

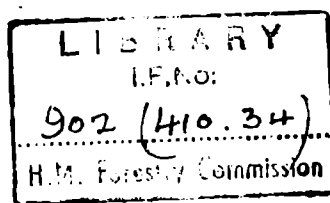
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HISTORY
OF
TWIGLEES

FOREST
S(S) CONSERVANCY

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FORESTRY COMMISSION

HISTORY

of

TWIGLEES FOREST

1938 - 1952

SOUTH (SCOTLAND) CONSERVANCY

History of Twiglees Forest

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HISTORY OF TWIGLEES FOREST

CHAIRMAN'S COMMENTS

By the time Twiglees came under consideration for acquisition we were confident that we could afforest the greater part of it with success, though there was a possibility that the climate was somewhat harsher than in the similar forests south of the Border.

Of great interest to me was the introduction of tractor ploughing with the double object of drainage and providing turfs for spruce planting. It came about in this way: J.M. Murray purchased a John Deere (a wheeled paraffin tractor) in December 1938 and set it to work at Loch Ard (165 acres were ploughed there up to April 1940) with a solotrac plough. I saw it in operation soon after, and was impressed with the potentialities of ploughing along the Border. I therefore arranged for the outfit to be transferred to Twiglees, where a successful demonstration was staged at which were present the two Assistant Commissioners, the Divisional Officers concerned with Border forests, and myself. This was in June 1939. Between then and December 1939 successful trials were also made at Wark Forest. It was this pioneer work which began the large planting programmes which have since been carried out on both sides of the Border.

When I inspected Twiglees in May 1950 after an interval of 4 years I was somewhat disappointed at the rate of growth, which was due to the severe winter of 1944/45 and the unusual spring frost of 1947. By the time I visited the forest again in 1952, however, the favourable growing conditions had greatly improved appearances, and I am sure that we can count on good and quick-growing plantations over the major part of the area.

Another point noted in 1952 was the importance of providing Land Rover tracks over which fire-fighting equipment and men can be rapidly transported. These tracks should be so sited that they can subsequently be developed into extraction roads.

I asked in 1950 and again in 1952 that Twiglees Wood should be taken in hand by Research Branch and used for systematic investigation into the treatment of wind-blows; some have already occurred and as necessary further openings can be made to simulate blows. This question is of

great importance and should not be further neglected.

I was disappointed with the result of the experiment on sheep grazing in spruce plantations which was made at Twiglees, and wish I had insisted on it being carried further. I found recently that Mr. Oliver is doing the same sort of thing with success in some of the Scotland (East) forests.

R.

July 26th 1952.

COMMENTS BY CONSERVATOR OF STATE FORESTS

Preparation of Ground

I do not feel that the plough drains running uphill at Twiglees constitute a serious threat to future erosion. On short lengths and on a slope which has no great watershed behind it I do not feel that there is any great danger. The greater part of the plough drains at Twiglees were done by a very experienced ploughman and by and large I was under the impression that they were entirely satisfactory.

J. R. T.

28th July, 1952.

HISTORY OF TWIGLEES FOREST

GENERAL DESCRIPTION OF THE FOREST

Situation

The Forest of Twiglees lies in the County of Dumfries and mainly in the parish of Eskdalemuir, although a small area lies within the parish of Hutton and Corrie. Lockerbie is the nearest town and is ten miles to the south-west; Langholm is about fifteen miles to the south-east. The forest is surrounded by sheep farms except on the east where it marches with Castle O'er Forest.

Area and Utilisation

The first and principal acquisition consisted of the farm of Twiglees extending to 4146 acres, which was purchased from The Buccleuch Estates Ltd., in 1938. Twiglees was a well known sheep farm carrying about 120 score Cheviots with a few dairy and store cattle. There was a little over 100 acres of inbye land, none of which had been ploughed for many years. The farm was considered to have deteriorated in the immediate years before its sale. About 40 acres of woodland, mainly Norway spruce with a little Scots pine were included in this acquisition.

The farm of Todshawhill was purchased in 1940 from Adam I. Rutherford, Esq. This farm, which adjoined Twiglees on the east, added 525 acres to the forest area. About 50 acres consisted of inbye land and the remainder of hill grazing. It is estimated that the stock amounted to about 15 score Cheviots.

In 1946 a further 437 acres were purchased from John King, Esq. This acquisition formed part of the farm of Tanlawhill and, owing to a more economic concentration of stock on the remaining two hirsels of the farm, a reduction of only about five or six score Cheviots was entailed.

Further acquisitions consisted of a cottage in 1946 from Dumfries County Council and 29 acres of land in 1949 from John L. Lockhart, Esq. This last small area was acquired at the owner's request and without cost to give a more convenient boundary with Tanlawhill Farm.

In brief, therefore, the total acquired area consisted of 5137 acres,

and for this a little under £17,000 was paid. The total former sheep stock carried was about 140 score Cheviots.

