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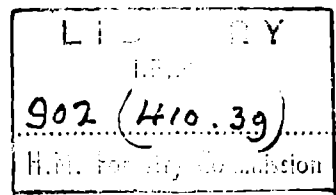
FORESTRY  COMMISSION

HISTORY
OF
ENNERDALE

FOREST
NWCE) CONSERVANCY

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FORESTRY

COMMISSION

HISTORY

of

ENNERDALE

FOREST

1925 - 1951

NORTH WEST (ENGLAND) CONSERVANCY

History of Ennerdale Forest

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HISTORY OF ENNERDALE FOREST

UP TO AND INCLUDING F.Y. 51

GENERAL DESCRIPTION OF THE FOREST

Situation

Ennerdale Forest derives its title from the valley of Ennerdale in which the first acquisitions and most of the forest lie. The forest, however, includes one small outlier, Broadmoor, near the western end of Ennerdale Water, and two larger ones, Lowther Park, near Cold Fell and Blengdale, in the valley of the River Bleng and abutting on Stockdale Moor. The latter is known in the district as Blengdale Forest and will be dealt with separately where appropriate. The whole unit is in the County of Cumberland near the town of Egremont.

Area and Utilisation

The total area is 8,405 acres of which 3,106 acres are planted. With the exception of scrub oak and a very small area of European larch, giving a total of 17 acres the whole of the acquired property was formerly sheep pasture or bare fell. In the valley of Ennerdale much of the fell side was scree which carried little or no vegetation and the remainder carried a sparse herbage. There was therefore only a relatively small area which provided reasonable grazing, and it was heavily overgrazed, the remainder being virtually unproductive.

Blengdale

This was reasonable grazing country.

What there was of the best quality agricultural land, in the Main Block, at Lowther Park (Uldale Valley) and at Blengdale is still managed as such.

ENNERDALE FOREST HISTORY - TABLE I

From	By	Date	Plantations Acquired	Plantable excl. Col. 4	Nurseries	Agricultural	F.W.H.	Implantable excl. Col. 4	Other Land			Total	
									Land Permanently Transferred		Land Temporarily Transferred		
									Description	Acreage	Description		Acreage
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
LONSDALE Rt. Hon. H. C. Earl of	Conveyance	31. 3. 25									Lease to Youth Hostels 21.12.49 of Bothy.		2717
TYSON John	Conveyance	11. 8. 26							Deed of Exchange 22.12.38 to Mrs. A. E. Williamson.	12.785			2830
LOWTHER SCHOOL Governors of ALLEN Thos. Wm. STURKEY Rev. Thos. Owen FERGUSON Harold HUDDLESTON John Wm. BURNYEAT Mrs. Sarah Francis PARK Wm. Newby THORPE Mrs. H. M.	Lease Conveyance Conveyance Conveyance Conveyance Conveyance Conveyance Lease	18. 9. 28 28. 12. 28 2. 5. 29 4. 4. 36 12. 2. 37 21. 3. 38 25. 8. 38 20. 12. 38											317 165 194 97 290 386 97 260
WILLIAMSON Mrs. A. E.	Deed of Exchange	22. 12. 38		221				295					516
LECONFIELD C. H. Baron PATTINSON Messrs. R.	Conveyance Conveyance	19. 11. 47 30. 9. 48		78 97									78 97
ROYAL EXCHANGE ASSURANCE	Conveyance	3. 8. 49		259				22	Conveyance of 11.4.51 to Boro' of Whitehaven.	.519	Transferred to M. A. F. Uldale	87	368
JACKSON Henry	Conveyance	16. 8. 50				5							5
										13			8418
													Resumptions 13 Nett area 8405

Note: In the case of most of the above acquisitions only total area can be given as no breakdown is available.

TABLE II

(a)	Plantations -	
	Acquired	17 acres
	Formed by Commission	3106 acres
(b)	In hand awaiting planting	
	For afforestation	- acres
	For reafforestation	- acres
(c)	Tenanted pending planting	
	For afforestation	259 acres
	For reafforestation	- acres
(d)	Agricultural Land	
	No. of tenancies ..7... Area	1791 acres
	(Including M. A. F. 87 acres).	
(e)	F. W. H.	
	Number ..6... Area	83 acres
(f)	Unplantable Land	3147 acres
(g)	Other Land	2 acres
		8405 acres

There is a tied sheep flock at Gillerthwaite of 280 sheep.

The sporting rights are retained by the owner.

Prior to afforestation the lands now forming part of Ennerdale Forest were almost entirely devoted to sheep farming. The principle acquisition which was in the Ennerdale Valley comprised 5,547 acres purchased from Lord Lonsdale and Mr. John Tyson and records show that this land supported a breeding flock of 1619 Herdwick sheep or thereabouts. The main farming unit was that of Gillerthwaite Farm and here a number of excellent rams have been bred in addition to other good breeding stock.

Over a period of 25 years nearly all suitable land has been taken for planting purposes and resumptions are practically complete. Gillerthwaite is reduced to a sheep run worked by a neighbouring farmer and with a tied flock of 280 sheep. The old farm house is now used as a Youth Hostel and there is also another Youth Hostel at the head of the Dale where the Association have been granted the lease of an old building known as Black Sail Bothy and previously used as a shepherd's bothy. The National Trust are interested in the Ennerdale district and in 1927 they were granted a lease giving them rights over 3,624 acres for the purposes of public recreation. Much of this land is of high elevation and unplantable.

The small amount of better quality pasture lands within the forest boundaries are fairly evenly distributed between the Ennerdale, Lowther Park, Blengdale and Scalderskew sections and are largely used in conjunction with the original homesteads as small stock rearing units. There are four stone built cottages at Gillerthwaite erected by the Commission for their employees and these also have a certain amount of land allocated to them.

Altogether there are some 14 letting subjects.

There is little information available on sporting rights, apart from one or two small areas and it is thought that the Lord of the Manor may claim the rights. It is in any event doubtful whether any stock of game has ever existed for many years past.

The area is hunted by one of the well known packs of Lake District fox hounds.

Physiography

Ennerdale Valley

A narrow, glacial, river valley for most of its length running east-south-east to west-north-west. The River Liza, which runs the length of the forest enters it at 960 ft. and joins Ennerdale Water at the western end, at 360 ft. The forest boundaries to the North, South and East run for some considerable distance above 2,500 ft. descending to the lake side, a little above 300 ft. at the western end.

The sides of the valley are steep to precipitous as the altitude increases and with the exception of the valley bottom and the foot of the slopes, most of the forest is difficult of access.

The alignment of the valley means that exposure to coastal winds is severe at times and the generally high altitude at which most of the forest lies increases this.

Broadmoor

This is a small isolated acquisition of less than 100 acre and lies between 380 ft.- 420 ft. with a gentle slope to the South and East. There is little exposure and much of the ground has little if any fall. It is at the western end of Ennerdale Water.

Lowther Park

This lies on either side of Kirk Beck along that length of it which

runs from east-north-east to south-south-west from just below B.M. 430 to B.M. 385.7. North and south of these points the forest rises to the North and North-East and to the West and South, rising to 1,100 ft. and 940 ft. in either case.

The slope to the north of the beck is very steep until it reaches the 1,000 ft. contour where it decreases considerably.

To the south of the beck the rise is less abrupt and the relief becomes more irregular above the 600 ft. contour, although the slopes are relatively gentle.

Exposure to sea blast is quite marked but not excessive.

Blengdale

This covers both banks of the River Bleng from a level of 640 ft. to one of 300 ft. near Bleng Farm, and its boundaries run along the 600 ft. contour, descending at the south-south-west end to 300 ft. There are two other detached sections; one is to the north of Ponsonby Fell and west of Stockdale Moor; it lies between the 650 ft. and 900 ft. contour sloping to the East, and at its northern end to the North. The other section (Raise Moor) lies either side of Scale Beck to the south-west of the River Bleng, and slopes south-westerly from 750 ft. to 650 ft.

Exposure in all sections varies from slight in the Bleng Valley to moderately severe at the higher elevations. There is some exposure to sea blast and the configuration of the Bleng exposes the north of the valley to severe gales from the North-East.

Geology and Soils

Ennerdale and Broadmoor

As one approaches the valley the geology changes from the metamorphic shales of the Ordovician Series to the Borrowdale Volcanic rocks of the same series. The latter consist largely of granophyre, an acidic volcanic rock of varying compositions and colour.

The glacial drift is a compacted, sandy gravel or boulder clay of varying depths according to elevation and topography and there are hard, gravelly morainic knolls near the River Liza throughout its length. The Broadmoor acquisition is on the terminal moraine at the foot of the original glacial lake.

The soils in the valley bottoms are quite freely draining on the sandy gravel where the fall is favourable but, in Broadmoor for example, the compaction and lack of fall have resulted in impeded drainage.

