by the Forest Workers' Training Scheme; a camp for this purpose was opened at Glenbranter and started off with some 36 trainees. These were again mostly young men from the cities and while a few remained and are now Forest Workers, the majority gradually dispersed to other work, generally to the towns again. The original number of 36 was never maintained and for long periods there were only 7 or 8 of these men at work.

The following table shows the fluctuation of the labour force during the life of the forest:

Year	Spring	Summer	Autumn	Winter
1922	27	35	40	14
1923	25	24	23	23
1924	25	30	32	24
1925	23	28	32	31
1926	34	31	29	30
1927	35	37	36	29
1928	32	33	38	32
1929	31	29	23	24
1930	24	28	28	22
1931	20	22	23	21
1932	21	26	24	21
1933	25	23	22	24
1934	24	23	24	22
1935	21	22	20	20
1936	18	20	18	18
1937	16	16	15	18
1938	24	24	24	22
1939	20	22	26	16
1940	20	27	22	27
1941	27	36	29	22
1942	25	26	28	25
1943	24	24	23	25
1944	23	24	25	24
1945	24	20	19	17
1946	17	25	29	24
1947	26	25	36	39
1948	41	44	33	25
1949	32	35	34	38
1950	38	40	35	40
1951	37	43	41	49
1952	49	54	57	

Housing

With regard to housing there are now 35 houses in the forest. Of these, two are occupied by foresters, the forester and under-forester, one by a foreman, 28 are occupied by forest workers and 4 by Engineering Branch employees. The number of forest workers' holdings is 16, of which one comprises the original Balliemeanach farm and 15 were established by the Forestry Commission in the years 1926-27. The forester in charge occupies the original Glenbranter Farmhouse and the under-forester the renovated Balliebeg croft. Fourteen new Swedish houses were completed in 1951 and are now all occupied. Two of the former estate houses are occupied by forest workers and an iron hut in the Camp by an Engineering Branch employee. Approximately half of the total forest staff are housed and a site has been reserved at Balliemeanach for the erection of a further dozen houses when these become available. This should be sufficient for

a considerable period provided standing sales of produce proceed as at present and forest labour is thereby assisted by that of the timber merchant.

A hostel in the Camp can provide accommodation for a further 20 men and timber merchants are assisted by giving their workers room in the hostel. The wives of workers in new houses have assisted the carrying out of the programme by offering themselves for the lighter types of job in the summer months.

SILVICULTURE

Preparation of Ground

During the early years there was probably insufficient preparation of ground and foresters were too optimistic in expecting satisfactory establishment of plantations without any assistance to plants by improving surface conditions. The first plantings were carried out in Glenshellish which is one of the wettest parts of the forest and which was almost entirely free of scrub. Draining was not sufficiently intensive and the drainage system is not good; it comprises too many leaders running with the slope and far too few cross or contour drains to trap water seeping down. It would appear that there are little more than fifteen chains of drains per acre on this ground.

No turfing was done at this forest until 1927 when several trial plantations of Sitka spruce were established on high ground on Stronchreich by more intensive draining and full turfing. Practice before that was to screef fairly heavily and most of the early planting was done on screefed ground. The screefing was generally put out on piece work to men prior to planting. Much of the Glenbranter and Balliemeanach sections were planted directly without either screefing or turfing.

Scrub areas were confined to the Invernoaden, Stronchreich and Glenbranter portion of the forest. The first scrub dealt with was in the P.24 and P.26 areas of Stronchreich and complete clear felling was the practice. These plantations are now receiving a first thinning and the stems of the felled oak are still lying, hard and fairly sound, all over the forest floor. On Invernoaden, the practice was similar until it was decided that such preparation of ground was too expensive and partial felling with girdling was resorted to. Gradually girdling ceased on areas visible from roads and at Invernoaden, roadside planting is under untouched scrub, although behind this

the dead girdled oak are numerous. On the lower slopes of Stronchreich, silver firs are coming through almost completely girdled oak scrub. Very few hardwood trees were left alive and no effort was made to retain scrub belts or to leave groups for amenity and protection from wind.

Choice of Species:

The entire forest is almost entirely composed of Norway and Sitka spruce. In the years from 1922 to 1926, the Sitka spruce was confined to the lower slopes of the glens and the Norway spruce to the high ground; this is the reverse of the practice in force today and it has resulted in very fast growth of Sitka and very slow growth of Norway spruce. In the same P. year, Sitka spruce may have had two thinnings, whereas the Norway spruce is not yet urgently requiring brashing. The vegetation was principally grass and rushes with sparse heather on the higher ground.

In the 1922 and 1923 plantations, pine groups were put on the heather ground. The species was chiefly Scots pine with small amounts of mountain and Corsican pines. These have generally done very badly due to insufficient drainage and preparation of ground.

There is very little Douglas fir in the forest; a small lot occurs in the P.27 area in one Compartment. The only area of European larch, a few acres on Balliemeanach, did very badly and was replaced in 1943 by Norway spruce. Japanese and hybrid larch areas are not extensive. These species were planted on dry bracken ground, chiefly in 1927, 1928 and 1932-33 areas and made splendid growth. A block of Hybrid larch in Balliemeanach planted in 1927 is of excellent quality and has had three thinnings. Smaller lots of these species were planted elsewhere, principally on Balliemeanach and Balliemore.