In the main acquisition of Twiglees the land was let to the Buccleuch Estates for grazing. Provision was made for annual resumptions of planting areas, and a number of temporary fences were erected in advance of the planting until 1947 when the stock was finally cleared from the area. The needs of the sheep stock affected the management considerably, and the first areas planted were perforce those nearest the march and therefore the most distant from the main road. In addition, after the first year's planting in 1939 when it had been decided to plant first all the ground to the west of the Black Esk, a change had to be made to the east of the river for the 1940 and 1941 plantings to allow the continuation of certain experiments being conducted by the Animal Diseases Research Association (Edinburgh) who had the use of about 600 acres from 1939 to 1943.

It is interesting to note that as an experiment to determine the effect of sheep on newly planted trees, the area planted in 1939 was left unfenced. Practically all the trees were pulled out within a few weeks and the area was fenced during the summer.

In both the Todshawhill and Tanlawhill sections all the stock was removed at the time of acquisition.

From 1941 to 1946 the forest, except the Todshawhill section, lay within the target area of an Army practice range, which greatly increased the difficulties of management since access to certain areas could be obtained only in the evenings and at week-ends. The actual damage done was only to march dykes and fences for which compensation was later obtained.

The whole forest has been let for game shooting since its formation and the fishing rights in the Black Esk have been let jointly with the rights in the White Esk in Castle O'er Forest since 1940.

Table Showing Utilisation of Land.

a) Plantations -		
Acquired	36	
Formed by Commission	<u>4529</u>	4565
b) In hand awaiting planting -		
Blanks after felling	-	
Burnt areas	-	
Other land	<u>215</u>	215
c) Nurseries		
d) Agricultural - number of tenancies 8		
	area	127.3
e) F.W.H. Number - 3		
	area	48.2
f) Unplantable land in hand		
		181.75
g) Other land		
		-
	Total	<u>5137.25 acres</u>

Physiography

The forest lies among the rounded hills of the Southern Uplands and is situated on the high ground between the two north-to-south valleys of the Annan and the Esk. The Black Esk, itself a tributary of the Esk, runs through the area from near its source and all the land within the forest boundaries drains into this river, usually by way of a number of burns. The main and central part of the area forms an undulating plateau lying to the east and north of the Black Esk and varying in height from 700 ft. to 1100 ft. To the west of this river and parallel to it runs a ridge which forms the western march of the forest. At the northern end of this ridge lies the highest point of the forest - a little over 1300 ft. To the east of the central plateau lies another north-to-south ridge draining into the Black Burn which is a tributary of the Black Esk.

The general tilt of the central plateau and its two flanking ridges is to the south. All aspects are represented but generally the land is exposed to the south-west and south-east. Nowhere is there a steep slope.

Geology and Soil

The underlying rocks consist of grits and shales of the Tarannon series of Upper Silurian age. A massive intrusive dyke of basalt runs through the area from north-west to south-east and outcrops on numerous hilltops and ridges. The whole area has been affected by glaciation and the lower slopes are covered with boulder clay. The flats in the valley bottoms of the Black Esk and some of its tributaries are made up of recent alluvium derived from glacial drift. Peat occurs frequently on the high ground but is generally of little depth and of a good type, except in occasional flats and depressions, especially on the central plateau, where deep basin peat has formed. Where the soil is exposed it consists of a stony red clay loam.

Vegetation

Molinia caerulea is found at all elevations except in the valley bottoms. This grass often grows with Nardus stricta, with Agrostis species and Eriophorum. Aira and Holcus species occur frequently on the lower slopes and rushes are found at all elevations. Calluna vulgaris is occasionally co-dominant with Molinia.

It is interesting to note that before planting began it was recorded that there was little if any Calluna, apart from that on the deep peat flats while in a vegetational survey carried out in 1951 Calluna was classified as at least "frequent" over about 250 acres apart from the deep peat flats. In the depressions where deep peat has formed, Calluna, Erica tetralix, Scirpus and Sphagnum species occur with frequent Narthecium and Eriophorum species.

Climate

Although lying in the middle of an inland mass, the area is still within the influence of the "West Coast" climatic sub-division of Great Britain. Rainfall is between 55 in. and 60 in. per year and is fairly well distributed over the whole year; the period of the late spring and early summer is the driest time and the early winter the wettest. Snow is frequent and may lie for some time over an elevation of 1000 ft. Only in July is frost exceptional and spring frosts are common and may be severe. The prevailing wind is from the south-west and gales are frequent from this

direction and from the north.

Fire Protection

a) Risks

The main danger period occurs in the spring-time during the season of muirburning, when the risk of a fire spreading from adjoining land is very great. This period fortunately does not last long, and it is very unusual for there to be acute fire danger at other times of the year. Apart from the risk from muirburning, traffic passing through the forest on the Lockerbie to Eskdalemuir road constitutes a danger and there is always a certain risk from the forest staff.