On the slopes, particularly at higher elevations, the soils are nearly all derived from the volcanic rocks and are light and friable. Outcrops are very frequent at the higher elevations and soils are either very thin or non-existent.

Lowther Park

To the north of Kirk Beck and for a short distance to the south the parent material is mudstone or shale from the Ordovician Series covered with a sandy gravel or boulder clay which is of no great depth and outcrops are fairly frequent at the higher elevations.

To the south, bounded by the 700 ft. contour (approximately) is an intrusion of igneous rock from the Borrowdale Volcanic formation, composed of Andesite and tuffs and some conglomerates. There is a varying depth of glacial drift similar in nature to that north of the Beck and giving rise in places to impeded drainage. To the west of the Linkrigg fell the shale rock of the Skiddaw slate reappears and there are limited areas of haematized limestone on the north-western limits of the area on which the forest lies.

Blengdale

The valley lies in the Borrowdale Volcanic formation; the parent material is of andesite and similar rocks. The glacial drift which is a sandy gravel varies and in parts to the East is non-existent. The soils from this are of a light loamy nature except where the impeded drainage on the flat ground gives rise to peat. The soils derived from the volcanic rock are more freely drained but do not differ markedly otherwise. Scalderskew and Raise Moor lie to the east and south-west of an extensive area of peat on Stockdale Moor which is largely due to the presence of boulder clay and to elevation, topography and rainfall. In places at Scalderskew there are stretches of gravel deposits above the peat, alleged to be deposits from old hillside drains. The peat is of varying extent, covering the whole of Raise Moor and a small part of the Scalderskew plantation.

Vegetation

The vegetation largely reflects the state of the drainage and other varying factors do not appear to play a readily discernible part. Where the drainage is poor, Erica tetralix and Calluna vulgaris replace Erica cinerea, and Eriophorum vaginatum is co-dominant; bog asphodel and Scirpus caespitosus are frequent and there is often an underlying floor of Sphagnum species. With improved drainage, Molinia appears and further improvements give rise to increasing Deschampia flexuosa with a corresponding decrease in the other species. Vaccinium myrtillus also makes its appearance.

On the drier ground Agrostis-fescue associations appear where there is reasonable depth of soil, with increasing bracken. Where the soil is thin or very sparse, Erica cinerea is dominant or co-dominant with Calluna vulgaris, with accompanying sub-dominant Vaccinium myrtillus. The Bryophytes include Polytrichum spp., Hypnum cupressiforme, Hylocomium squarrosum and others. Where the grasses are dominant bedstraw is frequent and is accompanied by Potentilla erecta and a small number of flowering plants including foxglove.

The natural woody species include rowan and the sessile oak as well as birch.

Meteorology

This forest is situated within 4 miles to 10 miles of the west coast of Cumberland and experiences a coastal sub-oceanic climate. The increase in altitude as the main Ennerdale Valley is approached, results in a marked increase in rainfall. Rainfall figures for key localities are shown below.

<u>Locality</u>	<u>Section of Forest</u>	<u>Rainfall</u>
Gosforth	Blengdale	50 in. per annum
Egremont	Lowther Park	50 in. " "
Gillerthwaite	Ennerdale	90 in. " "

The rainfall on the higher slopes and at the head of the main valley is probably well in excess of 100 in. per annum.

Snowfalls are rarely heavy and below 1,000 ft. the snow lies for only a few days. Above this altitude the snow may lie for several weeks and heavy drifts are not uncommon in the mountainous relief of Ennerdale Valley.

Strong winds are a characteristic feature of these localities the prevailing wind coming from the south-west. The most dangerous winds are those

from the north-east which are common in the spring. These are particularly dangerous in the Bleng Valley, largely due to its alignment.

Frost is not a severe risk except where the micro-relief favours it. The proximity of this forest to the sea, particularly at Lowther Park, involves exposure to wind borne sea mist which causes a browning off of Scots pine in the winter. This may be severe on westerly aspects.

Risks

Sheep

Sheep trespass is undoubtedly a severe risk in the Ennerdale Valley. The existence or proximity of sheep drift-ways, tenanted and common grazing land and the antipathy of the farming community have all contributed to making sheep damage a serious problem. The situation is not made any easier by the difficulty of maintaining intact a very long fence line on territory which it is difficult to inspect frequently, and which is largely bare rock or scree, constantly moving in the winter. Damage by large boulders is a frequent occurrence. Finally the carelessness of the public in the matter of closing gates aggravates the situation.

Trespass

Under this heading is included the difficulties experienced in every direction due to the insistence of the general public on unrestricted access to all parts of the forests. The existence of many alleged rights of way and the presence in the Ennerdale Valley of some rock climbs of international fame are to a large measure responsible for this.

Fire

At the western end of the valley and at Broadmoor the fire risk is high as these form the favourite picnicking sites of many urban visitors.

Roads

The valley has always possessed a main access route for vehicles as far as Gillerthwaite. This was upgraded and carried further up the valley after the recent war and forms the only useful road in that part of the forest. Most of the rides have not been laid out with a view to providing useful access or extraction routes. There are no bridges other than foot bridges, across the River Liza.

In the Blengdale and Lowther Park section an excellent system of all weather roads have been developed. This is a recent development which accompanied the onset of, or was due to an impending, thinning programme. However, in the case of a recent acquisition, Uldale Fell, the alignment and formation of the future road system has preceded the planting of the area. This method has permitted considerable economies in construction and will provide access for labour and protection during the establishment period.

Labour

The supply of labour has never been satisfactory and the building up of a nucleus of experienced and skilled men has never been possible. In the years of industrial depression in West Cumberland the large number of unemployed men in the neighbourhood eased matters but in recent years, particularly with the development of the Sellafield Atomic Works nearby the supply of labour has been seriously inadequate. This has resulted in the recruitment of low grade labour with attendant high costs and, in the case of Ennerdale Valley particularly, it has meant some neglect of existing plantations. The progress of the small planting programme has not however been seriously affected.

SILVICULTURE

Preparation of Ground

Little or no preparation of ground other than draining was thought necessary or carried out until recently (P.48, P.49) when a limited amount of ploughing with the Cuthbertson plough and R.4. crawler tractor was done at Sillathwaite (Lowther Park), Bleng Tongue and Raise Moor (Blengdale). Cutting of drains and turfs was carried out extensively on the badly drained ground from 1930 onwards. There was some burning of heather before planting, particularly in the European larch areas (P.34 to P.39) and screefing in heather patches was also done. Fencing was an extensive operation especially in the Ennerdale Valley where there is a very long fence line in proportion to the area involved.

Choice of Species

The main species planted has been Sitka spruce with Norway spruce, Japanese larch, European larch and Scots pine as the principal subsidiaries. Douglas fir has been used at Blengdale only.

Sitka spruce

Ennerdale Valley

This species was planted extensively prior to 1934 at the eastern end of the valley, on the shallow soil on the screes and (particularly on the northern side) the wet valley bottoms and the morainic knolls near the river course. Grazing damage has to some extent obscured results on the upper screes but there is ample proof that where there was a moderate amount of vegetation the species has succeeded. However, where the Erica species and/or Calluna vulgaris become dominant both on the knolls and in very poorly drained areas (Erica tetralix - Scirpus caespitosus - Eriophorum vaginatum) the spruces have checked extensively for many years and in some cases particularly on the morainic knolls, are still in check. The Sitka spruce has proved itself as the best species for exposed sites and at higher elevations can be planted pure.

The planting of Sitka spruce from 1934 onwards (P.33 was scree planting) proceeding westwards down the valley and including Broadmoor, was restricted to the valley bottoms and/or to the areas of poor drainage at higher elevations. On the morainic knolls the species has checked and on some of the poorly drained areas, particularly where the drainage has been neglected. However, even at the higher elevations, on the peaty areas there has been considerable success with this species in recent years particularly from F.Y.44 onwards on the northern side of the valley.

Lowther Park

Sitka spruce has been planted extensively, particularly at the higher elevations and has proved an unqualified success. The natural drainage is nowhere very inadequate and there are very few extensive areas of Erica tetralix - Scirpus caespitosus; instead Molinia - Deschampsia flexuosa or Nardus stricta predominates. On the better drained slopes where there are fescue - Agrostis associations and varying degrees of bracken, Sitka spruce has been planted and has done well.

Blengdale

On all but the bad peaty areas, characterised by Erica tetralix and Scirpus caespitosus the Sitka spruce has proved successful.

It has been planted less extensively on the light sandy gravel soils on either bank of the River Bleng, which have to some extent been reserved for Douglas fir, but where it has been it has succeeded equally well and on such sites appears to have been more wind firm than Douglas fir.

On some of the excessively drained banks of Bleng Tongue where the soil is very shallow the planting of this species was a risk that remains to be justified although no obvious signs of failure are yet apparent. On the shallow peats further north (Bleng Tongue) and on Raise Moor, the recently formed plantations of Sitka spruce are doing well particularly where the grasses Agrostis canina, Holcus lanatus and Deschampsia flexuosa are increasingly frequent.