Corsican pine were planted singly through most of the Sitka spruce on the western face of Balliemeanach hill and these trees grew very satisfactorily, but were not relieved sufficiently early from the strong competition of the spruce. Small lots of Abies nobilis and Abies grandis were established on the low ground at Stronchreich and on the middle slopes of Balliemeanach, and in girdled scrub on Stronchreich, a trial was made with a small number of Abies forestii. Pinus contorta was sparsely used on sour heather and cross-leaved heathland at the foot of Balliemeanach, and through heath ground higher up on Balliemeanach and on Invernoaden.

Planting:

The spacing of the spruces was generally five and a half feet but in later years this was brought in to five feet for most species, pines were planted at four feet by four feet on much of the poorer ground.

In the first two years planting, 1922 and 1923, seedlings were used in the planting of the huge spruce areas in Glenshellish, on ground which was not turfed. There were heavy losses, at least 25% and the following note is from a report by the Chairman in 1924:-

"P.22 (which looked exceedingly well in the spring after planting) and P.23 have not developed to expectations. Numbers of plants have died and few have really got going. Deaths could in some places be traced to lack of drainage and in others to weed growth. Frost has probably played a part in checking the young Sitka.

It appears that the following points require attention.

1. More intensive drainage
2. The use of well developed plants 12 in. - 18 in. high. (particularly Sitka)
3. More weeding."

No further seedlings were used from then on until P.50 when seedlings of Japanese larch and Pinus contorta were planted on mounds in Stronchreich. Generally pines and larches were planted as 2+1 transplants and spruces and silver firs as 2+2. The majority of the plants were imported from Benmore, Glenfinart and Tulliallan nurseries. Seedlings were imported also from these nurseries and were lined out in the small nursery at Balliemeanach until of an age and size for planting in the forest.

Planting was almost entirely done with the circular spade, the Schlich notching spade and the garden spade. Mattock planting was never done at Glenbranter. The circular spade was the principal tool used from 1922 to 1928 and it was employed on both screefed and unscreefed ground. All seedlings planted in the extensive programmes of 1922 and 1923 were put in with this spade. After 1928, the Schlich notching spade became more popular and it was used for both notch and turf planting. In late years the nursery spade is more in use in turf planting. This spade was also used in pit planting scrub areas. Much of the 1924, 1925 and 1926 programmes were planted by the pitting method with the garden spade.

The annual rate of planting was considerable. No planting was done in 1934 because of the very large beating up programmes which were considered necessary but in almost every Forest Year from 1922 to date, there has been a programme of new planting. Areas planted annually are given below:-

F.Y.22	438 acres	F.Y.36	124 acres
23	340 "	37	106 "
24	340 "	38	100 "
25	186 "	39	80 "
26	210 "	40	80 "
27	334 "	41	90 "
28	174 "	42	63 "
29	201 "	43	25 "
30	202 "	44	25 "
31	317 "	46	44 "
32	118 "	47	60 "
33	123 "	50	58 "
35	101 "	51	24 "
	3084 acres		879 acres

Total 3963 acres

As a result of a resurvey of plantations in 1937, 90 acres of high lying spruce in Glenshellish were written off as failed due to altitude and exposure bringing the total planted area to 3873 acres.

Very little manuring of plants was done at this forest. In the 1941 and 1942 blocks in Glensluan, slag was applied to pines on hard heather knolls one year after planting. This assisted in taking these plants out of check.

On the 1950 area at Stronchreich, trial was made of a manure with the name of Fison's No.8. Two ounces per plant were applied to Japanese larch and Pinus contorta seedlings on a heath type of ground. The manure has 5% N. 10% P_2O_5 and 5% K_2O. Results were only slightly effective.

Generally the establishment of these extensive plantations may be said to have been achieved with marked success. Today over these three thousand eight hundred acres of plantation there is very little sign of

failure of any great extent and blanks are few and far between. The forest now presents itself as an almost solid block, principally of spruce with compact stands of Japanese and hybrid larch interspersed, and with smaller blocks of silver fir. The species which has done least well is Scots pine but it is nowhere extensive and was principally used in small clumps on heather ground in Glenshellish. In a report dated 20th February 1928, the Chairman instructed that Sitka spruce should be planted in parts of the area in which it had been arranged to plant pure Scots pine. This was carried out and successful spruce is now on the ground. The turf planted spruce in P.27, the first of this type of planting in Glenbranter which was directed by the Chairman to be done on the Stronchreich nose between the two main valleys has developed very well and these areas are now at the thinning stage.

On the lower slopes of Glenbranter (P.24 and P.26 areas) growth of the spruce has been very fast and it is here that the most advanced stands of this species occur. Height growth reaches to 70 ft. to the tree top and trees of 8 cu.ft. to 10 cu.ft. are not uncommon. The spruce in this glen seem also to be of a finer, less coarse type than in Glenshellish, and are generally lighter coloured in the bark.

The Norway spruce over Glenshellish and Glenbranter is slow due to its high situation and to a lack of "sweetness" in this ground which checks rate of growth. It is in good health, however, and should develop satisfactorily. The species is at its best on Balliemeanach where it has been given more favourable conditions on the lower and middle slopes. It is here competing satisfactorily with the Sitka spruce and making excellent stands.

Silver fir is not abundant but where small blocks of Abies nobilis and Abies grandis have been planted, they have made satisfactory growth so far. Of the small plot of Abies forestii at the bottom of the Stronchreich, only a few survivors remain and these are not particularly vigorous.

Much of the early Scots pine planting in Glenshellish has failed and in many cases was replaced many years ago by Sitka spruce. Very little pine has been used in this forest and the best crops are on the middle slopes of Balliemeanach in mixture with Pinus contorta and on heather knolls in Glensluan.

