

FORESTRY COMMISSION

HISTORY

of

FOREST OF DEER

1926 - 1951

EAST (SCOTLAND) CONSERVANCY

History of Forest of Bear

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HISTORY of THE FOREST OF DEER

CHAIRMAN'S COMMENTS

There was some opposition in the Commission to the acquisition of Lenabo, notably by Colonel Pethringham, who from his own knowledge of the country thought trees would not grow there. As he put it the Buchan country grows the biggest men and the smallest trees in Scotland. It is certain that with our then experience we were taking risks, and it is satisfactory to know that the results are proving reasonably satisfactory.

My first recollection of the silviculture of the forest is the high degree of butt rot reported in semi-mature white spruce at Pitfour. The old beech on better soil had grown reasonably well. In the 30-year-old Norway spruce/Scots pine acquired plantations, the Norway spruce were much the better but we were ignorant at the time of the value of mixed pine/spruce under certain conditions. There was some good Sitka spruce of perhaps 35 years of age near the lodge-gates of a small private house in the neighbourhood (according to note on inspection of Sept. 17th, 1931 "Mr. Russell's house near Mintlaw" - age placed at about 37 years). There was nothing near Lenabo to serve as a guide.

I have only two remarks to make about the new plantations:

(1) The extensive use of pure Scots pine, which I felt from the beginning was a great mistake.

(2) My doubt whether Japanese larch was going to succeed on the exposed parts of Lenabo. Certainly in the first few years the growth of the trees was unpleasing. Apparently there has been continued improvement such as is common with Japanese larch as it builds up shelter and receives proper thinning treatment.

The future may hold a considerable risk of butt-rot for the spruces especially on former plough-land.

(initialled) R.

11.5.51.

DIRECTOR'S COMMENTS

The plantation of Picea omorika at Lenabe is interesting and some data about growth and volume etc. would be a useful addition. I doubt if anywhere is there an example as at White Cow of such bad effect of exposure on Scots pine. Many of the trees adopted a prostrate form intertwining with the heather.

(Intd) H.C.B.P.

2/5/51

COMMENTS BY STATE FOREST OFFICER

Mr. Horne has written an account which shows his sound appreciation of silvicultural problems at Forest of Deer.

He has not stressed sufficiently the marked incidence of late and early frost in this part of Buehan. Frost has been recorded in every month of the year with severe frosts in June.

The lessons at Deer are clear and establishment problems under these conditions are now understood. The great superiority, against exposure, of Sitka spruce and Scots pine is a factor we can use at higher elevations, and the differing resistance to blast of races of Scots pine is obviously of importance where we have to plant this species in exposure. There is encouragement too for our belief that Japanese larch will not only start well on bad surface conditions but will also stand a considerable amount of exposure. More evidence is here against intimate mixtures of Sitka spruce/Scots pine and Sitka spruce/Japanese larch on difficult ground, and this method of mixing is fast giving way to band mixing.

Formerly there were hardwoods on Pitfour and in particular, beech grew well and was of a high quality in spite of severe exposure. It is unfortunate that more hardwoods were not planted where soil conditions were suitable.

(Sgd.) T. H. WOOLRIDGE

State Forest Officer.

HISTORY OF FOREST OF DEER

GENERAL DESCRIPTION OF THE FOREST

Situation

The forest consists of two main areas - Pitfour and Lenabe - to which has been added recently an area of 48 acres in Rora Pass.

All lie in that part of Aberdeenshire known as Buchan. The forest constitutes the only large areas of woodland in a wide and singularly bleak agricultural district.

Area statement:

The following table gives the present land utilization as at 30.9.50.

Under Plantations

Acquired	...	...	58	acres
Planted by F.C.	...	...	1997	"
<u>Total Woodland</u>	...	...	2055	"
Bare Plantable	...	...	49	"
			2104	"
Total - Woodland and Potential Woodlands	...	...	2104	acres

Unplantable

Agricultural

D.O.A.S. management	...	138	
F.C.	...	16	174 acres
<u>Other</u>	Houses etc.		14 "
		<u>Total</u>	2292 acres

Previous Utilization

Pitfour. Before this area was acquired by the Forestry Commission in 1926, the greater part of it had been under a timber crop. It was largely felled before acquisition and the area under timber at the time of acquisition, 191 acres, has been reduced during the tenure of the Forestry Commission chiefly during the last war, to 58 acres.

The woods at the time of acquisition varied in age from 52 years to 2 years and consisted mainly of Norway spruce and Scots pine with some inferior European larch and some white spruce.

Lenabo. This area originally consisted of several farms but had been taken over by the Admiralty to be used as an airship station during the 1914-18 war.

The pulling down of fences and the erection of hangers etc. rendered most of the land unsuitable for agriculture and it was acquired by the Forestry Commission in 1926.

Physiography

The elevation varies from 160 ft. to 466 ft. above sea level.

Pitfour

The surface is undulating and rises in knolls of varying height but nowhere is the gradient severe, except in very small patches. All aspects are represented, but the general aspect is easterly.

Lenabo. The main part of the area is rather flat with a gentle rise to the south east. All aspects are present but the aspect generally is north to north-westerly.

Geology and Soils

Pitfour. The underlying rock over almost all the area is quartzite. There is one small area of granite at Brunkia.

Most of the area is mantled with glacial drift derived mainly from the local rocks.

The derived soils are undeveloped. Typically there is up to 6 in. peat on 6 in. - 12 in. stony, gritty, slightly leached clay loam or loam, on an indurated stony clay-loam. On the Race Course there are areas of deeper peat, up to 12 in. to 15 in. and also areas of podsol with a soft iron pan at a depth of 4 in. to 12 in.

