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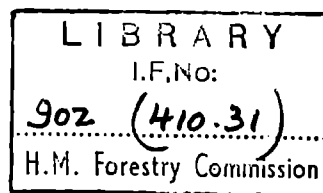
FORESTRY  COMMISSION

HISTORY
OF
GLENTRESS

FOREST
S(S) CONSERVANCY

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FORESTRY COMMISSION

HISTORY

of

GLENTRESS FOREST

1920 - 1951

SOUTH (SCOTLAND) CONSERVANCY

History of Glentress Forest

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HISTORY OF GLENTRESS FOREST

GENERAL DESCRIPTION OF THE FOREST

Situation

Glentress Forest lies within the Parish of Peebles and is situated mainly to the east and north of the town, in and around the glen from which the forest takes its name. A second and much less extensive section was acquired much later and occupies Cademuir Hill to the south of the town of Peebles.

The name "Glentress" is derived from the old common lands of "Glentars" which, through common usage, had developed into Glentress long before acquisition by the Forestry Commission.

Area and Utilisation

There have been three separate acquisitions of land as detailed in Table I. The figures in Table I are taken from acquisition reports, but they do not show the area of woodlands acquired in the first acquisition from Haystoun Estate. Bare land comprised most of the first acquisition although there was a small area of felled woodlands and a smaller area of standing woods.

The second acquisition of Venlaw and Shielgreen consisted of felled woodlands and poor sheep grazing. A small area of woodlands on Venlaw was acquired.

The third acquisition of Cademuir Hill consisted solely of a felled woodland area.

Three acres of land suitable for a nursery are rented from the Department of Agriculture for Scotland.

TABLE I

Glentress Forest : Acquisition and Disposals of Land

From	By	Date	Plantations Acquired	Plantable Acres	Nurseries	Agricultural	F. W. H.	Unplantable	Total	Subject
Haystoun Estate	Purchase	Whit '20		1000					1000	Glentress
Venlaw Estate	Purchase	Mart '32		604		15		369	988	Venlaw and Shielgreen
Haystoun Estate	Purchase	Mart '48		373					373	Cademuir
D. O. A. S.	Rent	Whit '47			3				3	
Totals				1977	3	15		369	2364	

To

D. Drummond	Sale	6/2/33		2.5					2.5	Glentress
Peebles C.C.	Sale			8.0					8.0	Glentress
Burgh of Peebles	Sale	Whit '36		1.25					1.25	Glentress
Totals				11.75					11.75	
Net acres				1965.25	3	15		369	2352.25	

TABLE II

(a) Plantations		
Acquired	266	
Formed by Forestry Commission	<u>1418</u>	1684 acres
(b) In hand awaiting planting		
Felled Woodlands	205	
Burnt Areas	-	
Other Land	<u>-</u>	205 acres
(c) Nurseries		3 acres
(d) Agriculture		-
(e) Forest Workers' Holdings (2)		16.5 acres
(f) Unplantable land in hand		<u>443.5</u> acres
	As at March, 1952	<u>2352</u> acres

Physiography

The forest lies in the southern foothills of the Moorfoots. There are two main valleys in the main Glentress section occupied by the Glentress Burn and the Cramb Burn, both flowing south into the Tweed. The Shielgreen section is on the slopes of the catchment area of the Soonhope Burn which also flows into the Tweed. Cademuir section consists of the slopes on the east and south sides of Cademuir Hill. The slopes are moderate throughout the forest and only on sections of Cademuir can they be classed as very steep.

Elevations range from 500 ft. to 1700 ft. for plantations and up to 2000 ft. for unplantable land. The main valleys are well sheltered but that of the Cramb Burn is exposed to the south-west and acts as a funnel for all gales. The higher slopes of the isolated Cademuir Hill and the ridge tops of the main Glentress section itself are exposed to the full force of the prevailing winds.

Geology and Soils

Glentress Forest is situated at the southern end of the Leithen Plateau and lies on the belt of Silurian rocks. These rocks are mainly grits, shales and greywacke. Overlying these rocks is a layer of varying thickness of boulder till. The soil is generally a gritty loam for the first 18 in. with small rock fragments and a small proportion of clay. From 18 in. downwards there is frequently a red-brown layer of soil with fairly high

clay content and large angular rock fragments. In places scree has formed and appeared on the surface in Shielgreen and Cademuir, but not to any very great extent. Peat is almost non-existent and where it does occur on some ridge tops it is only a few inches deep. In the Cramb Burn valley there is a humus loam over clay. Natural drainage is generally good except in some of the more level parts of the valleys.