The most impressive stand of larch is the hybrid larch plantation in Compartments 133 and 134, Balliemeanach. This crop, planted in 1927, has had three thinnings and has developed well; trees are well proportioned and quality is good. It is regenerating itself freely on bare ground along the Balliemeanach roadside. Moderately satisfactory stands of Japanese larch are in the P.23 area of Glenshellish, in the P.32 area of Balliemeanach and in the P.38 and P.40 areas of Glensluan.

Ploughing:

No ploughing was done at this forest until F.Y.51 when a small area at the head of Glenshellish was prepared for planting. Approximately 30 acres of soft rush ground were ploughed with D.4 tractor and Cuthbertson plough with two discs. Drains of approximately one foot deep were opened at a spacing of 21 ft. and turves were cut from the furrow using the rutter spade. These turves, of a size roughly 14 in. x 14 in. x 6 in. were spread with backs at 5 ft. spacing, four rows between drains, and were planted by splitting with the garden spade. Two-plus-two year transplants of Sitka spruce were used and to date the percentage of loss is very small.

Beating up:

Mention has already been made of the principal beating up which was necessary at this forest. This was on the P.22 and P.23 areas, Glenshellish, where extensive programmes were carried out on wet ground and with inadequate drainage. Losses of the original plants were aggravated by the use of seedling Sitka spruce. It was estimated that failures in both these P.years amounted to 25% and extensive beating up was carried out and was not finally completed until 1934, in which year no planting was agreed to in order that labour might be concentrated on beating up. It was directed that over Glenshellish, many of the Scots pine areas should be replaced with Sitka spruce and that mountain pine plants should be ignored.

Elsewhere, beating up was more or less normal and species similar to the original plants were used. Vole damage was the principal cause of the large scale beating up, and epidemics of these were frequent between 1932 and 1940. In 1939 it was expressed by the Commissioners that the forest was satisfactorily beaten up and that bare looking patches were actually stocked.

Weeding:

In the early years of the forest, weeding of grass, bracken and rushes was very intensive. Vegetation between the plants and between the rows was shaven to the ground and was frequently done three times during one growing season to each planting block. In later years it was advised correctly that this intensive cutting was unnecessary and extremely expensive and gradually weeding was brought to the brief freeing of plants as is the practice today. It is obvious now that the spruces develop the better by having an erect growth of vegetation around them during the early and middle summer and that the principal object in weeding these is to prevent their being covered with a mat of decaying vegetation in the autumn and winter. The larches and pines require more freedom in the growing season and some of the heavy shadebearers such as Abies grandis and Tsuga heterophylla become very soft if not given access to light before the end of the growing season.

Mixture of Species:

Very little mixing of species was carried out at Glenbranter Forest. Planting was almost entirely confined to large blocks of pure Norway spruce and pure Sitka spruce with smaller compact blocks of pure larch and pine and still smaller patches of silver firs. In the P.25 area in Glenshellish, there is a considerable extent of intermingled blocks of small size of Norway and Sitka spruces but the plants are not mixed. The only plant by plant mixture of these species was done in Compartment 93 in the P.26 area. The Sitka spruce, however, shot so far ahead that the Norway spruce was very much suppressed; to date three thinnings have been carried out in this compartment and very few Norway spruce now remain.

In the 1928 area in Balliemeanach, a line by line mixture of hybrid larch and Lawson's cypress was planted. The larch went ahead very quickly and the cypress very slowly; many of the latter species died out in the early years and the strong aggressive branching of the larch, which soon overtopped the cypress, completed the destruction of the slower species. Only a few very suppressed and badly shaped cypress now remain and the larch on this block are coarser than where pure due to their having twice as much room in which to spread. This particular block has also had three thinnings but few trees could be removed where the larch and cypress had been planted together.

In Glensluan, in 1939, small blocks of Scots pine, Sitka spruce and Pinus contorta were planted on heather-grass ground. The blocks consist of about 20 plants of each species. The method appears so far to have had very good results; the pines have developed very well and are in the lead. Their well developed crowns and superior height growth have benefited the spruce which although slower, are of good appearance and are following the pines satisfactorily.

Small groups of Pinus contorta and Scots pine were elsewhere in earlier years, planted through large blocks of pure spruce but generally they are very inferior in growth to the spruce over most of the ground.

Rates of Growth

Sitka spruce has generally been successful over those parts of the forest in which it has been used. It is at its best on the middle slopes and in depressions of soft rush ground, even at fairly high altitudes. Its rate of growth over such areas is approximately three feet per annum from a height of twelve feet onwards. The species has done most satisfactorily on the lower slopes of Glenbranter and Balliemeanach and in the former glen, trees of 70 ft. height at 27 years of age, are not uncommon.

As previously mentioned, the bulk of the Norway spruce planting was carried out on the high ground above the Sitka spruce and seldom lower than 400 ft. elevation. The result is very slow development due to exposure and a less deep and fertile soil. The species is coming away faster now where it adjoins the Sitka spruce and gets the benefit of its shelter but trees are very stunted at the upper limit of planting and in parts it is doubtful if it will ever be more than a scrub growth. Where the species has been given better conditions on sites at a lower elevation, it compares favourably with the bulk of the Sitka spruce and is very little behind in the rate of growth. In the growing season of 1950, Norway spruce on good sites appeared to have greater height increment than the neighbouring Sitka spruce.

Moderately good stands of hybrid larch have been established in the P.27 and P.28 areas of Balliemeanach and have now had three thinnings. Rate of growth has been good and trees are approximately 50 ft. high with a breast height quarter girth of five to six inches. More of this slope might have been planted with this species.