A new danger was added during the war years when the forest was used as the target area for Army firing practice. A few small fires were started by shells but all these were extinguished without damage to any plantations. The Army authorities were alive to the danger from shell, mortar and small arms fire and co-operated well to give immediate warning of fire.

b) Traces

A fire trace has been formed along each dangerous march. This trace consists of a drain, and a strip half a chain wide burned under control annually. Internal traces have been formed by controlled burning along the sides of the main road by the planting of Japanese larch on the banks of streams and by mowing selected internal rides. While stock was still grazed and the plantations formed were protected internally by temporary fences, a strip was burned annually along the lines of these fences and after this was completed the rest of the unplanted area was burned. A wide cattle grazing strip divides the main block of Twiglees from the smaller area of Todshawhill and Castle O'er Forest.

c) Methods of Detection

A fire tower was constructed on Castle O'er Forest in 1946 and this tower overlooks most of Twiglees as well as Castle O'er. Patrols were employed up to the year after the tower's erection. A field telephone system connecting the two forests was installed in 1946 and a joint Standing Fire Plan was first written in 1944.

d) Access

When the area was taken over there were $2\frac{3}{4}$ miles of useful roads and tracks leading to the main county road through the area. A further 2 miles of metalled road have been made up to 1951, but there are still parts of the forest up to two miles from a metalled road; especially difficult of access are many of the marches. During 1951 a beginning was made in the construction of Land Rover tracks; these tracks, it is hoped, will eventually give access to all the high and distant parts of the forest.

e) Fires

Only one serious fire has occurred; on 2nd March, 1946, during a period of acute danger when there was a hard frost, a fire spread on to the hill land from a rubbish dump in the garden of the shepherd's cottage at Garwaldshiels, less than half a mile from the forest march. A north-east wind carried the fire into the north-west tip of the forest where it burned back into the 1939 and 1940 plantations. The large number of men assembled to fight the fire were greatly handicapped by being unable to wet their sacks as all water in drains and pools was frozen. After a few hours the wind turned to the south-east and carried the fire out of the forest. In all 47 acres were destroyed and the damage was assessed at £550. The claim against the owner on whose ground the fire started was eventually settled for £350.

Other Protection

(a) Animals.

Hill sheep farms carrying both blackface and Cheviot stocks adjoin the forest and stock fences have always been necessary. Considerable trouble was caused by the breaking down of march dykes and fences by shell fire when the forest was used as a firing range.

Rabbits were very numerous, especially around Twiglees Wood and near Sandyford, from 1938 until 1941 by which time constant trapping and shooting had reduced them to a very small number; they have never increased since then. There have never been many hares in the area and damage has been negligible. Foxes have always been numerous, especially in the Blackeskhead area and on the adjoining hill land.

One roe deer was seen in Twiglees Wood in 1939 and one was seen on the recently planted area of the Whirl Rig at the north of the forest in 1943. From then until 1950 deer were increasingly often seen although never more than two at a time. In 1951, however, eight were seen together in the area of the Black Burn on the eastern march. It seems certain that the population will increase very greatly in the next ten years.

Black game have always been scarce although there has been evidence in the past two or three years that they are increasing slightly. A trapper has been employed since the first days of the forest.

(b) Climatic Conditions

Frosts and cold east winds in the spring have caused damage from time to time. In the winter of 1946-1947 turfs were frozen and most of the plants planted in the early winter were killed. Only one severe late spring frost has occurred - in 1945 - when considerable damage was caused. Wind-blow has occurred at two places on the margins of the Twiglees Wood; in each case the trees have been blown in the direction of the middle of the wood, i.e. in one case by a north-east wind and in the other by a south-west wind. In 1951 most of the newly planted Norway spruce plants lost their needles in a long spell of cold, dry east winds. Recovery, however, has been rapid and almost complete.

Erosion has begun in drains cut at too steep an angle and this trouble will certainly increase in the future wherever the alignment of the drains has been incorrect.

Roads

Apart from the three miles of main county road which runs through the forest from south-west to north-east there were $2\frac{3}{4}$ miles of metalled roads within the area at the time of acquisition. A beginning was made at once with the improvement of the road from Sandyford to Kilburn. This was completed in 1941 and in 1947 the track from Tanlawhill to the south-eastern tip of the forest was metalled. In 1947 also a start was made with a road from near Kilburn towards the P.39 area and in this year too a road from Twiglees towards the Hog Knowes was begun. This latter road has been continued from time to time since then.

Housing

In the original acquisition of Twiglees there were included six houses. Blackeshead was a partial ruin and has never been occupied. Twiglees farmhouse became the forester's house in 1938 and entry was also obtained immediately into the house now known as Forest Worker's Holding No.3. Entry into Kilburn was obtained in 1943 and 15 acres of ground are let with this house at present as seasonal grazing. Entry into Sandyford was obtained in 1947 and to the houses known as Forest Workers Holdings Nos.1. and 2 in 1948. In this year, too, entry into the whole of the steading at Twiglees was obtained. The three holdings were all scheduled as such in 1948.

Todshawhill Farmhouse was occupied in 1947 and is let at present as a farm of 49 acres with some additional seasonal grazing: the tenant of Marlside joined the forest staff in 1949 three years after the house had been sold to the Commission.

In the Tanlawhill acquisition there was included the cottage of Sandyfords, and entry into this house was obtained in 1947.

In 1947 three timber houses were built and occupied the following year, and in 1950 a further four timber houses were occupied.

Thus, although for five years there was only one house available apart from the forester's, by 1951 there were fifteen houses on the forest and the nucleus of a permanent forest staff had been formed.