Vegetation

The original vegetation on the main Glentress section was Juncus communis and Aira caespitosa in the valley bottoms. This was followed up the slopes by willow herb, raspberry, bracken, ferns and grasses such as Holcus mollis, Aira flexuosa and Festuca species. On the higher tops Calluna covered considerable areas, with Erica tetralix in small patches; Nardus and Scirpus occasionally occur in patches.

There has been very little change of vegetation due to afforestation. Where the ground vegetation has not been killed the bracken has largely disappeared giving way to a lush growth of Holcus. Where Calluna occurred before planting it has now developed in area and in strength. Aira flexuosa has survived only on the more open sites.

Meteorology

The average annual rainfall is 35 in. Very little falls in March, April and May. Frosts are frequent and severe, causing damage by frost lift and to the young shoots in the late spring and early autumn, both in the nursery and in the forest.

The prevailing wind is south-west. Gales are severe at times from the south, west and east. Northerly gales, such as caused a severe windblow in 1945, are exceptional. Snowfall is heavy on the high tops and lies long and does considerable damage to pine.

Risks

Fire. The main risk of the forest is from fires. The Edinburgh to Galashiels railway runs along the edge of the forest for about one mile. There are several rights of way through the forest and the town of Peebles, being a very popular holiday resort, these rights of way are much used. The most dangerous at this stage (1952) is the one passing through the Shielgreen section. A new fire tower

has recently been erected on Janet's Brae from which both the Glentress and Shielgreen sections of the forest can be seen. The fire tower is connected by field telephone to the Forest School and forester's office. A large part of the forest is now at the thinning stage and fire danger is consequently very much reduced. Although many railway embankment fires have occurred little damage has been done. Muirburning by adjoining landowners has always been done under control.

Sheep. The area has been fully enclosed and the fences renewed as required, but in times of heavy snowfall sheep have got in and have done some damage on the east and north-west of Shielgreen. Fences have to be inspected after snowfall.

Deer. No red deer. A small stock of roe deer live in the forest but little or no damage is done.

Rabbits. In conjunction with all border areas the rabbit population on surrounding land has been and still is fairly high. This has meant a fairly high expenditure per acre on protection, especially as considerable areas are underplanted and form excellent shelter for any rabbits which do get in. The brashing of much of the plantations has assisted in control of rabbits.

Black Game. Only a very few in the forest and damage has been negligible.

Fungi. Honey fungus, larch canker and Fomes annosus are prevalent in the forest. The worst is Fomes which is causing a lot of damage to European larch in Venlaw and to the spruces and European larch in the Glentress block. Apart from some of the P.03 acquired plantations of European larch on Janet's Brae much of the European larch suffers very badly from canker. Brunchorstia has led to the dying off of nearly all the Corsican pine in the forest. (Elevation, soil and exposure are most likely to be allied causes).

Die-back. Die-back of European larch has been very severe in about 200 acres on the Shielgreen section. Heavy cleanings and thinnings along with removal of the dead trees appear to have slowed down the rate of dying off.

Insects. Pine Weevil and Pine Shoot Beetle have caused

considerable damage following the clear felling of certain blocks in war-time. Replanting has been delayed to reduce the damage. Most varieties of Adelges and Chermes are to be found, but no severe damage has been done.

Wind. About 12 acres of Douglas fir and Norway spruce planted in 1903 were blown by a gale during heavy rain and sleety snow in February, 1945. Another 10 acres of P.27 Douglas fir which had been planted under 1903 European larch were also very badly lain by this gale. The gales of 1949 and December 1951 blew several isolated trees in Compartment 3/15 where the soil is humus loam over clay and springs are frequent.

Snow. Severe snow break has occurred in Scots pine at higher elevations in the main Glentress section and Shielgreen sections.

Frost. Sitka spruce in the Soonhope Burn valley of Shielgreen have suffered from spring frosts, as also have the European larch.

Roads.