Japanese larch is not plentiful in the forest and has been confined principally to small blocks. These are in the P.23, P.30 and P.32 areas. The largest is in the P.30 area, amounting to approximately 20 acres and is at a fairly high elevation and fully exposed. Height growth has been slow, trees are little more than 20 ft. in height and average four inches quarter girth at breast height. The best quality stands are in P.30 Balliemeanach which has had one thinning and in P.38 Balliemore, recently cleaned and now ready for thinning.

Scots pine has been planted only locally and nowhere extensively. It was chiefly used in groups through plantations of spruce and on such sites, it has remained in check for a very long period and in many cases had died out. It is at its best on part of the middle slope in Balliemeanach P.32 where in association with Pinus contorta, it has developed moderately well. The latter pine is here on somewhat better ground than it normally received and is making fast growth. These pine areas will have a useful stabilising effect on the vast pure spruce areas around them.

Douglas fir and the silver firs were planted only in a few specially selected sites.

The following table gives some examples and an indication of rates of growth in the forest:-

Species	P. Year	Geology and Soil	(a) Altitude (b) Aspect (c) Slope (d) Exposure	Mean Height of Dominants Feet	Mean Annual Height Increment Inches	Current Annual Height Increment during last 5 years Inches
S.P.	29	Metamorphic-quartzites and schists Free, loose soil	(a) 100' (b) S (c) Very steep (d) Sheltered	36	19½	19
C.P.	28	-do-	(a) 200' (b) S.W. (c) Steep (d) Mod. exposed	32	16½	14
N.S.	27	-do-	(a) 150' (b) S.W. (c) Gentle (d) Sheltered	38½	19	19
S.S.	27	-do-	(a) 120' (b) S.W. (c) Moderate (d) Mod. exposed	49	24½	33½

Species	P. Year	Geology and Soil	(a) Altitude (b) Aspect (c) Slope (d) Exposure	Mean Height of Dominants Feet	Mean Annual Height Increment Inches	Current Annual Height Increment during last 5 years Inches
J.L.	28	Metamorphic-quartzites and schists Free, loose soil	(a) 100' (b) S (c) Very steep (d) Sheltered	56	29	26

Past Treatment of Established Plantations

From the time of establishment, the major operations which have been carried out by way of maintenance are brashing, cleaning and thinning, and repair of drains. Due to the extensive areas which were afforested each year, much of this maintenance work has fallen into arrears and the labour position during the war years and the years immediately following has aggravated the position. In particular drain repair work was neglected in the years before closing of the canopy and as a result, many plantations had reached the first thinning stage without any attention to drains. In many cases, this work was so urgent that special brashing alongside drains had to be done to enable men to clean and deepen existing water channels. The position has now been considerably improved and in addition, thinning is always followed by attention to the drainage system.

Brashing has been a time consuming and tedious job. In large spruce areas such as those at Glenbranter, brashing is a major operation and no subsequent work can be done until this operation has been completed. The work is very much heavier here than in the pine and larch areas of the east and due to the preponderance of unskilled labour, the hand pruning saw is almost universally used. This combined with the density of the stands and the need for at least 80% brashing to ease extraction on these steep hillsides slows up the work considerably and marking of thinnings, both for felling by the forest squad and for standing sales cannot be attempted until brashing has been completed.

In the years when brashing was in its early stages, it was the custom to clean 50% of the trees only and as time went on to clean 60% and 70% but

experience has shown that insufficient brashing merely increases the costs of marking, felling and extraction and current practice is to brash all but the very suppressed. Timber merchants too, are averse to offering for a partially brashed lot and there is no doubt that their offers for lots are enhanced by the appearance of a well brashed and cleaned plantation where the stems and extraction lines are better shown up.

Until F.Y.46, thinning in Glenbranter was carried only on a small scale in the more advanced and more accessible areas. Thinning was light, little more than a heavy cleaning; only dead and suppressed trees were removed and there was practically no interference with the canopy. As a result, thinning had little or no effect and at the beginning of F.Y.47 it could be said that no thinning of any real consequence had been done over the entire forest.

Prior to F.Y.47, the area of ground gone over in thinning was 60 acres. In F.Y.47, as a result of a slightly better labour position, a reduced planting programme and the beginning of road construction, more large scale thinning was put in hand and the figures to date are:-

	First Thinning Acres	Subsequent Thinning Acres	Total Acres
Prior to and including F.Y. 46	60	-	60
F.Y. 47	65	21	86
F.Y. 48	156	-	156
F.Y. 49	114	9	123
F.Y. 50	76	20	96
F.Y. 51	195	-	195
Totals	666	50	716

Slightly over one fifth of the total forest area has now been thinned. The above figures include areas sold standing to merchants.

In F.Y.47 the thinning of these fast growing spruce plantations was still being done rather on the light side, some 400 cu. ft. approximately being removed per acre. It was not sufficiently well realised how fast the trees were growing and how quickly the canopy closed and it was inclined to be

forgotton that, at the stage plantations were being entered for this purpose they should actually have been receiving a subsequent thinning and there was consequently a greater volume to be removed to bring them to some semblance of normality. A further factor contributing to too light marking was that Sitka spruce was not being treated as the strongly light demanding species which it is and that it in no way resembles the Norway spruce in this respect. The thinning of Sitka spruce needs actually to be based on the principal that the crown of the tree needs abundant light all round and that it loses foliage rapidly if not so supplied. Many of the plantations have reached a stage at which the crown depth is little more than a ninth to a tenth of the tree's total height and the species is very slow to recover crown once it has been largely lost.