Norway spruce

Ennerdale Valley

This has been planted most extensively in the eastern end of the valley prior to F.Y. 33 and mostly in an extensive area on the south side rising to 1,000 ft. where it was planted in conjunction with Scots pine as a nurse in a 2: 1 mixture; it has proved successful although initially this procedure received some criticism. (Inspection by Mr. O.J. Sangar July 1932, and Mr. A.D. Hopkinson's comments thereon August 1932). It has latterly been reserved for planting on the more sheltered ground where the drainage is unsatisfactory although it is not as tolerant as Sitka spruce in this respect and is more suited to the Molinia/Deschampsia flexuosa ground where there is little or no peat.

Lowther Park and Blengdale

The lower, less exposed and more fertile sites of poor or inadequate drainage have been planted successfully with this species. Dry sites have been avoided.

Scots pine

This species has been planted in all three sections mostly as a nurse as at Ennerdale Valley or in shelter belts as at Blengdale. It has so far proved hardy, but is prone to suffer severely from wind-sway in its early years in exposed positions in light, unstable soils. It has succeeded in all classes of soil from the good quality woodland soils on the banks of the River Bleng characterised by woodland grasses and a relatively luxuriant

vegetation to the poor, peaty soils at 1,000 ft. in Ennerdale Valley. It has proved susceptible to damage by sea blast at Lowther Park although this is apparent only during the winter and does not appear as yet to have a marked effect on the progress of the tree.

European larch

Ennerdale Valley

The planting of this species on any scale did not begin until 1935 and it was confined to banksides and steeper heather covered slopes of the valley, particularly in the Gillerthwaite, Ling Mell and Moss Dub region and in Compartments 82 - 88 east of Gillflinter Beck. There is evidence of some difference of opinion as to the wisdom of planting this species at all and the Chairman directly criticised such action on his visit, in September 1944. However, there is less reason for complaint here than in other localities in the Lake District and the existing stands are still in a reasonable condition particularly near Woundell Beck. For example there has been no extensive outbreak of larch canker and no strong sign of the die-back so often found with this species in the Lake District. Although there is reason to doubt whether this was the best species for the dry, rocky, Calluna-Erica cinerea sites on which it is found there is no strong evidence as to what other species might have succeeded in its place.

On the lower bracken covered slopes, the European larch has yet to prove itself but is so far moderately satisfactory. There are signs of a decrease in health and vigour, in Compartment 79 opposite Gillerthwaite but this may well be due to the delay in thinning. Recent examination indicates that die-back is in evidence here.

Lowther Park and Blengdale

European larch was planted on the well drained ground where bracken predominated. Various aspects were employed under varying degrees of exposure but in all cases the crop failed completely and in recent years was replaced by other species. The age at which the failure was evident is not easily identified but it would appear to be between 15-20 years. The larch canker, Dasyscypha calycina, was the most evident

disease and there was some evidence of attack by the Larch Saw fly.

Frost damage has also been named as a contributory factor to the failure of these areas but only a detailed critical survey would justify any worth while diagnosis. It can only be said that under conditions of satisfactory drainage, a moderately fertile soil and none too severe exposures the European larch failed disastrously; a failure which became increasingly evident as the crop reached the thicket stage and which was inescapably apparent before the crop was due for thinning.

Japanese larch

Ennerdale Valley

This species has progressively replaced the European larch on the more fertile, well drained, grass and bracken covered ground, particularly on the lower and less exposed situations. In recent years it has been the only larch planted. It has also been planted on the rocky ground where Erica cinerea and Vaccinium myrtillus are co-dominant, particularly in the P.37 area Compartments 40-43. It has not been planted in exposed situations nor at high elevations. It has grown satisfactorily in all cases with the best results on the more fertile, well drained, ground near the Bowness Knott. It has also proved successful on the poorly drained boulder clay of Broadmoor although here it has been employed only as a fire belt.

Blengdale

Here, on the light, gravelly soil derived from the volcanic parent material, this species has flourished. It has also been planted in the peat over boulder clay above 700 ft. at Scalderskew, as a fire belt, where it has also proved satisfactory.

This species has so far proved to be tolerant in many respects and its rate of growth in early years is unquestioned. It remains to be seen what success it will have as it matures.

Douglas fir

Blengdale

This species was planted on the loose, sandy gravel of the glacial drift which covers much of the sides of the narrow valley of the River Bleng. It is of very coarse form and has grown very vigorously

However, it is subject to wind blow and has suffered quite severely in this respect. Past treatment, e.g. delayed thinning, has of course played its part in this, but it is very doubtful whether in view of the nature of this valley with its steep unstable slopes it was the best policy to plant this species.

Lawson cypress

Blengdale

This species has been employed to underplant a proportion of the failed European larch which was subsequently felled. The sites were well drained sandy-gravel glacial drift or sandy soil derived from the andesite of the Borrowdale Volcanic formation and in most cases the drainage was very satisfactory except on the higher flat ground where the compacted boulder clay had resulted in impeded drainage. The species in all cases has so far succeeded although in no case is it more than seven years old and so has still to prove itself.

Ennerdale (Main Block)

A small area was planted in 1937 at about 450 ft. on the south side of the valley (Compartment 69). The soil is sandy gravel and is well drained. The trees have grown well.

Tsuga heterophylla

Blengdale

This has been planted to replace European larch on the boulder clay of the flat areas at the west side of the Bleng Valley. The planting was done in F.Y. 43, 44, 45 and ⁱⁿ all cases, although the drainage is inferior, the species has proved successful except in a few instances where overlarge plants were used.

Pinus contorta

A small area was planted in Ennerdale (Main Block) in 1934/5 on the south side of the valley at about 750 ft. on very rocky ground with a thin soil and a cover of bracken and fell grasses and/or Calluna vulgaris and Erica cinerea. The slope was steep and the aspect northerly. The trees have had a successful history and are vigorous and well grown. They have shown no signs of checking on the heather ground.

Pinus mugo - Mountain Pine

A small area was planted in Ennerdale (Main Block) on the north side of the valley at about 600 ft. in poor peat (Scirpus caespitosus and Erica tetralix - Sphagnum spp.) in 1944. It has made reasonable progress but has an undesirable rather bushy form.

Hardwoods

Oak

Ennerdale Valley

The sessile oak, Quercus sessiliflora, is the natural climax association for this valley and about 17 acres of the type are to be found in Compartment 92. They are of very bad form and are of no commercial value, but this area is being left untouched because of its interest as the last surviving remnant of the natural woodland.

Birch

Ennerdale Valley

Although there are occasional natural birch in the valley these are of no commercial value and are generally inaccessible. On the lake and roadside, birch has in recent years been planted largely for amenity purposes. It has proved successful and is developing satisfactorily.

Beech

Ennerdale Valley

Small groups of this species are to be found among the Norway spruce in the P.26 planting. The trees have all kept pace with the surrounding crop which is on a poorly drained peaty soil overlying a gravelly glacial drift. However, they are of extremely poor form and will not provide good timber when felled. There is evidence that this is due to an unsuitable seed provenance and the species in mixture and on carefully selected sites might prove moderately successful.

American Oak (Q. borealis)

A very small quantity of these were planted at Ennerdale this year on a commercial basis but with regard also for their amenity value. They have taken well. The site chosen was a well drained, reasonably sheltered slope of light soil derived from the parent rock (volcanic).

The vegetation included the grasses, sweet vernal, Agrostis canina and Festuca ovina and bracken. The elevation was about 300 ft.- 400 ft. and the aspect south-south-west.

Ornamentals

Ennerdale Valley

Those planted in the Ennerdale Valley include rowan, wild cherry, (Prunus avium) red sycamore (Acer rubra) and Abies nobilis. The sites in all cases were sheltered and the soils light and well drained with a moderate depth of soil.

Blengdale

The last four species were also planted at Blengdale. The most fertile and sheltered sites were chosen, and the trees now 1-3 years old are still flourishing.

Planting

(a) Spacing

The normal spacing was employed in all cases except with Japanese larch at Blengdale where in Compartment 1 $4\frac{1}{2}$ ft. x $4\frac{1}{2}$ ft. spacing was used and 3 ft. x 3 ft. for a fire belt. (Standards:- Sitka spruce 5 ft. x 5 ft.; Norway spruce $4\frac{1}{2}$ ft. x $4\frac{1}{2}$ ft.; Norway spruce/Scots pine $4\frac{1}{2}$ ft. x $4\frac{1}{2}$ ft.) (European larch was planted at $4\frac{1}{2}$ ft. x $4\frac{1}{2}$ ft. and 5 ft. x 5 ft. and Japanese larch was planted at $4\frac{1}{2}$ ft. x $4\frac{1}{2}$ ft. and 5 ft. x 5 ft.)