Labour

For the first two years the staff numbered about six, only one of whom actually had a house on the forest. The remainder travelled daily from their homes, distances of up to four miles. In 1940 about fifteen conscientious objectors were sent to the forest and these men, together with about five local men, formed the labour force up to 1945. During the war years Castle O'er Forest was in the charge of the Twiglees forester and the labour force of the two forests was frequently switched from one forest to the other. Newfoundland loggers working at Castle O'er helped to carry out the P.40 planting programme.

Management was made very difficult by the fact that entry to certain

parts of the forest could be obtained only at week-ends and in the evenings owing to firing practice. Generally the quality of the workers employed during the war was not good. Prisoners of War and some Polish workers were used in 1946 and 1947. In 1947 men were transported by lorry from Boreland and later from Lockerbie, and this practice has continued since then. In the immediate post war years the running of this lorry increased the squad greatly and by 1948 thirty to forty men were employed. From 1949 to 1951 the average number of men employed has been about thirty. Most of the hand draining, turfing and planting has been done on piecework.

SILVICULTURE

As has already been stated great inconvenience was caused in the first five or six years by the requirements of the grazing tenants and during the war by the limitations on access imposed by the use of the forest as a firing practice area. The portion of the forest most distant from the main road had to be planted first to aid the herding of the sheep and then the scheduled planting area had to be altered, first to accommodate Animal Research experiments and later because the area formed part of the target area. The result has been that to reach the first thinning areas two to three miles of road through younger unproductive plantations will have to be made. In addition the first three years plantings are six miles by road from the next two years plantations, which will not make for ease of management in the thinning stage.

Although 450 acres were considered unplantable at the time of acquisition no areas have, in fact, been left unplanted. In 1951 it is thought that about 50 acres which have been planted might have been excluded.

Preparation of ground

Until the stock was cleared from the area in 1947 the ground still being grazed was burned annually, partly as a safety measure and partly for the benefit of the stock. This no doubt helped to suppress the heather among the Molinia which has become evident over much of the area in the past few years. For the first year's planting in 1939 the ground was prepared by hand draining at twenty-one feet intervals and the spreading of turfs between the drains. From 1940 onwards most of the preparation

was carried out by ploughing, the first trials being made in the summer of 1939. All types of typical Border country ground were ploughed, from mineral soil of red clay loam, through shallow peat overlying boulder clay, to deep peat heather bogs. The plough was the Ransome Solotrac and this was pulled by a John Deere tractor; the type of ground first tried was typical "white lands" ground - three to nine inches of amorphous peat over boulder clay; a shallow turf of about eight inches in depth was turned out. This plough was used at Twiglees up to 1945 although a stronger version - the Morrison - was tried in 1943. This improved type gave a deeper turf of about ten to twelve inches. The Cuthbertson single-furrow plough was first tried at Twiglees in 1946 when it was pulled by a Caterpillar D.4 tractor. This plough, improved from time to time, was used up to 1950 in conjunction with Caterpillar D.4, International T.D.9 and Fowler tractors. In 1948 a short trial was made with the Cuthbertson double-furrow plough. This was not very successful as the drains made were shallow and the wedge-shaped turfs were apt to turn over and were difficult to plant in. The Begg plough was first used in 1949 and this plough, hydraulically mounted on a Caterpillar D.4 tractor, was introduced in 1951.

The Cuthbertson single furrow plough was a great improvement over the solotrac since a drain about eighteen inches deep was made and a larger turf turned out. The early models, however, still had one fault of the solotrac - the line of turf turned out lay too near the drain side. Later models, however, have overcome this trouble and the turf ridge thrown up by this plough from 1949 onwards has been at least three feet from the drain centre.

The Cuthbertson single furrow plough has been used more generally on the forest than any other type and has proved a very successful draining tool and turf producing machine. The main type of ground ploughed with this plough has been the typical shallow peat over boulder clay of this area; this plough has also made excellent drains in deep peat bogs.

The Begg plough has been used mainly for mineral soils with little or no peat. It has in emergency, however, ploughed areas of deep peat with moderate success but has the disadvantage of laying the furrow immediately on the drainside.

The solotrac plough was used either at intervals of five feet, or twenty-one feet on the better ground. The Outhbertson single furrow plough has been used at intervals of ten, seventeen, twenty-two, and twenty-seven feet. Only small areas of deep peat have been ploughed at ten feet; the main interval has been seventeen feet, and the twenty-one feet spacing has been used only on mineral soil, and the widest spacing of twenty-seven feet was used in 1951 in conjunction with Begg ploughing at five feet. With all types of ploughing the joining up of the ends of plough drains and the clearing of areas where the drains have been blocked by the falling back of the turf ridge is essential. During the period when the forest was used as a firing range it was not possible to carry out this necessary work of sorting up. In the years of the large planting programmes from 1947 to 1950 it was again often impossible to carry out this essential sorting up; in fact the work of the later period was not completed until 1951.

The development of the hill draining ploughs has enabled good drains to be made fairly cheaply and very economically in man-power. One major mistake has, however, occurred - too little attention has been paid to the correct alignment of the drains. Over large areas of Twiglees plough drains run steeply downhill and only rarely are contours followed in the long gentle sweeps of the well laid out drain. The reason for this has been partly due to a lack of understanding of the inefficiency of a steep drain and partly to the fact that the turf thrown out of a drain correctly aligned on the contour is apt to roll down the hill or back into the drain. Now that the thicket stage has been reached in many areas the prohibitive difficulties of correcting the alignment of the original drains may easily be seen.