Lenabo. The underlying rock over almost the whole area is granite. There is a small area of quartzite at the south boundary. The area is mantled with glacial deposits. Most of the area has been cultivated with the result that the superficial layer has been disturbed. There is typically 6 in. of black loam on 2 in. rusty brown loam on a greenish and fairly stony boulder clay. On the south margin there are small areas of peat, up to 12 in. on a stony and slightly leached loam.

Meteorology

Rainfall. The annual rainfall varies from 30 in. to 35 in.

Temperatures: The summers are cool and the winters are not generally severe. Late and early frosts have done considerable damage in some years to Norway and Sitka spruces, and the larches.

Winds: The principal adverse climatic factor is the cold, salt-laden winds from the east and north-east experienced during the winter and spring. These cause browning and defoliation of Scots pine and Norway spruce particularly, Sitka spruce being resistant.

The prevailing winds are south-westerly and they also cause deformation on plantation margins, particularly at Pitfour.

Roads: Roadmaking has been in progress in the forest for the last two years. All work has been carried out by the local squad under the Forester's supervision. A road plan has been prepared. The road system is scheduled to be completed in F.Y. 53, except for roads serving very recently planted areas.

The following are the particulars:-

<u>Section</u>	<u>Existing Roads</u> Chains	<u>Proposed Roads</u> Chains	<u>Total</u> Chains
Pitfour	445	817	1262
Lenabo	275	267	542
Rora	26	26	52
Totals:	746	1110	1856

The area to be served is 2104 acres. This gives one mile of road for 90 acres of woodland.

SILVICULTURE

Planting of Scots pine

In the early years of the Forest of Deer, large acres of the White Cow Wood were planted with Scots pine. There was ample evidence in the district to show that the locality was not suited to the growing of this species. The area is subjected to very cold winds from the north, north east and north west during winter and early spring. On the evidence available, it was a mistake to have planted Scots pine on such a scale.

The result has been the almost complete failure in P.27, P.28 and P.29, and has resulted elsewhere in stunted, mis-shapen and poorly stocked areas with little economic future.

In 1927, no doubt the blast resistant qualities of Sitka spruce were not fully appreciated. The provision of a belt of Scots pine on the margins of Sitka spruce stands, indicates that it was thought that the pine would afford shelter for the exotic species. The reverse has happened.

Browning of the needles in the pine, took place very shortly after planting. The unsuitability of the species must have been appreciated soon after 1930 for the predominating species thereafter is spruce.

The winds causing the damage would generally blow at cold, dry seasons mainly in the early spring. They have been described as salt-laden, but whether this has any bearing on their effect, is open to doubt. Scots pine is to be found in Buchan at places nearer the sea growing much better than the stands of this species in Deer Forest.

In any event, where even a little shelter is afforded by the Sitka spruce the pines show reasonably good growth. In some places, trees 7-8 ft. high and 20 years old have recently produced very vigorous annual growths of up to 15 in. with long well developed needles of a fine healthy colour.

In Compartment 10 there is an area which is very clearly defined, where there is a marked difference in growth. A thinly stocked Scots pine area of extremely stunted trees gives way abruptly to a fairly well stocked area of trees of reasonably good form with a top height of about 25 ft.

Records show that two lots were planted here:-

Id. 23/101

Deeside

Id. 23/105

Lower Morayshire

It is unfortunate that there is no record today to show which trees are of Deeside origin and which are of Morayshire origin. It is presumed that the better trees are of Morayshire origin. Unless examination of specimens can settle the matter, all that can be said is that this is "probable".

It would seem then that, as Scots pine will undoubtedly grow to maturity in Buchan, albeit producing poor specimens of their kind, we have planted them where the general adverse factor of the locality is extreme. We have also, it is thought, been unfortunate in the race of pine which has been used.

It would be of some interest to know if deep ploughing would have made a difference. It might well be that the plough "doing good wherever it goes" would have so improved one factor as to have mitigated the effects of an adverse factor. Such an experiment at Deer would be of academic interest only. We should not strive to grow pine where we know that the two spruces and Japanese larch will flourish.

Introduction of Sitka spruce to the worst Scots pine areas.

Sitka spruce were introduced in the worst pine areas in F.Y.36, F.Y.43 and F.Y.47.

Those introduced in F.Y.36 have had the desired effect. They are themselves doing very well and the Scots pine which was formerly stunted is beginning to grow satisfactorily. The F.Y.43 planting has had a period of check and possible frost damage, but generally it has come away with very good growth in F.Y.49 and 50. The best of these are now up to 7 ft. in height. It was thought that in the parts where blasting was most severe and where the original stocking of pine was sparse, that the F.Y.43 introduction at approximately 10 ft. x 10 ft. would only give a widely spaced heavy branched crop of Sitka spruce among a scattering of poor stunted Scots pine. It was therefore decided to fill up the area with Sitka spruce to bring the crop up to normal stocking. No cutting back of Scots pine was done to achieve this.

The F.Y.47 lot are small for their age. From all accounts this is normal for White Cow Wood. In the first few years the Sitka spruce suffer from check and frost and form dense little bushes. Later they come away with particularly vigorous annual growths.

Checking of spruces. The checking of Norway spruce and Sitka spruce in Pitfour, seems to have been governed by the time which was allowed to elapse between felling and replanting. Heather re-invades very quickly and vigorously. Evidence of this is to be seen in P.46 and P.47, Compartments 1, 2 and 3. The previous crop was felled in 1940 and 1941 and was replanted in P.Y.46 and 47. By that time heather must have re-established itself to some extent, for over quite large areas a Sitka spruce/Scots pine mixture was used. The pine is having the same experience as its neighbours over the fence in P.27, while, though a few Sitka spruce have got away, the general impression is that a yellow tinge is appearing and the spruce may be in for a prolonged period of check. In a small patch of Pinus contorta/Sitka spruce mixture the Pinus contorta are growing well, unaffected by the blast. Ploughing would have been impossible here on account of stumps. Similar areas today would be burned and ploughed with the stump plough, and planted with pure Sitka spruce and ^a/Sitka spruce/Japanese larch band mixture. The suggested treatment for this area is the introduction of two lines of Japanese larch on big screes in place of the Scots pine. A dressing of ground mineral phosphate would help them along in their mission.