The original tracks through the forest followed the main valley of the Glentress Burn and the Cramb Burn with one road leading from Soonhope through the forest to Eshiels Toll (where the Forester Training School now is). On the Shielgreen section only a grass track led from Soonhope Farm to the Forest Holding at Shielgreen.

In 1936 a start was made from the Eshiels Toll and Soonhope to make graded metalled roads using labour from a Ministry of Labour Instruction Centre established at the edge of the forest. Road work progressed rather slowly and only about one and a half miles were made when war started and the camp had to be evacuated.

In 1947-48 a roads Clerk of Works was appointed and about 6 miles of roads were made round the main valleys of the forest and up to Shielgreen Holding. A bridge of concrete on old tram lines was built across the Soonhope Burn to replace a ford which was often impassable due to high water.

Minor subsidiary fair-weather roads were bulldozed only, to act as feeders to the main vehicle all-weather roads.

Lack of roads had delayed reconstruction work in some of the poor European larch plantations on the north and north-west boundaries of the Compartments in Series 2.

Labour

Labour supply in the early years of the forest appears to have been plentiful, although not skilled. Planting was able to proceed at a normal rate for the area of land available. During the years of the war some clear felling was done and a considerable amount of thinning, but thinnings (see report of Chairman's visit on 23/5/41 and report on visit of Director (Scotland) on 30/9/47) were much in arrears. The local labour supply from Peebles is now sufficient to deal with all work in the forest. The establishment of the Forester Training School in 1946 enabled all arrears of thinnings to be cleared off by 1950.

SILVICULTURE

Preparation of Ground

(a) Acquired Woods. No intensive drainage work done in the wetter slopes or valleys; only drains put in to take off spring water. This may have been partly responsible for the blow of 1945.

(b) Plantations formed by Forestry Commission. During the early years only light drainage was done in the valleys of Glentress Section. In the spruce areas of Shielgreen (P.34, P.35, P.36) drainage and turfing was done. Recently on the dry compact soils near the top of the slopes of Cademuir screefing combined with breaking up the soil by mattock has been used with very beneficial results. This has allowed moisture into the soil, opened it up, and the death rate after planting has been greatly reduced.

Choice of Species

(a) Acquired Woods.

European larch. The greater part of the acquired woods were of European larch planted on the drier slopes and ridges at elevations from 600 ft. up to 1600 ft. These had been planted in 1903-1906 on sites of bracken, grasses and ferns. Older European larch was on a fairly steep slope from 1400 ft. to 1750 ft. and the greater part of this European larch has done very poorly and has mostly been underplanted with Norway spruce or opened out in large groups for interplanting.

Douglas fir. This species was planted on the moister slopes and in the valley of the Glentress Burn on Juncus, Aira caespitosa, fern

sites, moderately sheltered from the prevailing winds. It has produced a large volume of timber where not blown. (See Sample Plot figures Plots S.23 and S.143).

Sitka spruce. Sitka spruce was planted on moist, fairly steep slopes with fern, bracken, grasses. It has done very well in a well sheltered site at 1000 ft. elevation. (See Sample Plot S.141).

Norway spruce. Norway spruce has been planted on moist, moderate fairly well sheltered slope, and on the valley bottom of the Glentress Burn. The vegetation appears to have been Aira caespitosa, bracken and Holcus. It has done fairly well. (See Sample Plot S.142).

Hardwoods. Mixtures of oak, ash, beech, sycamore with a few elm were planted on a fairly dry slope with a southerly aspect and moderately sheltered. A fairly good volume of moderate quality timber has been produced. There has been successful natural regeneration of ash, sycamore, beech and birch.

(b) Planted by Forestry Commission

Scots pine. This species has been planted extensively throughout the forest at elevations from 800 ft. to 1500 ft. At elevations over 1000 ft. the species has suffered from exposure and snowbreak and it is obvious that it should not have been planted pure at high elevations. Sitka spruce has been introduced among the pine at higher elevations (1200 ft.- 1500 ft.) in the Shielgreen section. The species was planted on the drier, harder ridges and slopes and on the heather sites. Rate of growth of the species at 800 ft. is recorded in Sample Plot S.150.

Pinus contorta. A very small area was planted on a dry ridge in Shielgreen section where the vegetation was Calluna with sparse blaeberry. It was not very successful at first due to roe deer damage, but it is recovering and doing fairly well. It was used now in mixture with Sitka spruce on the hard dry exposed ridges and tops of the Cademuir section.