A certain amount of hand draining has been done each year. With ploughs not hydraulically mounted the large turning circle and the inability to back make impossible the ploughing of many areas. The hand dug drains at Twiglees are nearly always better aligned than the plough drains and the system of connecting up always superior to the improvised connections of the plough drains.

With both hand draining and draining by plough at all spacings other than five feet upturned turfs have been spread at the required interval between the drains. With the solotrac and the Begg ploughs, these spread

turfs have been small, often too small to be satisfactory. In part this has been due to the difficulty of spreading a turf of crumbling mineral soil.

With hand draining, too, turfs spread have often been inadequate in size on heathery ground.

Up to 1949 no particular attention was paid to the distance from the drainside of the nearest trees. At that time, however, the lessons of other forests in the thinning stage on similar "Border" ground were applied, and no trees were planted nearer the centre of a drain than three and a half feet. In 1950 three experimental spacings were tried of 3 ft. 9 in. 4 ft. and 4 ft. 3 in. from the drain centre.

Choice of Species

At the time of acquisition it was thought that Sitka spruce would form 50% of the crop, Norway spruce 45% and other conifers 5%. This estimate has proved roughly correct as at the end of 1951, with less than 100 acres still to be planted, Sitka spruce covered 60% of the area, Norway spruce 34% and the remaining 6% consisted of Japanese larch, Pinus contorta, Picea omorika and Scots pine. With the experience of other similar areas to draw on, the mistake of planting Sitka spruce in frosty hollows was avoided. Generally this species has been kept to the true "white lands" of Molinia peat and to the higher exposed areas. Norway spruce has been planted in flushes and on the better land of the lower slopes, but where there has been shelter from the surrounding ground and no Eriophorum appeared with the Molinia, Norway spruce has been planted up to an elevation of 1000 ft. On dry banks in the valleys Japanese larch was used. Pinus contorta was planted pure in 1939 and 1940 on a few small deep peat bogs of heather and Scirpus, but no further contorta was used until 1951, although many small areas of poor ground could, with advantage, have taken this species in mixture with Sitka spruce; in the war years, however, Pinus contorta plants were scarce. During the years of the large programmes (1947 to 1950) the difficulties of supervision made for less careful differentiation between ground suitable for Norway spruce and ground suitable for Sitka spruce. Over the whole area only a little over 1% consists of mixtures and almost all of this is a Norway spruce/Sitka spruce mixture of alternate single lines. A small area of Pinus contorta/Sitka spruce in alternate four rows was planted in 1940,

and a larger area of the same mixture was used in alternate triple rows on a deep peat heather bog in 1951.

Planting

Planting has generally been carried out in the spring; after the end of January, whenever the weather was suitable, a start was made and planting usually continued up to the beginning of April. Winter planting was tried in 1945 and 1946; the first year was successful but in the severe winter of 1946/47 the plants were frozen in the turfs and practically all had to be replaced. Within the last six years 1948 was one of the most successful years, probably due to a very wet spring.

Transplants have been used mainly. In the early years 2 + 1 and 2 + 2 spruce were the main types with occasional 1 + 1 Japanese larch; most plants came from Fleet or Kirroughtree nurseries. Recently practically all Norway spruce has been 2 + 2 transplants although Sitka spruce transplants have varied greatly; the main types have ranged from 1 + 1 to 2 + 2 plants. Seedlings were first tried in 1941 when three year Japanese larch seedlings from Kirroughtree were used. Apart from some Research Branch experiments no further attempt to use seedlings was made until 1949 when two year heathland Sitka spruce seedlings were used and proved a success. The following year the same type of plant again did well but three-quarters of the three year Sitka seedlings from Tulliallan died; two year Japanese larch were also a failure. Two year Sitka have again been used in 1951 and there seems no reason why large seedlings should not be used on turfs on ground where no great growth of vegetation is expected. A high standard of planting, however, is of greater importance with seedlings than with transplants. In 1941 a "hill nursery" was formed at Blackeshead to carry a reserve of plants; spruce was lined out on hill ground by plough. This "nursery" was abandoned when Castle O'er nursery was established.

In the first few years the Mansfield spade was used with a "T" notch on five feet ploughing, but on twenty-one feet ploughing the single notch was used with the Dumfries dyking spade. The latter tool has been used for all turf planting for the past four or five years. Larch on the steep banks was planted with a mattock. With the low standard of worker employed during and immediately after the war much of the planting has been of only

moderate quality. In recent years the plants have been inserted more deeply into the turf, even to the extent of leaving only a few inches of the top whorl of needles showing.

Basic slag was applied to the heather/Scirpus bog areas in 1939 at the rate of 2 oz. per plant after planting. In 1940 slag was applied under the turfs before planting to similar areas. Apart from a few small areas in 1943, phosphate was not used again until 1950 and 1951.