(b) Type of Plants

The type of plants used up to the late thirties were often considerably older than now used; 3 + 2 and 3 + 1 + 1 and 3 + 1 were not uncommon ages. 2 + 1 was the youngest age and 2 + 2 was equally common. There are small numbers of Sitka spruce which were 3 + 0 and 4 + 0; as for hardwoods some had been relined three or four times and their ages varied between 3 and 7 years. The plants were not a great deal larger than the 2 + 1 and 2 + 2 Sitka and Norway spruces and the 1 + 1 Japanese larch and Scots pine now used but there is evidence from inspection reports (see Report on Chairman's inspection 1930) that the stem/root ratio was unsatisfactory. Thornthwaite and Kershope are local nurseries mentioned and the balance came from N.E. (E) and S. (S). See Appendix III for list of nurseries.

(c) Methods of Planting

Turf planting was not adopted until after 1931 and notch planting with Schlich spade was customary with mattock planting on the very steep and rocky ground. Notch planting of spruce originally was too deep according to criticisms made by the Chairman in 1931/2 and a shallow method was adopted. The turf and notch method were both used according to the requirements of drainage and in some instances, for example with ornamentals, pit planting was used.

In more recent years turf planting on badly drained ground was always employed with mattock on the slopes and where there is a thin, rocky soil. Very little ploughing has been possible but in such cases at Blengdale (Raise Moor, Bleng Tongue and Scalderskew) and Lowther Park (Sillathwaite) the turfs were cut from the plough furrow and spread by hack. A Guthbertson single furrow plough pulled by an R.4. crawler tractor was used and the interval between furrows was 10 ft. (5 ft. at Scalderskew). Planting was on the top of the furrow slice in peat and on the side in mineral soil.

(d) Annual Rate of Planting

The mean annual rate of planting up to 1939 was 90 acres with a maximum of 199 in 1928 and a minimum of 9 in 1932. The other large divergencies from the mean were due to a total of 171 acres in 1926 and 150 acres in 1939. Planting continued up to 1944 and was not resumed on any scale until 1948. The figures were:- P.40:- nil, P.41:- 194, P.42:- 95.5, P.43:- 15.8, P.44:- 16.8, P.48:- 36.1, P.49:- 212.9, P.50:- 190.7, P.51:- 45.8.

(e) Manuring

Basic slag was used on the P.26-36 checked or doubtful areas at Ennerdale Valley and to a lesser extent at Blengdale and Lowther Park. It was considered well worth while and the species involved (Sitka spruce and Norway spruce) were said to show a good response. 2 ozs. a tree was recommended for the very bad areas. The type of ground involved was the poorer peats carrying Erica tetralix, Scirpus caespitosus, Eriophorum vaginatum and Sphagnum spp. The same treatment was prescribed for the morainic knolls (1936/1937) but it was not a general practice.

(f) Degrees of Success of Establishment

Ennerdale Valley

In this section it is undoubted that considerable difficulty in establishing a crop was experienced from the outset. Quite considerable areas of the planting done in those early years are still in check, particularly on the morainic knolls and near the river course. The planting on the scree has had a very qualified success and the experiments with pot planting under such conditions were not so successful as to warrant a large scale extension of the idea.

In very extensive areas of the earlier spruce planted ground P.26-34, the last decade has seen a marked improvement and it is fair to say that the majority of the crop is now established. The report of the inspection of 4.9.44 records the Chairman's observation that the shelter and protection of the surrounding crop will result in the release from check of isolated groups of trees and this seems to be borne out by the present conditions in the eastern part of the valley.

The European larch has still to prove itself but has not until recently required much attention and the Japanese larch has been remarkably trouble free.

Sheep damage has distorted the situation in Ennerdale Valley and but for it the history of the establishment of the crop might well be described as one of slow and uneventful improvement which in recent years has been considerably accelerated. Developments in technique and in choice of species have resulted in a much more certain and more rapid establishment of the crop planted since 1939.

Blengdale and Lowther Park

With the exception of the European larch, the crop has been established with no great difficulty on these sites. The most spectacular success, although limited in area, has been that of the Japanese larch at Blengdale, but from the point of view of large scale planting, the continued excellent growth of the Sitka spruce on both sites is most encouraging. Douglas fir and Norway spruce have both developed with little trouble and but for the effect of the sea-blast at Lowther Park, the Scots pine has also been satisfactory.

There are some areas of Sitka spruce still in check at Blengdale.

These are the poorly drained peat over boulder clay above the valley. However, these too have now shown unmistakable signs of improvement.

Ploughing

This was all carried out in 1948 and 1949 on fairly deep peat overlying boulder clay, in upland situations at Lowther Park (Sillathwaite) and Blengdale (Raise Moor, Bleng Tongue and Scalderskew). The Guthbertson plough pulled by an R.4 "caterpillar" crawler tractor was used and a deep furrow was obtained.

The furrows were at 5 ft. to 10 ft. spacing, depending upon soil condition and except for the 5 ft. ploughing, a large turf was cut from them. Plants of 12 in. upwards were used and in all cases a very good take with little or no beating up resulted. The species was Sitka spruce.

Beating Up

Apart from the repair of grazing losses there is no record of this having been done on anything but the normal scale and the only replacement of species on a large scale followed the failure of the European larch at Blengdale and Lowther Park.

Mixtures

The Scots pine nurse for Norway spruce in P.26, 27 and 31 planting was a measure of expediency due to lack of Sitka spruce at the time of planting. Both species were planted in the same year and their early history was not too satisfactory due to the blowing of the Scots pine. However, the crop steadily improved and is now growing well.

The nurse had obviously proved effective, but Sitka spruce planted pure might well have been a better policy.

A small mixture of Norway spruce and beech has succeeded but it is spoilt by the inherent poor quality of the beech. More recently large groups of Quercus borealis have been planted in a matrix of Japanese larch. No report can yet be made.

Past Treatment of Established Plantations

Brashing and thinning have only recently commenced except at Blengdale where a very early thinning was carried out in the Japanese larch in Compartment I in 1943 (P.33) and the Chairman commented favourably on this

remarking that to his knowledge it was the earliest he had known (Report on inspection of 24.5.42). It had been planted at $4\frac{1}{2}$ ft. x $4\frac{1}{2}$ ft. and has subsequently been thinned twice at intervals of three years. The P.29 and P.30 Douglas fir and Sitka spruce at Blengdale have been thinned twice on a three year cycle and this will be the cycle for all species for some years to come. At this stage, with the Douglas fir particularly, it would be silviculturally unsound to extend the cycle. There has been considerable windblow in the Douglas fir at Blengdale and this is to some measure due to delayed and over cautious thinning.

About three acres of Sitka spruce have been thinned in Ennerdale Valley (P.31, Compartment 30), and a large thinning programme is now only a few years distant. It is already due in some of the P.33 European larch. Produce at all sections has been sold as graded poles.

Conclusions

Supervision, Labour and Commitments

There has been in the earlier history of the forest a too frequent change of supervision, particularly foresters and a tendency to rate this forest as secondary when the calibre of those appointed has been under consideration. This was no doubt natural in view of the very small staff employed. However, if this was permissible in the past it is certainly no longer so. Only an energetic, zealous and intelligent man will serve at this unit. It is particularly important that he should be a man of some practical experience, well able to handle labour and capable of dealing firmly but tactfully with an often antagonistic public and a reserved and sometimes hostile farming community.

The shortage of labour at Ennerdale is likely to continue for many years. The present supply is insufficient in number and below average in quality. The amount of work therefore that can be carried out is very limited.

There are a certain number of inevitable commitments such as draining and maintenance and the number and size of additional commitments should therefore be severely curtailed. This is the present policy.

However, this only relieves a difficult situation and does not remove it. The question of importing labour may have to be faced, but urgent

consideration should be given to the question of building more houses locally and to the provision of temporary accommodation for use by vocational labour, etc., in the summer months. This need not be an elaborate affair and even if it housed only six men it would improve matters considerably.

Sheep and Fences.

The grazing of the crop by sheep has been responsible for a considerable amount of beating-up and the trespass of sheep from adjoining pastures has involved the Department in some exchanges with the Animal Health Branch of the Ministry of Agriculture and Fisheries in connection with the anti-sheep scab campaign. The maintenance of an effective external boundary is, therefore, of considerable importance and present policy acknowledges this.

The problem of maintaining an adequate sheep proof fence, particularly on the bare scree, remains a difficult one and it is thought to be a wise policy, where possible without undue risk to any unestablished crop, to bring the fence line within the established plantation to minimise risk of damage by boulders etc.

There is next the question of drift ways. In view of the existence of these it is extremely important that every effort is made to secure the co-operation of those who use these means of access. It is therefore worth recording that a determined effort on the part of the Department to assist the farmers by maintaining a turnable forest boundary has resulted in a markedly more cordial and reasonable attitude on their part; this included commendatory remarks in a farming journal.