Forest of Deer is not an area where there are large checked areas of spruce requiring drastic treatment. Generally, ploughing was not possible at the time, nor was it necessary. It is, thus, not surprising to find that there were occasional areas which called for ploughing which were "notched" with Sitka spruce and which are today in complete check. Such areas do not total more than 20 acres and they will be recommended for ploughing and replanting with Japanese larch or Pinus contorta.

Frost Damage to spruce. Early frosts have caused damage in some parts of both Lenabo and Pitfour. The most noteworthy example of prolonged frost damage to Sitka spruce is to be seen in Compartment 65 P.35 (Lenabo). In extreme cases the "trees" are only 2 or 3 ft. high and are now dense little bushes. Here and there, however, a tree has managed in recent years to put up a "spire" and the situation is not hopeless. The good growth of surrounding Sitka spruce and the presence of the old railway embankment serves to accentuate the frost hollow. It is thought that Norway spruce would have fared little better, but it is a pity that the Picea omorika

which is planted nearby was not planted in this exceptionally frosty place. Though no action is contemplated in these frosted areas, the introduction of a few Picea canadica would be of some interest.

Though there are cases of frost damage to Norway spruce, Sitka spruce has suffered most. At Pitfour in P.35 and P.36 (Louden Wood) there are areas of Sitka spruce which have been cut back badly. They continue to struggle on and will eventually form canopy, but it will be a slow process. One of the effects of frost damage in early years, has been to delay the development of the spruces so long that heather has been able to re-invade vigorously and is now causing check.

Frost at Pitfour is not materially affecting the development of the forest.

At Lenabo in the early days, the wisdom of acquiring this low spruce ground on account of its proneness to frost, was questioned. Frost damage we certainly have had, but the area badly affected is small and even there, the position is not hopeless.

Generally speaking, Lenabo is a most pleasing little forest and will presently become a very productive one.

The fears mentioned above have proved quite unjustified.

Choice of Species. After the initial misfortune with Scots pine little fault can be found with the selection of species. The greater part of the forest was established before tractor drawn forest ploughs were in general use and before the disc plough had been thought of. Some of the slower areas on Pitfour would be ploughed today. Nevertheless, both spruces have, as has been indicated earlier, come on well with simple netching in many cases and elsewhere on mounds. Most of the Norway spruce appears to have been planted on mounds.

Some ploughing was done in P.27 and P.28 at Lenabo. A horse drawn agricultural plough was used on the flat grassy areas and it is interesting to note today, that these shallow furrows still persist. This is to be seen particularly in Picea canadica stands.

The use of Japanese larch on ploughing on good, moist, old arable ground is criticised. Although there is a good proportion of well shaped stems, there are very many coarse, corkscrew specimens.

The cutting out of holes and the introduction of Norway spruce in groups is worth considering at this stage.

In P.32 the only large scale mixture was tried. This was the planting of Japanese larch and Sitka spruce in alternate rows. The mixture was not a success. In some cases Japanese larch took the lead and eclipsed the Sitka spruce. The result was that ^{the} Japanese larch was heavily branched and the stems tapered quickly. Elsewhere the Sitka spruce was dominant. It is difficult to know why the mixture was used. Either species would have done well enough. The coarse Japanese larch were removed in F.Y.49, made into stobs and sold locally at a considerable profit.

The lesson to be learned here, is that, where Japanese larch is used as a pioneer crop (it was not necessary here), it must be planted in bands of three or more lines, if it is to do its job properly and if we are to get as part of the final crop, a proportion of Japanese larch stems of good form.

The use of Japanese larch in exposed places at a time when the species was popularly regarded as a non-hardy one, has been rewarded with success.

On the higher ground at Lenabe where the soil is poorer and where the exposure has become relatively severe, there are in Compartments 65, 70 and 83, P.30 some fine stands of Japanese larch. At White Cow Wood Compartment 17 P.29 where the exposure is probably more severe than anywhere in the forest and where Scots pine have been singularly unsuccessful it is interesting and encouraging to find a stand of Japanese larch affected in no marked degree by the adverse conditions.

The use of Corsican pine has been justified where it has been planted on drier situations. On these it has done well and has withstood the blast much better than Scots pine. The choice of ground has not been good in some cases. In P.31 Compartment 21 it was planted on a flat peat site. The ground slopes quite abruptly to the old race track and along this drier rim, the stocking and growth are good. On the flat part which is now sour, they have been a failure. Records show that they have been beaten up repeatedly. This part is not yet established. Draining and planting with Japanese larch on mounds is to be carried out this Forest Year.

European larch has not been used much and where it has been used it

has not been a success. One area planted in P.39 Compartments 57 and 58 is, however, worthy of a note.

Apart from the aspect which is southerly, the situation was considered suitable for European larch. The slope is moderately steep and the soil is a deep, fairly moist well drained sandy loam. Previously, the area carried a crop of hardwoods mainly beech and sycamore. At the time of planting the ground was covered with bracken.

In 1947 the heavy crop of cones was produced which was eagerly collected. At the time the larch showed no signs of die-back or canker in spite of the aspect.

However, in the summer of 1948 die-back was evident here and there over the whole area and there was a severe aphis attack. Since then die-back has not been common. Though there are many cankered stems, it is thought that the area will not fall a victim to wholesale die-back.

The seed came from Merayshire, Id. No.35/143 (Letham).