The annual rate of planting has varied considerably. The area rose from about 150 acres in 1939 to about 400 in 1942 and then fell away to about 50 in 1945 and 1946. The annual average for the years 1947 to 1951 was over 600 acres with the largest area being 765 acres in 1948. Management difficulties in the future will undoubtedly be very great as a result of the large plantings of the past five years. Planting will be completed in 1952 and although there may be adequate work in draining and road work to keep the regular employees busy before thinning begins about 1957, the difficulties of getting sufficient men (or a sufficient number of contractors) to tackle a programme of first thinnings alone, of about 600 acres each year, will be very great.

Early Maintenance Work

Beating up has been carried out in the year following planting and has often had to be continued for more than one year. The low standard of labour in the war years and the very large planting programmes undertaken after the war have not made for good planting, and the annual beating up necessary has been fairly high. Based on numbers of plants used the average beating up to 1951 has been 17%. Large plants generally have been used, usually the largest 2 + 2 transplants available. Beating up generally has been successful. A deep peat heather/Scirpus bog planted with pure Sitka spruce in 1948 was interplanted with Pinus contorta in 1951 in an attempt to bring the spruce out of check. Both pine and spruce were manured with ground mineral phosphate in 1951.

No additional drainage has been carried out at the time of the beating up, but within the past few years it was not found possible to "sort up" the plough drains immediately, and this work was often not done until one or two years after planting. In the Plan of Operations 1949 to 1958 a drain repair of all young areas on the wettest and poorest ground was scheduled

for two to four years after planting. By the end of 1951 most of this ground had been covered. In recent years at least more weeding has almost always had to be done than was anticipated. It has always been necessary on good ground of the valleys where the better soil, helped by the new drainage, grew rank vegetation of fine grasses. Holcus species have been the most troublesome grasses. In 1951 Holcus ground ploughed at five feet intervals at the beginning of the year had to be weeded in August. Generally, however, five feet ploughing is of the greatest assistance in keeping the plants clear of the vegetation until they are established. Weeding has usually begun in July and finished about the end of September each year, but occasionally it has had to be continued into November. From 1947 to 1951 the average annual planting programme has been a little over 600 acres and the average annual area covered in weeding has been over 750 acres. Even in the worst areas the plants have usually been free of danger three years after planting.

Rates of Growth

A table is given overleaf showing rates of growth in typical older areas: |

Table Showing Rates of Growth

Compt.	Species	P. Year	Age	Geology and Soil	a) Altitude b) Aspect c) Slope d) Exposure	Top Height of Crop (Feet)	Mean Current Annual Height Increment (Inches)
1	S.S.	39	13	Grits and Shales of Tarannan Series of Upper Silurian age 9"-18" peat over stony clay.	a) 1100 ft. b) S.E. c) Moderate d) Severe	16	22
4	J.L. N.S. S.S. P.C.	39 39 39 40	13 13 13 12	do. do. do. 12"-24" peat over boulder clay	a) 1050 ft. b) S.E. c) Moderate d) Moderate	12 9 10 11	10 10 16 12
103	S.S.	40	12	do. do. do. 6"-9" peat over boulder clay	a) 1050 ft. b) N.W. & S.E. c) Moderate d) Severe	7½	10
111	J.L. N.S. S.S.	40 40 40	12 12 12	do. do. do. 6"-9" peat over clay. Clay loam where J.L. planted.	a) 850 ft. b) W. c) Moderate d) Sheltered	10 7 8	10 9 10
117	S.S.	41	11	do. do. do. 6"-12" peat over boulder clay.	a) 1000 ft. b) W. c) Gentle d) Moderate	7	12
120	J.L. N.S. S.S.	41 41 41	11 11 11	do. do. do. Clay loam	a) 800 ft. b) S.E. & S.W. c) Moderate d) Sheltered	10 8 9	10 9 11
205	J.L. N.S. S.S.	42 42 42	10 10 10	do. do. do. Clay loam	a) 650 ft. to 850 ft. b) E c) Moderate d) Moderate	9½ 6 8¼	12 10 14
211	N.S. S.S.	42 42	10 10	do. do. do. 3"-6" peat over boulder clay	a) 800 ft. b) W c) Severe d) Moderate	6 8½	12 15
15	N.S. S.S.	43 43	9 9	do. do. do. 12"-24" peat over boulder clay.	a) 950 ft. b) S.E. c) Moderate d) Severe	7 9	14 22
218	N.S. S.S.	43 43	9 9	do. do. do. 9"-18" peat over boulder clay	a) 850 ft. b) E. c) Moderate d) Severe	5½ 7	12 18

Past Treatment of Established Plantations

Up to the present only pre-thicket stage draining has been attempted. In 1951 a beginning was made in the most important work of cleaning and deepening slightly about fifteen chains per acre of drains in the plantations formed in 1940 and 1941. In most of these areas slashing of the branches has first been necessary to enable the drains to be repaired. Further maintenance is not visualised until the time of brashing when a further deepening will be necessary at least one year before thinning begins.