Amenities

Some difficulty in the management of this forest has arisen from the public's jealous watch over the undoubted beauties and unique character of the Ennerdale Valley in particular, and to a lesser degree, those of the Bleng Valley. A positive approach to this matter is necessary and worth while. This requires that management should constantly bear in mind the public's reaction to any developments. Consideration should be given to increasing the proportion of hardwoods planted and to the use of mixtures. The possibility of leaving small areas of very special value to the public, unplanted, should not be dismissed altogether.

Much of the criticism which has arisen in the past has been due to

an ill-informed public and well-devised action to remedy this state of affairs should bring in good dividends.

Choice of Species

Sitka spruce

This species has proved to have a greater tolerance on poor soils and exposed conditions than perhaps any other species planted at Ennerdale. The localities where there may be some doubt are those where there is excessive Erica tetralix, Calluna vulgaris, Eriophorum vaginatum and associated species and in such cases it is always advisable to use a mixture of Sitka spruce and Pinus contorta.

Norway spruce

This should be restricted to the poorly drained mineral soils, the better peats and wet flushes. It is also a useful species in frost pockets, but should not be planted without a nurse in exposed positions.

Scots pine

A useful shelter belt can be obtained with this very wind-firm species. However, it is apt to be troublesome in its early years on light soils and care should be taken to see that well balanced, stocky plants are used in such situations.

European larch

Until further details are forthcoming on the suitability of this species for Lakeland forests it should not be planted.

Japanese larch

A very successful species in its early years on well drained fertile soils; it is not yet a proven species and over optimism may lead to errors in choice of site.

Douglas fir

Light, unstable soils should be avoided particularly where the configuration of the ground is likely to lead to wind blow. Considerably more information is needed on the seed provenance of this species if an extension of our existing stands of trees of poor form is to be avoided. High pruning of these older stands should be seriously considered.

Lawson cypress.

Although a useful species for underplanting on indifferent soils, it is not sufficiently superior to other species in any respect to plant on an extensive scale.

Tsuga heterophylla

A tolerant species which should be used for underplanting and the filling in of wind-blow gaps. It gives a useful timber and its attractive appearance should make it a useful species in this area.

Thuja plicata

Another tolerant species, whose thinnings are particularly valuable. It is unfortunately reputed to be susceptible to heart rot and this point should be carefully considered.

Pinus contorta

This is a very hardy species which has so far succeeded at high elevations although there is at this forest only a very limited amount on which to base opinions. The notes on Sitka spruce should be consulted for its value in a mixture.

Mountain pine

This has also been planted on a very limited scale on very poor peat and has done moderately well. More extensive use of this species, in exposed conditions, would provide valuable data in connection with sites at present considered unplantable for reasons of elevation and aspect.

Beech

It is suggested that if a race of suitable form could be found this species could be used in mixtures with conifers, much more extensively.

Oak

Of this genus, the American red oak (Quercus borealis) only has so far been used and that mainly as an ornamental.

Birch

This should not be planted except where amenity considerations are involved and then only on a very limited scale. However, it is a very tolerant species and if a suitable strain were available it would serve a useful purpose in afforesting^{some} of the scree where there is little or no vegetation.

Comments by State Forest Officer

The establishment and progress of the plantations in the Blengdale and Lowther Park Sections has been relatively straight-forward. The rate of growth in both areas is exceptional but apart from noting the obvious influence that this must have on thinning technique no additional comments are necessary.

The history of the main block is less happy and many of its present day problems arise from defective lay-out and choice of species. In making such criticisms it is of course appreciated that past decisions may have been dictated by circumstances which are no longer apparent and without the background of experience now available.

Lay-out

It was unfortunate that the sequence of acquisition was from the dale head downwards. As a result the poorest and most inaccessible ground was planted first and the onset of thinning is occurring simultaneously in scattered patches throughout the whole length of the forest.

The problem of extraction is complicated by the fact that the rides run across the contour and on such steep broken ground are virtually useless. The alignment of suitable routes has now to be surveyed through crops in the thicket stage.

The faulty alignment of boundary fences has been the source of great expense and constant injury to the forest from sheep. The only practicable alternatives are either well below or well above the moving scree, and the mistake was made in trying to change from one to the other and back again in an endeavour to take in the maximum area of plantable ground. It can be seen now that it would have been wiser at the outset to have accepted the first choice even at some considerable sacrifice of area, leaving the possibility of encroachment to higher elevations to be explored later.

Choice of Species

The fundamental differences in site factors between the south side of the valley, the valley floor and the northside of the valley have been largely ignored, both in practice and in the District Officer's report.

The south side, with a north aspect, is relatively (but distinctly) drier and colder, holds snow longer and has a shorter growing season. Given a satisfactory provenance, the long scree slopes are eminently suited

to European larch, the morainic knolls, rock outcrops and ledges to Scots pine and the wet flushes to Norway spruce, Japanese larch, Pinus contorta and Sitka spruce might here have been relegated to second choice for poorer soil conditions only.

On the other hand, the north side is wetter and milder, has a longer growing season and is somewhat more exposed. Japanese larch on the scree slopes, Pinus contorta on the knolls, outcrops and ledges, and Sitka spruce on the wet flushes would be acceptable, whereas the prospects for European larch and Scots pine and to a lesser extent Norway spruce are definitely poor.

The valley floor suffers from heavy flooding of all hollows and flats in time of spate, and severe nightly inversions of temperature during calm weather. The soils are based on an alteration of moraine, alluvial gravel, and basin peat, and an optimum choice of species requires to be accurately related to the micro-topography. It is quite certain that wholesale blanketing with spruce will not give the best result, and there is sufficient local evidence to show that on the first two types Scots pine would have been more satisfactory.

Amenity

Criticism of the plantations on grounds of amenity stems quite justifiably from the faulty or indiscriminating choice of species, the pattern of which fails to harmonise with natural variations on the ground. This discordant note is aggravated by abrupt changes coinciding with the completely irrelevant up and down rides.

Such points can be conceded and could be met fully in future work by better silviculture. On the other hand it seems that the demands by so-called amenity interests for the planting of ornamental strips along roadsides and other frontages are better resisted in a place such as Ennerdale. They can hardly fail to appear equally as artificial as the features they are meant to disguise, and may run the further risk of introducing suburban characters to what is otherwise still a functional rural landscape.

Access

A brief reference is made to the upgrading of the access road to Gillerthwaite. This was undertaken in 1949 as a labour relief scheme and brought to an abrupt stop for political reasons. It still leaves one of

the chief problems of Ennerdale unsolved, i.e. the bottleneck existing in the council highway approach to the valley, which is only suitable for one way traffic and impassable to large vehicles of the nature of timber lorries.

J.S.R. Chard,

State Forest Officer.

Conservator's Comments

Layout

Reference is made in the history and in State Forest Officer's notes to the demarcation of compartments by means of rides running straight up and down the hillsides. This lay-out follows long established practice in mountain forests at home and abroad. Such rides are essentially for demarcation purposes and were never intended to serve as extraction routes, though they were in places designed to function as fire breaks along which preventive measures might be taken to contain a fire and stop it spreading to a flank.

On the other hand this system has the disadvantage of looking unsightly, particularly during the early life of the plantations, and this is an important objection in an area of high amenity such as Ennerdale. The steeper the slopes the more unsightly the effect.

As far as extraction is concerned it would certainly have been wise to have left unplanted reasonably graded and well sited alignments the presence of which would now greatly facilitate the provision of extraction roads and tracks.

On the question of boundary fences I am sure that the solution to have aimed at, wherever possible, was to site these well above the maximum planting limit on firm ground free of moving scree and rock outcrops. This would have had the effect not only of enclosing all the land which was plantable or likely to become plantable but of avoiding a straight upper edge to the plantations with consequent benefit to the amenities. This is now current practice elsewhere in the Lake District where we are faced with similar conditions.

Choice of Species

The State Forest Officer's notes bring out an interesting point in regard to the relative wetness of the north and south sides of the Ennerdale Valley (Main Block) and its bearing on suitable choice of species.

While it is true that precipitation is almost certainly greater on the northern side, the greater degree of exposure and sunshine on this side must result in a higher rate of evaporation and, I would think, in a lower relative humidity.

With regard to the District Officer's note on Scots pine under the heading "Choice of Species" (Conclusions), there is no doubt that this species

should be represented at Ennerdale Main Block, but it should be restricted to the more sheltered ground. Its early history was full of troubles due to wind-sway wherever it was planted at high elevations and in severe exposure. On such sites I doubt if it will ever be anything more than a rough, stunted tree, and Pinus contorta would have been a better choice.