The following particulars from a sample plot near the foot of the slope give an idea of the exceptional growth:-

European larch (P.39) - Sanlinbrae - Details from 1/10th acre Plot.

Trees per 1/10th acre	...	...	109
Average Quarter Girth at Breast Height	...	...	3½

Sample Trees (Q.G. 3½)

Total Height	...	...	25 ft.	25 ft.	22 ft.
Height to 2½ in. diameter	...	14 ft.	14 ft.	13 ft.	
Average timber volume in plot	...	...	...	112.5 cu.ft.	
Number of stems showing canker	...	...	...	27	
Number of stems split	...	...	...	5	

Cankered stems fall mainly in the 2 in. to 3 in. quarter girth class, while the split stems lie between 3½ in. to 4½ in. quarter girth class.

Only two stems showed both splitting and canker, one having a quarter girth of 2½ in. and the other 3½ in.

The splits appear to have occurred in F.L.47 and are not yet completely concluded.

Planting

(a) Annual rate of planting

<u>F. Year</u>	<u>Afferested</u>	<u>Re-afforested</u>
27	175	16
28	185	20
29	223	26
30	94	94
31	62	111
32	56	94
33	95	74
34	60	98
35	106	90
36	-	66
37	-	51
38	-	57
39	-	15
42	-	25
44	-	35
45	-	35
46	-	24
47	51	24
50	-	

(b) Spacing

The spacing adopted was :-

Norway spruce	5 ft. x 5 ft.
Sitka spruce	5½ ft. x 5½ ft.
Pines	5 ft. x 5 ft.
Larch	6 ft. x 6 ft.

Extract from Thinning Plan

Thinning: Pitfour and Lenabe areas have been divided, each into a series of three annual thinning areas, and a Thinning Plan has been in use since 1950.

The following particulars are taken from the summary of the Thinning Plan. From F.Y. 53 onwards the area to be thinned annually will increase substantially.

<u>Forest Year</u>	<u>Thinning</u>	<u>Area</u>
51	Pre.	25
	1st	27
	2nd etc.	21
	Total	65
52	Pre.	7
	1st	41
	2nd etc.	19
	Total	67
53	Pre.	124
	1st	54
	2nd etc.	120
	Total	298

HISTORY OF FOREST OF DEER

APPENDIX I

Summary of Reports on Visits by Senior Technical Officers

1st September, 1928

Present:- Sir John Stirling Maxwell
Mr. J. F. Annand
Mr. E. Cowell-Smith
Mr. A. Ross

The Pitfour section of the Forest was visited first, the P.27 and P.28 areas in White Cow Wood being examined. The party walked through the two plantations from one end to the other, a very heavy rainstorm preventing a more detailed examination. Sir John commented that the planting on this area was somewhat uneven and considered that in some cases the trees had been planted rather too deeply. Though at present there was little sign of growth in the spruce, most of the plants were holding.

A visit was made to Mr. Bisset's Sawmill. Mr. Bisset was converting the previous crop grown on Pitfour, and Sir John questioned him on what timber he considered was the best and was the most marketable of the old crop. Mr. Bisset was strongly in favour of the Norway spruce, which was generally sound and produced good timber for fish barrels, boxes for dry goods etc. The slow growing white spruce was also very useful for barrel staves, but the majority of that felled was unsound. The larch on the area was not good, but the Scots Pine had yielded good boards, though most of it was rough and full of knots. Sir John discussed the feasibility of early pruning of selected Scots pine trees in the future crop in order to produce clean timber.

At Lenabo, Sir John inspected the planting which had been done on plough-furrows. An examination was made of an area planted alternately with spruce transplants and selected 2 year seedlings, and it was decided that there was little difference in condition and appearance between them. With the exception of the spruce in a low-lying part which had been killed right back by a frost in July, it was considered that the condition of the plants in P.28 was satisfactory. After walking through the area planted in P.26, Sir John was considerably impressed by the healthy look of the

plants, especially the Sitka spruce.

Mr. Annand here gave the reasons for the adoption of the method of planting followed at Lenabo:- Every year there was a very heavy growth of grasses and weeds on this old agricultural ground, and it was principally to avoid the difficulties and heavy costs of weeding that the trees were planted between a double furrow. So far, no weeding for the first year had been necessary, and any second year weeding was rendered much easier, as the plants could be quickly found by following up the furrows. Sir John was of the opinion that the results so far attained, had fully justified the method.

Mr. Annand also emphasised the necessity, on such open and windswept ground, of broad hardwood shelter belts. These should not only be planted round the boundaries of the compartments, but also in belts through them, to stiffen the main crop which would mainly be spruce. The best shelter trees for this area were beech and sycamore, but ash could also be planted in some of the best ground if the ground game were kept under control.

Remarks:-

It is interesting to note the method of planting spruce on moist grassy areas. Such areas would, today, be planted on the wide slice provided by the Solotrac plough. With a slice of about 24 in. and a furrow of 24 in. and the quick growth to be expected on such ground, no weeding would now be required. It is thought that grass would have come up strongly between the two furrows and it is surprising that no weeding was necessary the first year.

The use of seedlings on such ground is also of interest and is now common practice on suitable areas, similar to the one in question. We are today at an advantage in that we have the wider complete slice.

No mention is made at this stage of blasting of Scots pine at White Cow Wood. At that time they would still be sheltered by heather.

Ash has not done well, but the beech and sycamore used on the borders of plantations will one day provide excellent shelter.