From 1948 onwards, thinnings were marked on a heavier scale; the canopy was broken and the average volume of produce removed per acre has been 500 cu. ft. from first thinnings and 650 cu. ft. from second thinnings. These figures, from silvicultural plots and from standing sales over considerable areas, have remained fairly constant and give a reasonably accurate indication of what is being taken out. The first sale of standing thinnings was negotiated in F.Y.49 and since then there has been a series of such sales. The system has considerably helped progress in working through the arrears of thinning and sale of further blocks in the same way is contemplated. So far, one merchant only has been in the forest and this firm has co-operated well and done very little damage.

In the thinning of these blocks of spruce, the greatest danger to be feared is from wind and were this danger not ever present, particularly throughout the winter, even heavier marking would be considered. With the extent of area to be got over and the necessity of returning for a second thinning in from three to four years' time, it is not easy with the existing labour force to keep all compartments up to date and heavier marking is the only way in which the interval between thinnings can be prolonged. The danger of windblow in this wet region on soft sites makes it necessary, however, to mark in such a way that too sudden an opening is not made at once. Gales following periods of heavy rainfall are common and in the P.22 area in Glenshellish there is a windblow of spruce due to the removal of marginal trees to facilitate road construction. A gale of December 1949,

following shortly after, brought down approximately one acre of spruce which had received one thinning and had been marked for a second.

Research - Note by Research Branch

In 1926 an experiment on turf nurseries was started at a high elevation peat site. This method of planting on close turfs, moved later by hand to the correct planting distance, was originated by Sir John Stirling Maxwell and described in the Scottish Forestry Journal, volume 50, 1936, P.19-22. The method was found to be too costly to be practicable, especially after the advent of mechanical ploughing.

In November 1949 three permanent sample plots No. 217 hybrid larch, No. 218 Norway spruce and No. 219 Sitka spruce were established at Glenbranter.

The hybrid larch in Compartment 133 are excellent quality and at 21 years of age have a top height of 51 ft. and a total volume production of 2531 cu. ft. quarter girth under bark per acre.

In order to allow easier extraction of timber from the hinterland, the plot was again thinned in 1951, and now a total volume of 1111 cu. ft. quarter girth under bark has been removed by thinning.

With a top height of $35\frac{1}{2}$ ft. at 23 years of age the Norway spruce in Compartment 138 were just ready for a first thinning when the plot was established. This thinning produced 223 cu. ft. quarter girth under bark per acre. Height growth has been rather irregular throughout the area, and in places the canopy is open owing to slower growth. Branching is light and the stems straight and free from defects.

The Sitka spruce in Compartment 140 have a top height of 43 ft. at 23 years of age which puts them into Quality Class III of that species. In a first thinning 562 trees with a volume of 439 cu. ft. were removed per acre. Although crowns are deep at $56\frac{1}{2}\%$, the foliage is inclined to be light.

In 1951 an experiment on the economics of brashing was carried out. In this experiment, different methods of brashing and subsequent extraction were carried out and costed to find if the cost of brashing was recovered in the savings on extraction. The results are not yet available.

Conclusions

In the light of experience gained, the main conclusions to be drawn from a study of Glenbranter Forest are:-

(1) The planting of the high ground with Norway spruce and the low ground with Sitka spruce has been a mistake and has led to extremely slow growth of the former species and extremely fast growth of the latter and these factors have not made it easier to deal with the forest now at the thinning stage.

(2) The direct planting of Glenshellish in the early years and the use of seedlings made failures abundant on that area and early growth very slow. A tremendous amount of beating up was necessary and insufficient drainage at the time of establishment is now almost impossible to correct. A large area of somewhat unstable and irregular plantations has resulted and the trial throughout the block of small patches of Scots pine which have almost completely failed, has not improved the position.

(3) Insufficient change of species was made as a safeguard against wind-blow. Consideration should have been given to the lay-out of belts or blocks of wind resisting species such as Abies nobilis and Japanese larch through extensive spruce plantations.

(4) More use should have been made of Japanese and hybrid larch on the dry slopes of Balliemeanach. This is now almost 100% Sitka spruce and might have carried a more varied crop. Much of the low ground here too might have been Norway spruce instead of Sitka spruce.

(5) Little attention was given to the lay-out of forest roads and rides when planting was being done. Very few rides are of any use for access and extraction and rides were not laid out so as to be easily converted to roads.

(6) More of the original scrub might have been reserved for amenity and protection of these large conifer areas.

Apart from these points, it appears that the main work of bringing into being a large area of softwood timber has been successfully accomplished and there is no doubt that Glenbranter is one of the best

spruce forests of the West of Scotland. The greater part of the forest is progressing very well; it is in a healthy and thriving condition and with proper maintenance it should produce excellent timber.

The principal work to be done from now on is to get arrears of thinning undertaken and to keep thinning up to date. Strict attention will require to be paid to the drainage system on all blocks immediately after cleaning and each thinning to keep the forest stable and for the same reason, care will be needed in thinning and breaking up margins. Road work is now ahead of thinning and need only be pushed forward a little at a time to keep extraction possible and sales to merchants more attractive. Additional planting has still to be done but this should not be allowed to interfere with the main work of thinning existing plantations of eighteen years of age and over and of seeing that these are safe and secure until it is necessary to repeat the operation.

(signed) S. M. PETRIE

10th September, 1951.

Appendix I

Notes from Inspection Reports

Some notes from inspection reports have already been referred to; the following extracts from reports throw some light on the history of the forest and are those of chief interest:-

Technical Commissioner (Mr. R.L. Robinson) September, 1924

"P.22 (which looked exceedingly well the spring after planting) and P.23 have not developed to expectations. Numbers of plants have died and few have really got going. Deaths could in some cases be traced to lack of drainage and in others to weed-growth. Frost has probably played a part in checking the small Sitka.