The use of beech requires consideration. Groups of this species which were planted among the spruce and larch suffered from sheep grazing and many have disappeared altogether. Surviving trees are mostly of bad form and poor growth. The evidence provided by the beech experimentally planted in mixture with Sitka spruce at Hardknott Forest in P.38 at an altitude of 1,000 ft. in somewhat similar conditions of climate and vegetation encourage one to think that beech of a suitable strain might grow satisfactorily in Ennerdale Valley at least at the lower levels, among a matrix of conifers. In this connection their value for amenity purposes should not be overlooked.

European larch as a result of current die-back troubles, is out of fashion, but should not on that account be out of mind. Good European larch has been grown in the Ennerdale Valley, e.g. the old trees at Gillerthwaite, and some of the European larch planted by the Commission south of the river in P.35 - 37 (north aspect) looks well, though admittedly there is still time for canker and die-back to appear.

Carefully selected provenance and careful choice of site should govern any future planting of this species, and it may be wise to use it in groups among another species, e.g. spruce.

A. H. H. Ross,

Conservator, N.W. (E).

22.1.52.

History of Ennerdale Forest

APPENDIX I

Reports of Inspections

List of Inspections made - 1927-1949

<u>Inspecting Officer</u>		<u>Date</u>
Lord Robinson	Technical Commissioner	5th December, 1927.
Lord Robinson	Technical Commissioner	19th April, 1930
Mr. O.J. Sangar	Divisional Officer	October, 1930
Mr. Hopkinson	Divisional Officer	9th July, 1931
Mr. O. J. Sangar	Divisional Officer	July, 1932
Lord Robinson	The Chairman	27th July, 1932
Lord Robinson	The Chairman	5th April, 1934
Mr. A.P. Long	Assistant Commissioner	4th October, 1934
Mr. Hopkinson	Divisional Officer	25th August, 1937
Lord Robinson	The Chairman	4th October, 1937
Mr. A.P. Long	The Assistant Commissioner	24th November, 1937
Mr. W.L. Taylor	Technical Commissioner	17th December, 1938
Mr. A.P. Long	The Assistant Commissioner	14th March, 1939
Mr. A.P. Long	The Assistant Commissioner	24th August, 1940
Lord Robinson	The Chairman	24th May, 1942
Mr. A.P. Long	A/Assistant Commissioner	8th February, 1943
Mr. Thom	A/Divisional Officer	7th October, 1943
Lord Robinson	The Chairman	4th September, 1944
Mr. O.J. Sangar	Director	28th May, 1948
Lord Robinson	The Chairman	7th June, 1949
Mr. O.J. Sangar	Director	26th, 27th April, 1950
Mr. G.J.L. Batters	Conservator State Forests	20th June, 1951.

Notes from Inspection Reports

Subject	Comments	Date	Inspecting Officer
<u>Risks</u>	Rabbits at Blengdale	8. 2.1943	Assistant Commissioner
	Frost Damage to Sitka spruce	4. 9.1944	Chairman
	<u>Neomyzaphis</u> damage	4. 9.1944	Chairman
	Sheep at Lowther Park	4. 9.1944	Chairman
	Extensive sheep damage Main Block	27. 4.1950	Director (E)
	Sheep trespass in relation to unfenced common land and poor maintenance of the tenant's fences. Wind blows at Blengdale	20. 6.1950	Conservator S.F.
<u>Roads</u>	Main Block; Main Road, need for upgrading	24. 5.1942	Chairman
	Blengdale; Roads general	13. 2.1943	Chairman
	Main Block; Bridges need for them	4. 9.1944	Chairman
	Blengdale; Roads, river training and slip	24. 9.1948	Chairman
	Blengdale; Bark Butt's Bridge, need for upkeep	7. 6.1949	Chairman
	Main Block; General comments, bridges, views on approach road, negotiations.	7. 6.1949	Chairman
<u>Labour</u>	Discussion on possible sources of additional labour	27. 4.1950	Director (E)
<u>Silviculture</u>			
<u>Preparation of Ground</u>	Need for early resumption of ground before planting to allow for growth of herbage for protection of plants.	9. 7.1931	Divisional Officer
<u>Choice of Species</u> (Including progress and history of given species).	Norway spruce and Sitka spruce ; their relative merits; preference for Sitka spruce stated.	5.12.1927	Technical Commissioner
	Sitka spruce; its suitability, effect of exposure on it. European larch; the Technical Commis- sioner suggested this species might be suitable on heather ground.	April 1930	Technical Commissioner
	Sitka and Norway spruce; the preference for Sitka; suggestion that Norway spruce should not be planted in the valley.	9. 7.1930	Divisional Officer
	Norway spruce/Scots pine. Lack of supplies of Sitka spruce given as reason for use of Norway spruce.	July 1932 and other memo.	Mr. O. J. Sangar
	European larch, Japanese larch; encouraging growth in P.35, 36, 37 areas (Main Block). Die-back of European larch in P.30 areas (Blengdale). Hope of recovery. <u>Argyresthia</u> damage noted. Norway spruce, spruce; checked area on morainic knolls noted. (Main Block).	25. 8.1937	Divisional Officer

Subject	Comments	Date	Inspecting Officer
Choice of Species (Contd)	<p><u>Pinus contorta</u>; suggested for morainic knolls. European larch; given as best tree for any heather areas. Scots pine; recommended for checked Norway spruce and Sitka spruce. P.27 and P.28 areas.</p>	24.11.1937	Assistant Commissioner
	<p>Norway spruce/beechn P.26. Favourable comments. <u>Pinus contorta</u>; recommended for <u>Calluna vulgaris</u> knolls.</p>	14. 3.39	Assistant Commissioner
	<p>European larch. Causes of death suggested (Blengdale). European larch; treatment of clear felled areas. (Blengdale)</p>	15. 3.39	Assistant Commissioner
	<p>European larch; Japanese larch; Suitability for Main Block Sitka spruce; progress of early plantings. Norway spruce/beechn - favourable comments Norway spruce/Scots pine - general comments European larch - signs of canker in P.33, treatment discussed; brashing advised.</p>	24. 5.42	Chairman
	<p>Japanese larch; excellent growth rate noted. (Blengdale) European larch; treatment of diseased areas; discussion on choice of species for underplanting.</p>	8. 2.42	Assistant Commissioner
	<p>Sitka and Norway spruce; progress of early planting; establishment of forest conditions within 10 years forecast by Chairman. European larch; progress of P.39 and 40 areas noted (Main Block). Unsatisfactory condition at Lowther Park. Scots pine; recommended for gravel beds along River Liza.</p>	4. 9.44	Chairman
	<p>European larch; treatment of felled areas (Blengdale) Browning off of Scots pine Checked Sitka spruce and Norway spruce (Lowther) (Main Block).</p>	7. 6.49	Chairman
	<p>Good standard of European larch in Compartment 44 noted. Query as to presence of hybrid larch.</p>	27. 4.50	Director (E)
	<p>Seed collection from <u>Pinus contorta</u>; Ident. No: and origin queried. Favourable comments on Norway spruce/ Scots pine mixture.</p>	27. 4.1950	Director (E)
<u>Planting</u>			
(b) Type of Plants	<p>Criticism of poor root/stem ratio of Sitka spruce and suggestion of this as possible cause of checking.</p>	April 1930	Chairman
(c) Method of planting	<p>The depth of planting with the notch method was discussed. It was suggested as a cause for die-back in the Sitka spruce. Time of planting considered and comparison made between degree of success with autumn and spring planting; latter given as preferable.</p>	April 1930	Chairman
	<p>Pot experiments on scree</p>	(see appendix IV.)	
(e) Manuring	<p>Use of basic slag; its effect on checked areas on morainic knolls. Recommend for wet, flat areas adjoining River Liza.</p>	July 1932 August 1932	Mr. O.J. Sangar

Subject	Comments	Date	Inspecting Officer
<u>Planting</u> (e) Manuring (Contd)	Progress of slag experiments Beneficial effect of slagging noted Slagging of gorse areas. Recommended.	27. 7.1932 4.10.1937 14. 3.1939	Chairman Chairman Chairman
	Effect of slagging of checked areas. Prescription given (2 ozs per sq.yard)	14. 3.1939	Chairman
<u>Beating-up</u> (Including drainage)	Need for improved drainage near bed of River Liza.	24.10.1937	Assistant Commissioner
	Drainage criticised at Main Block Increased drainage required Drainage criticised	14. 3.1939 24. 8.1940 8. 2.1942	Assistant Commissioner Assistant Commissioner Assistant Commissioner
<u>Weeding</u>	Importance of early weeding in Sitka spruce planting, stressed.	4. 10.1937	Chairman
	Importance of weeding in European larch plantations.	13. 3.1939	Assistant Commissioner
	Cutting gorse before planting advised (Blengdale)	8. 2.1943	Assistant Commissioner
<u>Past Treatment</u>	Need for early thinning of European larch to minimise risk of die-back.	4. 9.1944	Chairman
	Thinning and brashing of Douglas fir and Sitka spruce (Blengdale)	29. 4.1948	Director (E)
<u>Conclusions</u>			
<u>Fencing</u>	Damage by scree; sheep trespass; fencing of Gillerthwaite holding.	8. 2.1943	Assistant Commissioner
	Systematic upkeep of fence line including regular inspections, prescribed.	27. 4.1950	Director (E)
	Difficulties of fencing on scree and value of enclosing badly stocked planta- tions on scree, discussed.	20. 6.1950	Conservator S.F.
<u>Amenities</u>	Use of barbed wire. Erection of stiles on recognised path.	24.11.1937	Assistant Commissioner
	Planting of hardwoods.	4. 9.1944	Chairman