17th September, 1929

Present: Colonel Stuart Fotheringham
Mr. R. L. Robinson
Mr. J. F. Annand
Mr. R. Cowell-Smith
Mr. A. Ross

White Cow Wood, Pitfour, was first visited and an inspection made of P.27, P.28 and a 30 year old plantation which was taken over when the estate was purchased by the Forestry Commission. Some two years planted out Norway and Sitka spruce were first examined; these were all of good colour and for the most part starting normal healthy growth. It was noticed that the beech planted along the rides had been killed right back, partly by a frost the previous month (August). These plants were partly replacements of beech planted in F.Y.27 which had suffered the same way but which were now mostly re-starting growth from the base of the stem. Mr. Robinson strongly emphasised the necessity for some quick growing species, such as willow or broom, to bring away the beech. Mr. Annand concurred with this and suggested Japanese larch also as a suitable tree. It was arranged that experiments should be made to find the most suitable method of bringing away the beech. A large group of Scots pine on the higher ground was examined, and Mr. Robinson asked the District Officer in charge why this species was planted in preference to Sitka spruce, and gave it as his opinion that the latter was likely to be more successful on this ground. The Divisional Officer, who said that it was on his instructions that the Scots pine was used on the gravelly knoll referred to, rather demurred from this view, and pointed out that good Scots pine had been grown on similar ground in Loudon Wood, now being cut by the timber merchants. This view was rather supported by Colonel Fotheringham, who mentioned that the crop of Scots pine and larch previously on White Cow was considered to be the best in the neighbourhood. After further discussion, however, it was agreed that a certain amount of spruce should be introduced into this pine group, and Mr. Robinson directed that Sitka spruce to the extent of 500 per acre should be used on this knoll.

The thirty year old plantation of mixed Scots and Norway was afterwards inspected, and it was noted that the spruce had almost everywhere outgrown and suppressed the pine. Mr. Annand, however, pointed out that

it had been stated that the Scots were grown from low quality French seed, and Mr. Cowell-Smith said that examination showed that the pine trees had been badly damaged shortly after planting. While it was the intention to plant spruces, especially Sitka spruce, at Deer as much as possible, it was thought advisable from a silvicultural point of view to introduce hardwoods and other coniferous species into the crop to make the stand more windfirm and to have a certain amount of mixture, and it was largely with these objects in view that groups of Scots pine had been used on the hard gravelly knolls.

Lenabe was visited and an inspection of the planted area made, starting with P.27. The Commissioners were very satisfied with the growth made by the Sitka spruce planted on plough furrows, and the Norway and Serbian spruce were also growing satisfactorily. Mr. Robinson suggested that when beating up, a sod on the furrow should be turned in order to save weeding to some extent. This was specially noted by the District Officer for adoption when beating up. A large wet hollow turf-planted in P.29 was next looked at, and Mr. Robinson emphasised the advantages of making shallow side drains in every case for taking out the turves.

Remarks:-

We have here the first mention of damage to Scots pine in the White Cow Wood and the first recommendation by the present Chairman that Sitka spruce be introduced. In spite of strong arguments in defence of the pine by Mr. Annand and Colonel Fotheringham, one notes that it was decided that 500 Sitka spruce per acre be introduced.

That the previous crop of Scots pine and larch on White Cow Wood were "the best in the neighbourhood" was small praise indeed and the Chairman was not, we imagine, impressed.

17th September, 1931.

Present: Sir Roy Robinson
Colonel Stuart Fotheringham
Mr. J. F. Annand
Mr. D. H. Bird
Mr. Douglas Murray
Mr. A. Ross.

Pitfour

The elder mixed plantations of spruce and Scots pine in White Cow Wood

were examined and it was recognised that the Scots pine were now of no value and were rapidly being killed out by the spruce. It was noticed that some of the spruce were dying out for no apparent reason, and the Technical Commissioner wished to have some of these trees marked in order that their future behaviour might be noted.

Some of the Sitka spruce in the south west corner of P.27 were badly frosted, but very few of the trees were actually dead. The Sitka spruce on the higher ground were seen to be making ^{very} good progress and the Norway spruce, although not so big as the Sitka, were not getting well away.

Lenaho

The P.27 plantations of Sitka spruce, Serbian spruce and Norway spruce were inspected. This was the first turfing on a large scale that was done in the Division, and the trees were getting away very well. The Sitka spruce were the most advanced - one Sitka spruce measured 7 ft. 10 in. high. A small experimental plot in P.28 plantations of mixed seedlings and transplants of Sitka spruce were then examined. The arrangement had been alternate seedlings and transplants close planted in the lines and no difference could be detected in the growth. It was impossible to tell which were seedlings and which transplants, and the Technical Commissioner said that, in future, where both seedlings and transplants were used, they were to be planted in separate blocks. Small blocks of Sitka seedlings were afterwards seen in P.30. These were seen to be starting away well, and compared very favourably with transplants alongside. The Technical Commissioner gave instructions that where the spruce had been killed out in the frosty hollows some of the close planted spruce could be lifted on their turfs and used for beating up.

The even growth of P.28 Sitka spruce on the higher ground was considered excellent. The P.29 plantations were also gone through and here again the Sitka spruce were looking very well. Some of this area was not ploughed, and there was a noticeable falling off in the growth of the trees on the unploughed area. The Technical Commissioner thought that very little weeding was really necessary, and suggested that a few plots should be marked out in the P.30 area and left unweeded to test the power of the Sitka to overcome the weed growth.

Remarks:-

The information gained from this report is the highly satisfactory behaviour of the spruce plantations at Lenabe, apart from the frost-damaged parts.

The use of seedlings is again mentioned; they appear to have been a most successful venture on this type of ground.

The necessity of mounding or, preferably, ploughing to reduce competition from grass is shown by the remark on the poorer growth on the unploughed areas at Lenabe. Although these areas are no doubt now well established, they would have been slow to become established and weeding was no doubt a heavy charge per acre for several years.

Visit by Mr. G. J. Sangar - May 1911.