"It appears that the following points require attention:-

(1) More intensive drainage

(2) The use of well-developed plants 12in.-18in. high (particularly Sitka).

(3) More weeding.

"With regard to weeding; the present wet season has been particularly bad for weed growth and this has come on top of the large area of young plantations all of which required attention. The rushy ground in particular requires watching before it begins to lay over and smother the plants. Molinia ground also requires early attention. I understood from the forester that the area is worked over compartment by compartment. It is worth considering whether this system, which admittedly is easy to work, really gets the most urgent work done in time."

The above note throws some light on the troubles in the early afforested blocks where drainage was insufficient and where no turfing was done.

Chairman (Lord Lovat) and Technical Commissioner (Mr. R.L. Robinson) September, 1925.

"With the adoption of intensive drainage, use of larger plants and more intensive weeding (to which reference was made in the report mentioned above), the chief problem now appears to be the method of dealing with the hard knobs which are covered with Scirpus or heather. It was generally agreed at the present inspection that it is wise in most cases to delay planting such areas (and particularly Scirpus areas) until the drains have

had time to act and the trees on adjacent and better land have grown up sufficiently to afford some shelter; also that when planting is done it is necessary to stir up the soil and not merely to notch into the peaty surface layer.

"It is proposed also to lay down a series of planting experiments on land of this type, a suitable area being the nose of the ridge between the two main valleys. I should be glad to see the working plan for these experiments which should be started during P.26."

It will appear from the above extract that the use of transplants as against seedlings had been decided and that more drainage had been found necessary.

The latter paragraph refers to the turf planting of Sitka spruce on the Stronchreich ridge. These plantations developed satisfactorily and are now at the thinning stage. In 1950, planting was done on the bare ground between these experimental blocks.

Chairman (Sir John Stirling Maxwell) and the Technical Commissioner (Mr. R.L. Robinson).
February, 1928.

"P.22 The Commissioners approved of the programme of beating up for the present season but they stated that it was desirable to press forward with the completion of the beating up over the whole of P.22 and especially in the upper sections.

"P.27 In the Glenbranter mounded section it was arranged to plant some of the hillocks that lie between the moulded valleys, with Sitka spruce and Pinus contorta.

"Mr. Robinson instructed that an experimentsl area should be prepared on this class of ground in which Sitka spruce should be planted on shallow mounds.

"P.28 In P.28 Glenshellish, Mr. Robinson directed that Sitka spruce should be planted in parts of the area in which it has been arranged to plant pure Scots pine.

"A proposal to omit a planting programme for one year and to complete all beating up required on the east of Glenshellish in that year was discussed but no decision was made. Mr. Robinson stated that some of the drains in P.28 and P.23 were too steep and too close."

It will be noted that P.22 is still in need of beating up at this stage.

The experimental area referred to is that on the Stronchreich ridge mentioned above.

Scots pine did very badly in Glenshellish in the 1922, 1923 and 1928 areas and a change to the use of Sitka spruce on these areas was directed.

Chairman (Sir Roy Robinson), September, 1933.

"The cutting back of birch and elder (etc.) coppice shoots should not be delayed in many places. The Chairman emphasised the importance of cutting the coppice back heavily at this stage and not merely trimming it back to afford temporary relief to the crop.

"The amount of beating up to be done at this forest is considerable. This is largely a result of damage by voles. The Chairman wished every effort to be made to complete beating up, particularly in the older plantations at once. He agreed that first planting should cease for F.Y.1934 to enable the beating up to be completed.

"In beating up the areas inspected (P.22) the Chairman wished all blanks in Scots pine areas to be filled with Sitka spruce. Mountain pine plants are to be ignored during beating up and a full crop of Sitka spruce introduced. Elsewhere the usual procedure is to be adopted. The use of Tsuga for beating up small blanks will be tried."

The vole plague was at its height during this Forest Year.

Chairman's Inspection, March 1939.

"The rapid growth of the Sitka spruce emphasized the urgent need of a speeding up of plans for road making through these glens. Again it was pointed out that brashing, etc., should not yet be tackled, and any pruning done should only be to allow access to the plantation.

"The plots formed in P.27 on the instructions of the Chairman were favourably commented on, and it was stressed that the idea of these was to provide shelter, and to follow them up by planting up the areas between them. It was agreed to do this meantime by extending the present areas halfway across the blank patches. The first row of plants to be 9 ft. from the present margins - spacing to be $4\frac{1}{2}$ ft. apart.

" A good view of the P.22 and 23 slope was obtained on the return route and a desire to see the bare looking patches and the high elevation Sitka spruce (peat nursery) experiment was expressed by the Chairman. These were visited in the afternoon and the route traversed was through Compartments 11, 12, 7, 13, 14, 18, 17, 16 and 15. This plantation looks much better on close examination and the Chairman was satisfied that these "bare looking" patches were well stocked and in a few years should improve. Voles were responsible for much of the different age patches on this area."

The first mention of the need for roads through these extensive plantations is made but no roads penetrating plantations were constructed until 1947. A considerable mileage of road, some 8½ miles, is now available for timber haulage and other transport.

Chairman's Inspection, August, 1947.

"On the first day, work done on the Glenshellish road by the Engineering Branch was examined and it was generally considered that this was of too elaborate a nature. The type and construction of roads necessary for the extraction of thinnings from Commission areas were discussed.