History of Ennerdale Forest

APPENDIX II

Supervision

Year	Conservator	Divisional Officer	State Forests Officer	District Officer	Forester
1925	-	Hopkinson A. D.	-	Not Known	Not Known
1926	-	"	-	"	"
1927	-	"	-	"	Phelps S. E.
1928	-	"	-	"	Not Known
1929	-	"	-	"	"
1930	-	"	-	Batters G. J. L.	"
1931	-	"	-	"	"
1932	-	"	-	"	"
1933	-	"	-	"	"
1934	-	"	-	"	Smith W. T.
1935	-	"	-	Thom J. R.	"
1936	-	"	-	"	"
1937	-	Hopkinson A. D. Ross A. H. H.	-	"	Sharp G. A. (Foreman)
1938	-	"	-	"	"
1939	-	"	-	"	Close F. (Foreman)
1940	-	Thom J. R.	-	Edwards J. H.	King L. A.
1941	-	"	-	"	"
1942	-	"	-	"	"
1943	-	Backhouse G. W.	-	Watts H. C.	King L. A. Close F. (Foreman-Blengdale)
1944	-	"	-	Dixon E. E.	Hodgson C. A. Close F. (Foreman-Blengdale)
1945	-	"	-	"	"
1946	-	"	-	"	Hodgson C. A. Close F. (Foreman-Blengdale)
1947	A. H. H. Ross	-	Fitzherbert J. T.	"	"
1948	"	-	Mackenzie G. I.	"	"
1949	"	-	"	"	"
1950	"	-	Mackenzie G. I. Chard J. S. R.	Begley C. D.	Nelson D.
1951	"	-	Chard J. S. R.	Begley C. D.	"

History of Ennerdale Forest

APPENDIX III

Plant - Sources

Scardale	Hexham	Laughton	Nag's Head
Glenbranter	Delamere	Grizedale	Lynford
Rendlesham	Bedgebury	Myherin	Kirroughtree
Wyre	Altonside (Teindland)	Dalby	Chopwellwood
Thorntwaite	Dean	Hamsterley	Tintern
Kershope	Mortimer	Seaton	Craibstone
Wykeham	Benmore	Strome	Inchnacardoch
Amphill	Clipstone	Widehaugh	Kielder
Newton	Drumtochty	Weeting	Knowle
Tair-Onen	Clocaenog	Knowle	Melton-Constable
Dovey-Corris	Bawtry	Deerleap	Halwill
Herodsfoot	Wareham	Tulliallan	

History of Ennerdale Forest

Abbreviations

APPENDIX IV

Rates of Growth - Species and Sites

Elev. - Elevation
 Grad. - Gradient
 Ht. - Height
 M. A. I. - Mean Annual Increment
 C. A. I. - Current Annual Increment
 Q. G. - Quarter Girth

MAIN BLOCK W. S.

Compt.	P. Y.	Species	Aspect	Elev.	Gradient	Geology	Soil	Vegetation	Ht.	M. A. I.	C. A. I.	Q. G.	Comments
82-80	39	European larch.	South	550'	1' in 6'	Borrowdale Volcanic Series Granophyre	Rocky gravel well drained.	Fell pasture grasses and bracken.	16'	15"	15"	2 $\frac{3}{4}$ "	No signs of serious disease.
30	28	Sitka spruce	South	550'	1' in 8'	do	do	do and some <u>Calluna</u>	30'	15"	30"	3 $\frac{3}{4}$ "	
24	28	Sitka spruce	South	750'	1' in 6'	do	do and thin peat	<u>Calluna</u>	10' 6"	5" 3"	15" 9"	-	
22	28	Norway spruce	South	700'	1' in 6'	do	do	Vac. and fell pasture grasses	18'	9"	12"	2 $\frac{3}{4}$ "	
44	37	European larch	North	400'	1' in 10'	do	Gravelly glacial drift.	Fell pasture grasses and bracken.	22'	18"	20"	3	Very Healthy
46	37	Japanese larch	North	420'	1' in 10'	do	do	do	25'	20"	20"	3	
77	33 33 33	Sitka spruce " "	South	500' 700' 750'	1' in 4' 1' in 4' 1' in 6'	do do do	Rocky-gravelly well drained. do	Fell grasses gorse and bracken " "	25' 12' 20'	16" 8" 13"	20" 24" 24"	3 $\frac{3}{4}$ " - 2 $\frac{1}{2}$ "	
93	40	European larch. Japanese larch.	South South-west	750' 800'	1' in 6'	do	do	do and bracken and gorse.	15' 6'	15" 6"	15" 8"		Very Exposed
100	42	Sitka spruce	S. east	900'	Nil	do	Peat	<u>Calluna</u> and <u>Scirpus</u> .	5'	6"	6"		
98	42	Sitka spruce	N. east	900'	Nil	do	"	"	7'	8"	10"		
97	38	Japanese larch.	South East	800'	1' in 8'	do	Thin peat over glacial drift.	Fell pasture grasses with local bracken & occ. <u>Calluna</u> .	12'	10"	12"	2 $\frac{1}{2}$ "	
81	34	Sitka spruce	East South East South	750' 500'	1' in 10' 1' in 8'	do	do Rocky gravel	<u>Molinia/Des. flex</u> local bracken Fell grasses	25' 20'	16" 13"	24" 24"	3 $\frac{1}{2}$ " 3 $\frac{1}{2}$ "	
32	34	Sitka spruce	North	900'	1' in 4'	Borrowdale Volcanic Granophyre	Rocky gravel	Fell grasses nardus occ. <u>Calluna</u> .	18'	12"	18"	2 $\frac{3}{4}$ "	
31	26	(a) Norway spruce (b) Scots pine.	North	900'	1' in 6'	do	do	<u>Calluna</u> Frequent in places	(a) 30' (b) 25'	14" 11"	20" 18"	3 $\frac{1}{2}$ "	2/1 mixture of Norway spruce/Scots pine

LOWTHER PARK W.S.

Compt.	P. Y.	Species	Aspect	Elev.	Gradient	Geology	Soil	Vegetation	Ht.	M. A. I.	C. A. I.	Q. G.	Comments
1	32	Sitka spruce	South West	600'	1 in 8	Borrowdale Volcanic Series Conglomerates, tuffs and andesite sites.	Clay loam (Glacial drift) with peat of varying depth.	<u>Molinia</u> <u>Des. Flex.</u> loc. <u>Juncus</u> spp. and bracken.	20'	12"	16"	3½	
2	32	Japanese larch Sitka spruce	South West	850'	1 in 8	"	"	do plus loc. <u>Calluna</u> <u>Vaccinium</u>	13'	8"	14"	2½	
4	34	Sitka spruce	North & West	900'	Nil 1 in 4	"	"	• "	(a) 16' (b) 6'	11" 4"	16" 7"	2¼	(b) in check
5	33	Sitka spruce	S. W. & West	600' to 800'	1 in 4 to 1 in 8	"	Clay loams & outcrops	Mardus: loc. <u>Molinia</u> <u>Juncus</u> and bracken.	(a) 22' (b) 13'	14" 8"	20" 16"	3½ 2½	(a) 600' (b) 800'
6	35	Sitka spruce	N. S. E. & W.	800'- 900'	do	"	Gravelly-loam localised peat	do	(a) 6' (b) 18'	4" 12"	7" 16"	-	(a) checked
8	35	(a) Norway spruce (b) Sitka spruce	North-west	500' 800'	do	do	Clay loam plus outcrops	do	(a) 16' (b) 18'	11" 12"	18" 22"	2¼ 2¾	
10	36	Sitka spruce	North-west	500'- 800'	do	do	Gravelly loam becoming heavier in pts.	Mardus <u>Scirpus</u> <u>Vaccinium</u> local <u>Alnus</u>	15'	11"	18"	2½	
12	36	Sitka spruce	South	900'	1 in 8	do	Gravelly loam with local peat.	do	8'	6"	9"	1½	