Mr. Sangar comments in an introductory paragraph as follows:-

This forest includes 204 acres of acquired plantations, chiefly Norway spruce/Scots pine mixture, in which thinning and pruning have been started. The plantable land falls into three main blocks for descriptive purposes, i.e. the old aerodrome at Lenabe, the old racecourse and felled plantations at Pitfour. Planting started at Lenabe and on felled ground at Pitfour in P.27 and on the racecourse in P.30. Just over 1100 acres were planted to P.32 inclusive. The 600 acres or so at Lenabe, was not inspected in detail, it is mainly spruces, ploughed or turfed; growth is remarkably good. The racecourse is a difficult subject and the plantations (P.30 and 31) are still doubtful. Felled ground at Pitfour is generally fully stocked apart from grass and frost damage, especially in unturfed Sitka spruce; from local evidence and present appearance the future of the Scots pine appears doubtful; a small area has been interplanted with beech.

He then deals in detail with the various P.Years. His remarks are of particular interest as they give heights at the time of inspection. The following is a summary of his notes:-

P.27. Scots pine fully stocked and 5 ft. high but badly browned and defoliated. Future very doubtful.

Sitka spruce poorly stocked in the grass areas due to neglect in

beating up. (The effect of this poor stocking is apparent in Compartments 7 and 9 today, one result has been a high proportion of wolf trees which were largely removed in thinnings F.Y. 51.)

Sitka spruce elsewhere was noted as being very good - Pitfour 4 ft. to 6 ft. in height, Lenabo 5 ft. to 8 ft. in height.

Picea canadica was 4 ft. high at the time of inspection and was considered most satisfactory.

P. 28 and 29.

Japanese larch on Calluna are 90% stocked and 3 ft. high.

European larch not good.

Sitka spruce stocking sufficient and 3 ft. to 6 ft. in height but here and there frost-killed (Pitfour).

Norway spruce are coming out of check even on pure Calluna, and 18 in. high on Calluna/Aira.

Scots pine stocking satisfactory - height 18 in. to 36 in. but much defoliated.

Notes:- The frost-killed areas of Sitka spruce at Pitfour, though now established, are behind the other areas. It is evident that Mr. Sangar refers to the Sitka spruce in Compartments 12 and 13, which were not at the stage to be included in the areas in the pale stage noted elsewhere in this account.

P. 30. Sitka spruce and Japanese larch were fully stocked. Sitka spruce were 2 ft. 6 in. high and Japanese larch 4 ft. high.

On the old racecourse Sitka spruce on ploughed ground was good but Sitka on swarded Calluna was in check.

P. 31. Sitka spruce was the main species planted on the racecourse. In 1933 this same area was heavily beaten up with Sitka on turves. The stand is somewhat uneven today but the spruce is growing well. Corsican pine in Calluna on broken quartzite is not very satisfactory.

The following remarks were recorded by Dr. H. M. Steven at the request of the Assistant Commissioner Scotland, after Mr. Sangar's visit:-

- (a) The Scots pine P. 27 appears to be suffering from exposure in an increasing degree. Some shoots are dying back without a pathological

cause, and this appears due to the blast.

- (b) The Sitka spruce over most of the Lenabo area is good, and recovering well from green spruce aphid.

10th October, 1935.

Present:- Mr. J. M. Murray
Dr. H. M. Steven
Mr. A. Watt
Mr. A. Ross

Mr. Murray recommended the interplanting of the White Cow Wood Scots pine with Sitka spruce at the rate of 1000 per acre, but agreed that it could be left for a year or so.

He commented favourably on the continued good growth of Sitka spruce and Norway spruce at the White Cow Wood and at Lenabo.

He was emphatic that rabbits must be kept down.

17th September, 1937.

Present:- Sir Roy Robinson
Mr. J. M. Murray
Dr. H. M. Steven
Mr. A. Watt
Mr. A. Ross

Acquired woodlands (P.98 - 99) in Compartments 1, 2 and 3 were inspected. These consisted of a mixture of Scots pine and Norway spruce. The Chairman's impression was that they were not looking so well as on his last visit. The Scots pine had practically all disappeared. The height of trees was estimated at 40 ft.

P.27 and 28 - Sitka spruce, Scots pine and Norway spruce were inspected. The Chairman remarked that there was no one-sidedness or blasting in the Sitka spruce and stated his opinion that it would only be a matter of time before the crop got away.

The District Officer said that this was the first growing season free from frost since he took over. He also remarked upon the improvement in the Sitka spruce adjoining the Scots pine. The Chairman said that apart from the shelter afforded, Scots pine helped the Sitka spruce under the soil. The Assistant Commissioner thought pine and spruce a good mixture under these conditions.

On the top of the ridge, serious defoliation of pine was noted, but it was not as bad as the Chairman expected. Discussion of the future

treatment again took place. The Chairman wanted Sitka spruce put in right away. The Divisional Officer thought that the Scots pine should be left until pitwood size and then to introduce Sitka spruce after a heavy thinning.

An area of one acre where Sitka spruce had been introduced in F.Y. 32 was proving a success.

At the recesses P.30 and 31, P.30 and P.32 were inspected. In P.30 Scots pine were seen to be better than the acquired Scots pine in the White Oak (the position is less exposed here). In P.32 a few Corsican pine throughout the stand were seen to be much better than the Scots pine and had not suffered from blast to the same extent.

This area was felled during the war, a small area of Corsican pine was planted in F.Y. 45 and 46 and is doing very well.

The slowness of Sitka spruce in P.30 and 31 was noted.

Islands

The Chairman pointed out the value of Picea mariana for use in a frosty place. It was said to be more frost hardy than Norway spruce and still more so than Sitka spruce. A frost hollow in Compartment 61, P.28 had a full crop on the ground and it was thought that 2 or 3 years in succession free from frost would let it crop.

Though this area has had a difficult time, it is now coming along well. I doubt if we had successive years free from frost but we appear to have had the occasional year from time to time which had permitted the crop to get above the frost level.