"Part of the Glenshellish area was gone over and the need mentioned for thinning the more advanced portions. Drain repair work and brashing were being carried out here. The Chairman stressed the need for more inspection paths. He outlined a possible road system on this side and the advantages of extraction to the roads by steel cable. He suggested the trial of floating short pitwood lengths down the Shellish burn to the river Cur and instructed that 50 peeled and 50 unpeeled 8 ft. props be tried when the water in the burn was at its normal level.

"An examination of the road work completed to date was made and part of the Glenshellish area walked to consider the possibility of a road on that side from Glenshellish Farm to the middle ride and thence round the shoulder by that ride southwards towards Loch Eck."

Chairman's Remarks

"The reports cover most of the points seen and discussed. There is a mistake I think in the suggestion that the road in the Cruach Wood at Benmore should be completed by men from Glenbranter. I think the idea was that Glenfinart Camp would give a more suitable type of labour.

"Also, the Engineering Branch undertook to make experiments on taking roads across boggy patches in substitution of the present expensive method of digging out the peat (a practice, moreover, which is not always feasible where the peat is deep and continuous).

"The discussions led to a revision of the approach to and specifications of road building in this (as in other) areas and by now a start should have been made on the new lines. I want to be assured of this and to have a progress statement sent to me personally on the first of each month.

"On the whole the development of these very extensive spruce plantations is pleasing. The amount of material to be removed as thinnings during the next few years will be very considerable."

On this visit the Chairman was concerned principally with road alignment and construction and he held a meeting with the senior Engineers at Glenbranter on those subjects. The result was a change to a less elaborate method of road construction and the beginning of speedier work in gaining access to plantations needing thinning by the formation of gravel roads with as little prior excavation as possible. It was agreed that Glenbranter required two roads and that Glenshellish would require three, one on either side of the burn and one on the middle ride. A ring road was suggested round the foot of Balliemeanach but with a branch to reach the middle ride and to proceed along it if possible in order to serve the high lying plantations.

In August, 1947, the Chairman instructed that a trial should be made of floating props in the Shellish burn which is a tributary of the River Cur, the latter flowing into Loch Eck. Several trials were made of seasoned, unseasoned, peeled and unpeeled props but results were unsatisfactory due to the rocky nature of the burn and to the rapid rate at which it falls to very low level very shortly after the cessation of heavy rain.

Results from two of the trials were as follows:-

31st August, 1948 /

31st August, 1948

No. Launched	Type	No. to reach Glenshellish Bridge	No. to reach Loch Eck.	No. held up in stream.
50	Unseasoned Unpeeled	12	6	32
50	Unseasoned Peeled	29	11	10
25	Seasoned Unpeeled	13	9	3
25	Seasoned Peeled	13	12	-
150	TOTALS	67	38	45

16th February, 1950

No. Launched	Type	No. to reach Glenshellish Bridge	No. reaching Junction of Rivers Cur and Shellish
50	Seasoned Peeled	10	24
50	Unseasoned Peeled	21	18

Director General, September, 1948

"The Director General was again principally concerned with the amount of finishing work at present being done on roads and suggested various possibilities whereby excavation and preparation could be reduced and the length of workable track thereby increased. He pointed out that quick access to areas of plantations needing attention was essential and contrived to get opinions from the Engineering Branch staff on various quick methods of getting a workable track for tractor or janker. The question was raised as to what type of track would suit best, what mechanical equipment would be best suited to its construction, what nature of transporting vehicle it could carry and whether it could at a reduced expense, be later converted to a better track and finally to a complete road. Mr. Green stressed that full excavation should be done at the outset, no matter what type of track was subsequently formed, and that bridges and culverts would require to be put in right away."

Chairman, June, 1949

"Felled material, Sitka spruce, which had lain in the forest for over a year was examined and judged sound and in its semi-barked state it was mentioned that in the peeling of prepared props, the timber merchants should have little labour; this was pointed out as a possible advantage in having the felling done considerably ahead of the extraction as material, on dry areas at least, could lie for a long period without deteriorating and could then be the more easily peeled."

The Chairman's comment was - "No doubt extraction, whatever the method, will be greatly facilitated by prior seasoning and probably by hand propping in the plantations. The observation that Sitka spruce almost barks itself without deterioration, if left lying for a year or so (provided it is not in contact with the soil) is of some importance."

Director General, June, 1950

"The Director General was concerned at the amount of thinning and brashing which has to be carried out on this area. He suggested a method whereby a man might enter the plantations and brash, with the axe, the worst trees and those which will obviously come out in the first thinning. It was suggested that a good deal of this work would be necessary to enable men to get in fairly comfortably to cut the trees, but these might be sawn off only as there would be little room to swing an axe. Brashing would then follow this type of cleaning. The method will be given a trial and the forester instructed."

The result of a trial of this work was reported to Conservator West (Scotland) in January, 1951. The report stated:-

"A small trial of the work as outlined in my previous memo was carried out at Glenbranter but results are very unsatisfactory. It is estimated that to brash and thin as was described was costing £20 per acre and was a very unfinished job. Sitka spruce is about the worst species growing for work of this kind; it is not an easy tree to brash with the axe, the wear and tear on men's clothes and skin was very severe, felling was very difficult for lack of room and extraction without further brashing impossible. The system might work in larch or pine but definitely not in

spruce and besides being difficult and expensive, further brashing would still have to be done and too few trees were taken out to make a satisfactory first thinning."

(Sgd.) S. M. PETRIE

10th September, 1951.