Abbreviations Elev: - Elevation
Grad: - Gradient

Ht. - Height
M. A. I. - Mean Annual Increment

C. A. I. - Current Annual Increment
Q. G. - Quarter Girth

Cmpt.	P. Y.	Species	Aspect	Elev.	Grad.	Geology	Soil	Vegetation	Before Thinning			Yield C. F. per acre			Comments	
									Ht.	M. A. I.	C. A. I.	Q. G.	1st Thinning	2nd Thinning		3rd Thinning
9	30	Douglas fir	East	400-600	1 in 4	Borrowdale Volcanic Series Andesites.	Shallow, sandy glacial drift overlain by gravely mineral soil.	Des. flex. Agrostis spp. Holcus lanatus local. Bracken local.	35'	19"	30"	3 1/2	350 (400 trees)			1949 Data Douglas fir 1200 stems p. acre before thinning.
		Scots pine							30'	16"	24"	3 1/2	430 (370 trees)			Scots pine 1200 stems p. acre before thinning.
		Sitka spruce							30'	16"	30"	3 1/2	656 (600 trees)			Sitka spruce 1550 stems p. acre before thinning.
2	34	Japanese larch	West	300	1 in 4	"	"	" excluding Des. flex.	25'	19"	24"	3 1/2	Not recorded	193 (220 trees)		1950 Data 1000 stems p. a. before thinning.
1	33	"	East	300-400		"	"	"	30'	21"	24"	4	"	450 (280 trees)		800 stems p. a. before thinning.
7	30	Sitka spruce	East	300-400	1 in 6	"	"	"	30'	18"	24"	2 1/2	"	Not recorded	400-500 (450-550 trees)	1470-1540 stems per acre before thinning.
6	30	Sitka spruce	West	300-400	1 in 6	"	"	"	25'	14"	20"	3	"	360 (300 trees)		1951 Data 800 stems p. a. before thinning.
8	30	Douglas fir	East	300-400	1 in 6	"	"	"	31'	18"	24"	3 1/2	"	490 (370 trees)		910 stems p. a. before thinning.
10	30	Douglas fir	East	300-400	1 in 6	"	"	"	33'	18"	24"	3 1/2	"	420 (310 trees)		870 stems p. a. before thinning.

Abbreviations
 Elev: - Elevation
 Grad: - Gradient
 Ht. - Height
 M. A. I. - Mean Annual Increment
 C. A. I. - Current Annual Increment
 Q. G. - Quarter Girth

History of Ennerdale Forest

APPENDIX V

Scree Planting Experiments

Following a suggestion made by the Chairman on a visit on 27th July 1932 seedlings were planted in pulp pots on the scree with the idea that the included soil might give them a sufficient start to become established and grow on after the pots had rotted. The pots were put out at irregular spacing in the deeper crevices of the scree. Subsequent trials made use of transplants.

The Chairman kept a keen interest in the progress of these experiments and called for reports from time to time. A list of the inspection reports in which reference is made to this is given below, and a comparison of assessments made on 22.10.40 and 9.2.52 is appended.

27th July	1932
5th August	1934
4th October	1937
25th November	1937
14th March	1939
24th May	1942
4th September	1944
7th June	1949

ENNERDALE SCREE PLANTING EXPERIMENTS

Experiment 8 P. 33.

Compt.
28 & 30

Area
0.75

Planted
P. 33

B. U.
F. Y. 38

Species
S. S.
N. S.

Age
3 + 0
2 + 1

Ident
-
-

Plot	Date of Assessment	Species	Deaths	Total Height		Stocking	Health	Colour	C. A. I.		Form	General
				Max.	Min.				Max.	Min.		
A	22.10.40	Sitka spruce	-	-	-	-	-	V. Good	16"	3"	Good	Now firmly established
	9. 2.52	Sitka spruce	-	5'	12½'	Poor 6-8 stems	Good	-	10"	2"	Good	-
	22.10.40	Norway spruce	33%	-	-	-	-	Excellent	7"	1½"	-	Deaths intermittent
	9. 2.52	Norway spruce	-	1'	2'	30 Plants	Poor	-	4"	1"	Stunted	-
B	22.10.40	Sitka spruce	-	-	-	-	-	Good	15"	2½"	Good	Now firmly established
	9. 2.52	Sitka spruce	-	5'	12½'	Poor 6-8 stems	Good	-	10"	2"	Good	-
	22.10.40	Norway spruce	40%	-	-	-	-	Good	5"	1"	-	Deaths intermittent
	9. 2.52	Norway spruce	-	1'	2'	30 Plants	Poor	-	4"	1"	Stunted	-
C	22.10.40	Sitka spruce	-	-	-	-	-	Good	24"	2"	Good	Now firmly established
	9. 2.52	Sitka spruce	-	5'	12½'	Fair	Fair	-	10"	2"	Fair	-
	22.10.40	Norway spruce	30%	-	-	-	-	Fair	6"	3"	-	Death intermittent
	9. 2.52	Norway spruce	-	1'	2'	Poor	Poor	-	4"	1"	Stunted	-

Plot	Date of Assessment	Species	Deaths	Total Height		Stocking	Health	Colour	C. A. I.		Form	General
				Max.	Min.				Max.	Min.		
A	22.10.40	Sitka spruce	5%	-	-	-	Good	Good	9"	1"	Satisfactory	- Plot could not be located.
	9.2.52	Sitka spruce	-	-	-	-	-	-	-	-	-	
B	22.10.40	Sitka spruce	7%	-	-	-	Good	Good	14"	1½"	Satisfactory	- - 2 Plants remain
	9.2.52	"	-	3'	6½'	Moderate	Moderate	-	8"	2"	Satisfactory	
	9.2.52	Tsuga	-	-	-	-	-	-	-	-	-	
C	22.10.40	Sitka spruce	7%	-	-	-	-	Fair	7"	1"	Satisfactory	- - None remain
	9.2.52	"	-	2½'	3'	V. Poor	Poor	-	4"	1"	Satisfactory	
	9.2.52	Tsuga	-	-	-	-	-	-	-	-	-	

Experiment 13. P.37.

Plot	Date of Assessment	Species	Deaths	Total Height			Stocking	Health	Colour	C.A.I.		Form	General
				Max.	Min.	'Av.				Max.	Min.		
A (C.30)	22.10.40	European larch	20%	-	-	-	-	Excellent	Excellent	24½"	2"	-	A grand plot
	9.2.52	"	-	4'	18'	-	Poor	V. Good	-	12"	2"	Good	-
	22.10.40	Scots pine	5%	-	-	-	-	V. Good	V. Good	12"	4"	Good	-
	9.2.52	"	-	1½'	4'	-	Poor	V. Good	V. Good	12"	2"	Good	-
B (C.28)	22.10.40	European larch	35%	-	-	-	-	Wind blasted)	Poor	9½"	1"	-	Very exposed
	9.2.52	"	-	10'	12'	-	Poor	Poor	10"	2"	Stunted	-	
	22.10.40	Scots pine	40%	-	-	-	-	Poor	Poor	4"	1"	Stunted	-
	9.2.52	"	-	-	-	-	-	-	-	-	-	-	None remain
C	22.10.40	Sitka spruce	26%	-	-	-	-	-	Good	9"	1"	Satisfactory	Mostly uniform
	9.2.52	"	-	15'	8'	-	Poor	Fair	-	10"	2"	Satisfactory	-
	22.10.40	Scots pine	32%	-	-	-	-	Moderate	-	6"	2"	Fair	Exposed in part.
	9.2.52	"	-	-	-	-	-	-	-	-	-	-	Not recorded.

38/45 ex Kershope

1 + 0

J.L.

P.40

1.0

91

Plot	Date of Assessment	Species	Deaths	Total Height		Stocking	Health	Colour	C.A.I.		Form	General
				Max.	Min.				Max.	Min.		
A	22.10.40 9.2.52	Japanese larch "	66% -	- 9'	- 2½' 5'	- Very low	Fair Good	Fair -	2" 6"	¼" 1"	Satisfactory Poor	∅ -
B	22.10.40 9.2.52	Japanese larch "	50% -	- -	- -	- -	Fair -	Fair -	7" -	½" -	Satisfactory -	∅ Plot could not be located.
C	22.10.40 9.2.52	Japanese larch "	60% -	- -	- -	- -	Fair -	Fair -	3" -	¼" -	Satisfactory -	∅ Plot could not be located.

∅ Seedlings too small as shown by largest plants doing the best. Drought after planting caused many deaths.

Ennerdale

ENNERDALE



SALTER AND
ESKETT

Broad moor

BUTTERMERE

BUTTERMERE

ENNERDALE. (MAIN BLOCK) W.S.

LOTHER PARK W.S.

Uldale
Fell

ENNERDALE AND KINNISIDE

Lingmill

Black Sail Barky

Black Sail

HAILE

Cold
Fell

STOCKDALE
MOOR
BLENGDALE W.S.

NETHER WASDALE

BECKERMET

WAST
WATER

PONSONBY

SCALE: 2 1/2 INCHES TO ONE MILE.

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