Several Aphis attacks were said to be responsible for the poor colour of the Sitka in P.28, 29 and 30.

The Chairman came out strongly against the use of Scots pine in P.29 on ground which would have grown spruce.

The Divisional Officer remarked upon an improvement in the Japanese larch in P.29. This is now one of the best stands of the specimen in the forest.

Seedling trial areas in P.31 and 33 had suffered through frost and drought. This is early evidence of how much we are at the mercy of the weather when we use seedlings for planting.

11th October, 1941

Present: Sir Roy Robinson
Mr. A. H. Gosling
Mr. L. A. Newton
Mr. I. Gillespie
Mr. J. B. Thew

The main object of this visit was to decide how best to deal with the blasted Scots pine areas. The beneficial effect of the Sitka spruce introduced in Compartment 10 in P.Y.32 was recognised. The Sitka spruce were themselves doing well and the Chairman remarked upon the improvement in the few surviving Scots pine and European larch.

The Assistant Commissioner remarked upon the superior pruning effect of pine against spruce as compared with spruce against spruce. Both the Chairman and the Assistant Commissioner were in complete agreement that beating up with Sitka spruce was the key to the problem and it was decided that the worst areas should be beaten up with Sitka spruce to the extent of 700 to 800 per acre.

Lenaho. Though noting some frost damage to Picea canadensis, the Chairman said that it was the most frost hardy of the three spruces. He objects strongly to the use of Scots pine in Compartment 62, but said that in spite of the peaty nature of the lower frosty parts, we would have done well to have mixed Scots pine with the Sitka spruce.

The Chairman also said that the Japanese larch at Lenaho had done better than he anticipated.

25th July, 1946

Present: Mr. A. H. Gosling
Mr. James MacDonald
Mr. H. Beresford Peirce
Mr. I. Gillespie
Mr. J. B. Thew

The Director expressed surprise at the choice of Norway spruce in P.46, but was assured by the District Officer, that in comparable situations in Compartments 5 and 7 it was thriving and had not been affected by the blast.

He also strongly criticised the use of the Sitka spruce/Scots pine mixture on the more grassy areas and stressed the need for flexibility in these mixtures.

The Director was well satisfied with the treatment agreed at his visit with the Chairman in 1941 for the fully blasted areas. The treatment of the intermediate types was a more difficult problem. The replacement of random blanks which had been done, would lead nowhere.

He finally prescribed two methods of treatment on an experimental scale (1 acre each) as follows:-

1. Removal of every second line of the existing crop and replacement with Sitka spruce at 5 ft. spacing.
2. Brashing of lanes every 10 ft. in the existing crop to permit interlining of Sitka spruce at 5 ft. spacing.

At Lenabo the Director was against any beating up of patches of severe frost check.

14th August, 1946.

Present: Sir Roy Robinson
Mr. Beresford Peirce
Mr. I. Gillespie
Mr. J. E. Thor

The Chairman was well pleased with the good growth of the early introduction of Sitka spruce into the poor Scots pine which had been done on his instructions. The pine had benefited greatly.

He was very much against any drastic cutting out of the Scots pine in Compartment 13 where Sitka spruce had been introduced in F.Y.43. Some relief to the spruce might be necessary, but he considered the treatment had been too severe.

With regard to the cutting out of alternate rows and the introduction of Sitka spruce at 5 ft. spacing, in the intermediate types of Scots pine he thought that the treatment would not make a successful wood nor would it be economically justified. He was inclined to favour leaving the rest of the untreated Scots pine till it could be utilised.

At Lenabo, it was with a feeling of optimism that the frost checked areas were viewed.

The Chairman did not think that any more filling up of frost hollows was justified.

In general the Chairman thought Lenabo was developing into a satisfactory forest and the fears of failure due to frost and exposure which

Colonel Fotheringham had expressed at the time of acquisition had not proved correct.

Remarks: The two trial areas which were laid down on the instructions of Mr. Goeling on his visit on 25th July 1946, have been inspected.

In both cases the Sitka spruce are suffering here and there from shade. Where the stocking of pine was poorer, this is not yet the case.

The pine have certainly improved since the Sitka spruce were planted due to the increasing shelter afforded by the surrounding older spruce. It is thought that the pine will continue to improve and that the spruce will suffer in an increasing degree from shade.

(Signed) R. J. G. Horne.

District Officer.

HISTORY OF FOREST OF REE

APPENDIX II

Supervisory Staff

Supervisory Staff During the Life of the Forest

Conservators

1946 - 1947	H. G. Berensford Peirce
1947 continuing	F. Oliver

Divisional Officers

1926 - 1932	J. F. Armand
1932 - 1933	H. G. Forbes
1933 - 1938	H. M. Steven
1938 - 1939	F. Scott
1939 - 1946	L. A. Newton

State Forests Officer

1948 to date	T. H. Woolridge
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District Officers

1926 - 1927	J. K. Leven
1927 - 1932	R. Cowell Smith
1931 - 1934	D. V. Murray
1934 - 1938	A. Watt
1938 - 1939	T. H. Woolridge
1940	D. V. Harvey
1940 - 1947	I. Gillespie
1947 continuing	R. J. G. Horne

Foresters

1926 - 1939	A. Rees
1939 continuing	L. R. Thow

HISTORY OF FOREST OF DEER

APPENDIX III

Rates of growth and volumes

Height Growths - The figures in the following growth table were taken in Forestry Commission planted areas as close as could be obtained to the ages 5 yrs., 10 yrs., 15 yrs., 20 yrs., and 25 yrs.

Growth of Norway spruce in F.Y. 50 was above the average.