APPENDIX II

Supervision

Conservators

1946 - 1948	A. Watt
1948 - to date	J.E. James

Divisional Officers

1922 - 1934	J. M. Murray
1934 - 1938	O. J. Sangar
1938 - 1939	A. H. Gosling
1939 - 1945	J.A.B. Macdonald
1945 - 1946	A. Watt

State Forest Officers

1947 - 1948	J. E. James
1948 - to date	H.V.S. Dier

District Officers

1922 - 1927	J. Hunter Blair
1927 - 1931	J. Fraser
1931 - 1938	A. H. Gosling
1938 - 1946	H. Watson
1946 - to date	S. M. Petrie

Foresters

1921 - 1923	R. W. Paterson
1923 - 1925	R. Shaw
1925 - 1930	R. T. Anderson
1930 - 1936	J. Calder
1936 - 1941	J. D. Macdonald
1941 - 1946	J. Jackson
1946 - 1947	J. D. Macdonald
1947 - to date	A. Maclean

APPENDIX III

Other Notes

The Forest is a unit, with Benmore, Glenfinart and Ardgartan, of the Argyll National Forest Park.

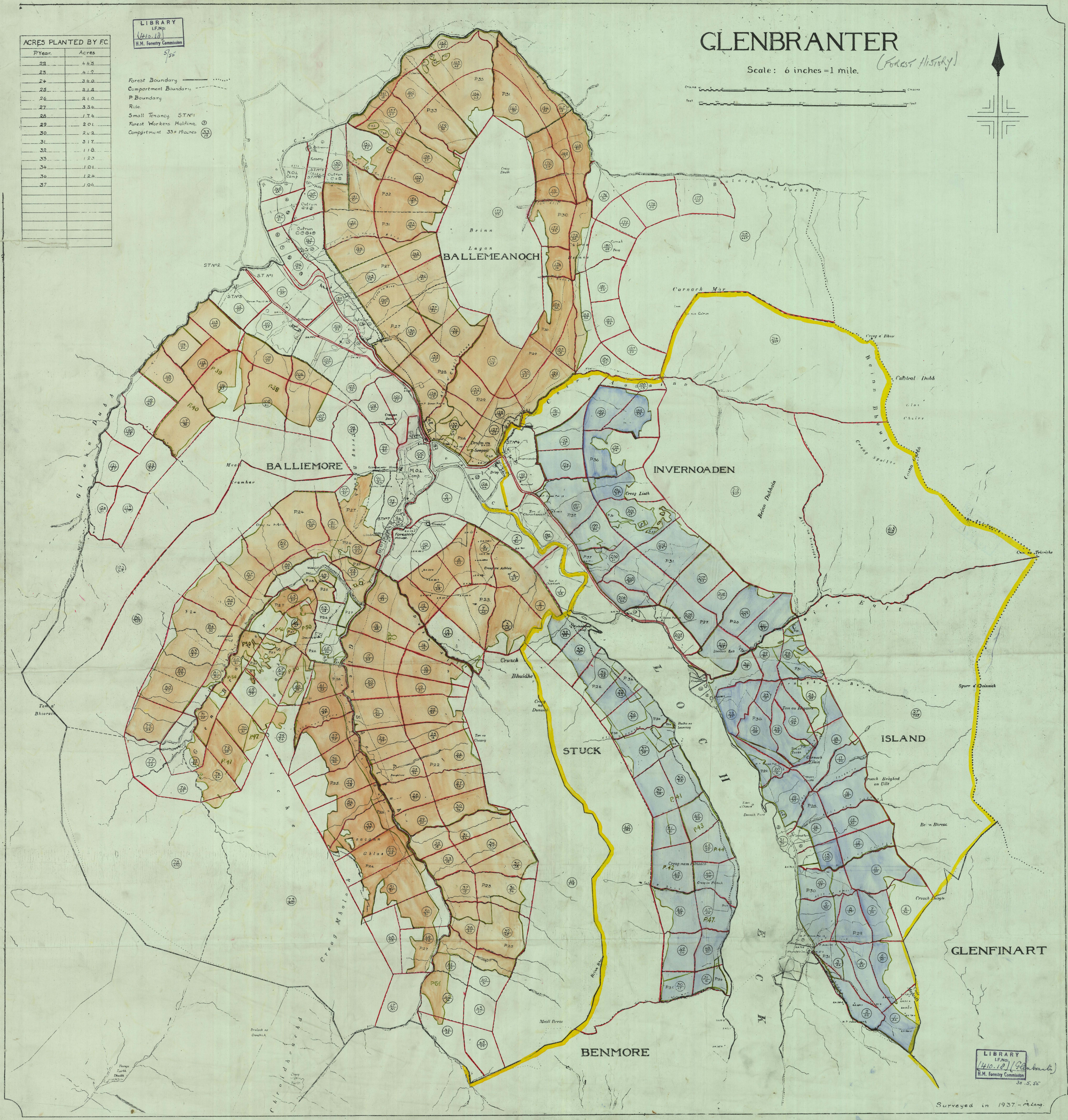
Farms on the forest are factored by the Estate Branch.

The mechanical side of the Engineering Branch has one of its main repair depots in the camp buildings at this forest.

Since 1947, the forest has been extensively roaded and there are now approximately 9 miles of road serving the plantations.

The nursery was wholly laid down to permanent grass in 1949 and is now let to a neighbouring holder. It was principally used for lining out only and was described in reports as "not impressive".

Glenbranter



ACRES PLANTED BY F.C.	
P. Year.	Acres
22	445
23	419
24	340
25	215
26	210
27	334
28	174
29	201
30	262
31	317
32	118
33	123
34	101
36	124
37	106