Twiglees Wood

This plantation of Norway spruce with a few Scots pine, extending to about forty acres, was included in the main acquisition of Twiglees in 1939. It is estimated from ring counts of felled trees that most of the wood was planted between 1895 and 1905, although there are patches in which Japanese larch, Douglas fir and Sitka spruce must have been planted up to about 1925. Except for a strip on the east side where the soil is a red stony clay loam the trees are growing on peat, and in the middle of the area are some irregular patches of deep peat with Vaccinium myrtillus and mosses. Some of these areas were planted in 1945 with Pinus contorta which has grown well. Generally the Norway spruce is of a very poor type with heavy coarse branches and a rough irregular bole. It seems not improbable that as much of the remaining spruce is widely spaced, European larch was probably planted originally in mixture with the spruce and pine, in the popular mixture of the period and that the larch failed or was removed early. The wood was brashed and drains cleaned in 1938 and a thinning carried out in that year and in 1939. Thinnings were again carried out over small areas in 1941, 1942 and 1944, and a further thinning over the whole area was begun in 1951. Both north-east and south-west winds have done damage at two places on the margins; in both cases the trees were blown towards the middle of the wood. From 1938 to 1950 it is estimated that the wood has produced over 25,000 cu ft of timber. In 1951 the top height of the spruce varied from a little over fifty feet to over seventy feet. Taking the mean age as fifty, this gives a variation from the mean of Quality Class IV to the mean of Quality Class II (Forestry Commission Yield Tables 1946).

RESEARCH - Note by Research Branch

Three experiments were laid down at Twiglees in 1947, two of them were plantings of Sitka spruce from various nursery treatments while the third was a direct sowing. The forest at this time was still suffering from the after effects of its wartime role as an artillery range and sheep succeeded in practically ruining all three experiments in the first year. The Sitka spruce lost some 25% of transplants and 30% of 2 + 0 seedlings but the survivors have grown quite well though no difference was found between original nursery treatments. In the sowing the effect of grazing was naturally even more severe and by the end of the second year only 20% of the patches were stocked. The seedlings had grown 2 in. to 4 in. and were practically overwhelmed by regrowth of Molinia. Even so the results showed quite clearly the beneficial effect of phosphate and nitrogen. All three experiments have now closed.

In 1948 an experiment on position of planting of Sitka spruce using three ages and types was laid down on a very poor Eriophorum/Scirpus bog. The most striking feature is the excellent growth of heathland nursery 1 + 1 plants compared to established 2 + 1 and 1 + 0 sterilised and also of the great benefit of phosphate on this site. The ridge planting positions are best.

In 1950 Twiglees was included in the "Survey of Checked Areas in the Borders" and some 2 $\frac{1}{2}$ % of the area planted to 1948 was found to be involved. A series of demonstration plots is about to be laid down to include the use of mulching, draining and phosphate, to relieve Sitka spruce in checked or semi-checked areas.

(Signed) J.W.L. Zehetmayr.

December, 1951.

History of Twiglees Forest

APPENDIX I

Notes on Inspection Reports

A list of the most interesting and important inspections carried out at Twiglees is given below, along with some extracts and brief notes:

26th November, 1937: Commissioner, Sir Alexander Rodger.

Twiglees Wood inspected and a general tour of the area being considered for acquisition.

31st January, 1939: Assistant Commissioner (Scotland) J.M. Murray.

The development of "a successful plough would greatly facilitate the increase of the (planting) programme". Difficulties discussed of carrying out proposed "grazing with planting" experiment. Some drains with too steep a fall were noted. "Norway spruce could be carried to 950 ft. with safety on good ground and in sheltered situations".

3rd June, 1939: The Chairman, Sir Roy Robinson.

A demonstration of ploughing with Ransome solotrac and John Deere tractor on Molinia peat of varying depth and on Eriophorum/Sphagnum peat of much greater depth. "A good drain (was made) and.....a heavy line of turf was very cleanly cut and reversed". It is noted that "it might prove cheaper to plough drains at greater spacing than the planting interval and cut and spread turfs by hand. This is to be tried and costed".

28th May, 1942: The Chairman, Sir Roy Robinson.

The policy of planting Japanese larch belts for fire protection approved. "There should be no difficulty in tackling (the planting of) all the types of ground seen". Elevation was not thought to be a limiting factor. Trial ploughing done in F.Y. 39 was seen and general improvement as shown by the vegetation was noted. The use of Tsuga for planting up gaps in Twiglees Wood was recommended; difficulty of keeping wood completely clear of rabbits was emphasised.

27th November, 1947: Director (Scotland), A.H. Gosling

A demonstration of the new Cuthbertson plough was seen. Twiglees Wood
"all blanks should be replanted and cautiously but progressively increased
in area by felling".

7th September, 1949: Technical Commissioner, Sir William Taylor.

"The system of wide ploughing (up to 21 ft.) and distribution of turfs
might have a wider application elsewhere than Scotland".

31st May, 1950: The Chairman, Lord Robinson.

Twiglees Wood. "This wood, as an example of what may be expected over
much of the forest in fifty to seventy years time, should be most useful for
trying out methods of obtaining the second crop".