Age	P. Yr.	Species	Areas of Poorest Growth		Areas of Best Growth	
			Top Ht. ft. ins.	Current Annual Growth - inches	Top Ht. ft. ins.	Current Annual Growth - inches
About 5 years	45	C.P.	1 10	7	5 2	15
	46	P.G.	2 3	10	3 8	24
		J.L.	4 8	11	7 3	22
	46	N.S.	1 9	11	3 5	13
		S.S.	1 10	3	5 9	25
About 10 years	42	N.S.	8 -	25	13 -	30
		S.S.	9 -	27	18 -	39
About 15 years	36	C.P.	9 -	10	21 -	15
		N.S.	15 -	30	27 -	36
		S.S.	7 -	10	28 -	36
About 20 years	31	C.P.	7 6	11	24 -	12
		E.L.	20 -	12	25 -	15
		J.L.	25 -	15	35 -	18
		N.S.	10 -	6	30 -	30
		S.S.	6 6	9	33 -	36
About 25 years	27	S.P.	9 -	9	28 -	15
		N.S.	25 -	18	35 -	36
		S.S.	18 -	12	45 -	44

Volumes. The particulars given below were obtained from $\frac{1}{5}$ acre sample plots selected as representative of the better stands for the species concerned.

Species	P. Yr.	Opt. No.	No. of Trees per ac.	Vol. to 2½" dia. H.ft. O.B. per ac.	Vol. removed in Thinnings to date. H.ft. per acre.	Total Vol. to date. H.ft. per ac. O.B.	Current Annual Increment of Present Crop to 2½" dia. Growth based on last 3 yrs. H.ft. O.B. per acre.
S.S.	27	6	830	2340	370	2710	260
J.L.	30	63	910	1210	340	1550	130
N.S.	27	5	1375	1880	Nil	1880	200
<u>Picea</u> <u>Omorika</u>	27	59	1345	2210	Nil	2210	200

Doubts have been expressed from time to time, most recently by Dr. Day, in his report on the splitting of conifers, that Sitka spruce which is growing vigorously now, will fall off soon and that in areas of low rainfall, such as Buchan, the species will have to be grown on a short rotation.

To get some idea of what might be expected, a stem analysis was made on a Sitka spruce tree 38 years of age growing in Compartment 44 on land similar to that on which good stands of Sitka spruce, planted by the Forestry Commission, are growing.

The following particulars will be of interest:-

Age	Total Height Ft.	Vol. to 2½" Dia. U.B. - H. ft.
5	2.9	-
10	9.	-
15	21.1	.99
20	34.5	4.81
25	45.9	11.3
30	56.5	19.8
35	66.	31.6
38	72.	42.1

The form factor of the stem was calculated as .48

Present dimensions of stem are as follows:-

Total Height	...	...	...	...	72 ft.
Timber Height (2½" dia.)	...	...	...	...	62 ft. 8 ins.
Quarter Girth at Breast Height	...	...	...	...	13½ ins.
Quarter Girth at mid Timber Height	...	...	...	...	10 ins.

The timber was sound apart from a split which appeared at the top of the first section only (i.e. confined between limits of 0 ft. and 21 ft.).

The precise extent of the split damage could not be assessed without further crosscutting of the sections and this was not done. The logs can be sawn locally when further information can be given if desired.

The split appears to have occurred about 21 years and to have been completely occluded by 25 years. The crack is filled with hard resin. There was no apparent sign of fungal infestation.

The greatest growth had been put on towards the south west.

The tree was not unique but one of a number of similar dimensions on the site. Norway spruce, Douglas fir and Scots pine included in the stand did not succeed so well.

A complete set of the analysis figures, together with a chart of the stem, age/height, and age/volume curves, is available.

Height of Sitka spruce introduced among blasted Scots pine
in the White Cow Wood

1951

Planted							
P.Y. 33		P.Y. 36		P.Y. 43		P.Y. 47	
Top Ht.	Av. Ht.	Top Ht.	Av. Ht.	Top.Ht.	Av.Ht.	Top Ht.	Av.Ht.
28 ft.	20 ft.	25 ft.	15 ft.	10 ft.	6 ft.	2½ ft.	1½ ft.

HISTORY OF FOREST OF DEER

APPENDIX IV

Distribution of species by age classes

<u>Age Classes</u>	<u>S.P.</u> <u>Ac.</u>	<u>C.P.</u> <u>Ac.</u>	<u>P.C.</u> <u>Ac.</u>	<u>E.L.</u> <u>Ac.</u>	<u>J.L.</u> <u>Ac.</u>	<u>N.S.</u> <u>Ac.</u>	<u>S.S.</u> <u>Ac.</u>	<u>P. om.</u> <u>Ac.</u>	<u>P.C.</u> <u>S.S.</u> <u>Ac.</u>	<u>S.P.</u> <u>S.S.</u> <u>Ac.</u>	<u>J.L.</u> <u>S.S.</u> <u>Ac.</u>	<u>S.P.</u> <u>E.L.</u> <u>Ac.</u>	<u>S.P.</u> <u>M.S.</u> <u>S.S.</u> <u>Ac.</u>	<u>Total</u> <u>Ac.</u>
0 to 10 yrs.		7			9	33	136		1	18				204
11 to 20 yrs.	13	48	10	15	68	213	618				9			994
21 to 30 yrs.	97		8	3	22	222	409	3				77	6	827
31 to 40 yrs.													10	10
Totals:	110	55	18	18	99	468	1163	3	1	18	9	77	16	2055



Forest of Deer. Lenabo 1951. Effect of
prolonged frost on N.S.



Forest of Deer. Lenabo 1951 N.S. pruned back
by frost for many years. Now putting on
good growth above frost level.



Forest of Deer. White Cow. P.27 S.S. on good
drift Q.C. IV.



Forest of Deer. White Cow. P.27 S.P. stunted
by exposure. Now B.U. P.43 with S.S.