History of Twiglees Forest

APPENDIX II

Supervision

Conservators

1946 - 1947	J. R. Thom
1947 (March to May)	F.W.A. Oliver
1947 - 1951	J. R. Thom
1951 to date	J.A.B. Macdonald

Divisional Officers

1938 - 1939	F.W.A. Oliver
1940 - 1942	A. Watt
1942 - 1945	} J.R. Thom
1947 (March to May)	
1948 - 1951	R. E. Fossey
1951 to date	W. N. Gibson

District Officers

1938 - 1939	R. F. Wood
1940 - 1943	None
1943 - 1950	W.B. Sutherland
1950 - 1951	G. G. Stewart
1952 to date	J. D. MacNab

Foresters

1938 - 1947	C. Parley
1947 to date	W. J. Robertson

From 1938 to 1945 the forest was a part of the South Division of Scotland which, on 1st January, 1946, became the South (Scotland) Conservancy.

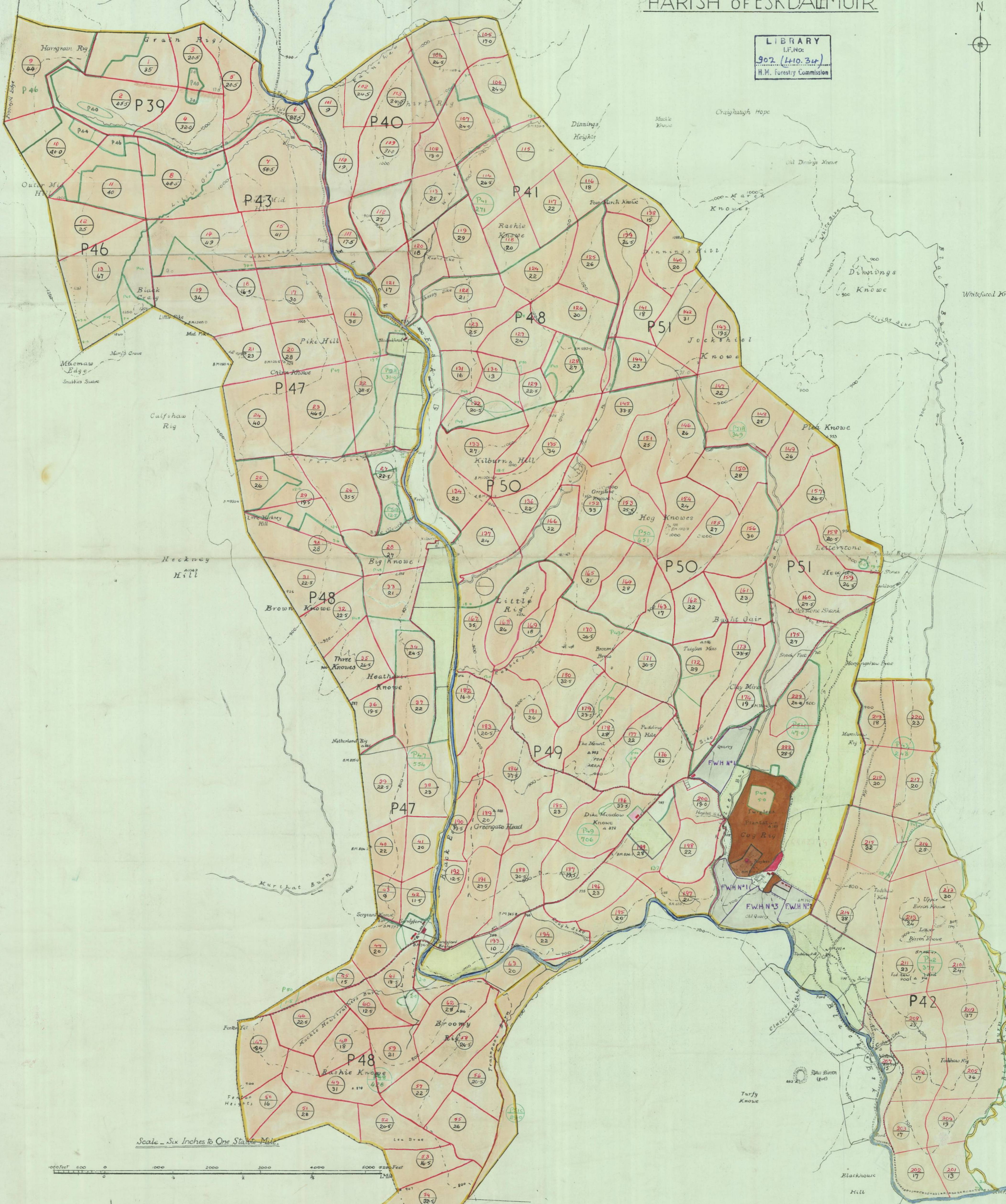
Twiglees

TWIGLEES FOREST.

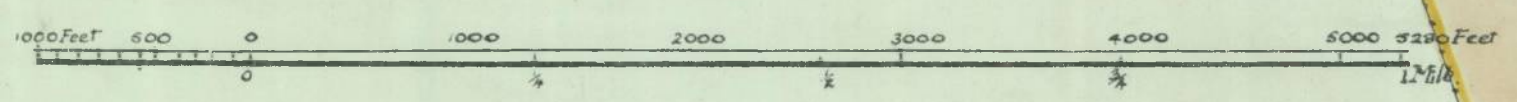
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