Corsican pine. This species was used on three sites. First on the top of a hard dry ridge in Calluna at an elevation of 1250 ft. at full exposure, where it was sown direct on screefed patches. This has almost completely failed and has been interplanted with Sitka spruce using the Corsican pine as shelter. Secondly, on a dry moderately sheltered slope at elevations between 1250 ft. and 1500 ft. on Calluna and Calluna-bracken

sites. This has also completely failed and has been replanted with Sitka spruce. The third site is a dry, shallow, steep slope with a southerly aspect at elevations between 900 ft. and 1000 ft. The soil is not deep but fairly loose and broken with rock fragments. This was planted in P.27 and is doing quite well on this site. (See rate of growth Page 15).

European larch. Small areas on the Glentress section were planted in P.21 but extensive areas on the Shielgreen section were planted in P.34, P.35. The sites generally chosen were on bracken-grass covered slopes where the soil was fairly loose with a fair amount of rock fragments. It was planted on all aspects and at elevations ranging from 800 ft. up to 1200 ft. This has generally all suffered fairly extensively from larch canker and especially in the Shielgreen section has it suffered very severely from "die-back". In some compartments it will not be possible to get a final crop of larch, and where deaths were very heavy the larch has been cut out in strips and interplanted with Norway spruce, Sitka spruce and Scots pine. Heavy first and second thinnings have been made and the trees which are left now appear as if they may live. On the Venlaw section the larch has suffered very badly from heart rot (showing as far up the stems of P.27 trees as 15 ft.). These have been opened out fairly heavily in the hope that some natural hardwoods may come away.

Japanese larch. This species was planted on a fairly extensive scale in P.21 - P.24, moderately in P.34 - P.36, and now being used at a fairly high rate. Sites chosen have been bracken-grass fairly steep slopes, with all aspects, on soils of free gravelly loam with broken rock fragments, at elevations from 700 ft. to 1300 ft. It is now being used on the drier grass with sparse Calluna sites on steep slopes with a fairly free soil, and on harder drier ridges and knolls. The stem form is generally good. Rate of growth, though not very impressive, is good for the elevation and site. (See Sample Plots S.144, 145, 146, 158, 159).

Hybrid larch. This species was planted in one small area on the main roadside in P.27. The soil was a good loam with grasses, willow herb, elderberry and privet, at an elevation of 500 ft. The stem form is very good and the rate of growth satisfactory. Could have been used more extensively.

Norway spruce. Norway spruce has not been planted very extensively. It has been confined to really moist places where Aira caespitosa and Juncus were growing on a fairly good loam. It could have been planted more extensively on the bracken areas of the Shielgreen section. A small area was turf planted in the Cademuir section after drainage. The rate of growth has been fairly good. See Sample Plot S.142.

Sitka spruce. About one-eighth of the plantings are of Sitka spruce. It has been planted on two types of sites: (a) on a moist site on slopes of the Cramb Burn and Soonhope Burn where the soil is a fairly good loam over clay and where the vegetation had been bracken, fern, Aira caespitosa and other grasses - these sites have been a little frosty but growth is good - and (b) on poor, dry exposed sites where the soil is hard and dry and vegetation is mainly Calluna, sparse blaeberry and fine grasses. The survival despite the exposure at 1700 ft. elevation has been good and rate of growth satisfactory. Latterly Pinus contorta has been mixed with it on such sites.

Douglas fir. A fairly high proportion of Douglas fir was planted in P.21 - 24 on the lower slopes where bracken, grasses and ferns occurred. The soil was a fairly free moist loam with broken rock. The rate of growth has been reasonably good. Stem form is poor in many cases and that is possibly due to the seed being collected from a poor source. Douglas fir is now being planted on slightly drier sites where willow herb or bracken occur, with fairly good loams, at elevations up to 800 ft. on fairly sheltered sites.

Abies grandis. Apart from being used to underplant P.03 European larch, only 2 acres were planted pure. This was on a fairly dry bank on the main roadside where the vegetation was Holcus, fern, willow-herb and privet. Rate of growth has not been very good but stem form is excellent.

Planting

(a) Spacing

Acquired Woods. The spacing of Norway spruce, Sitka spruce, Scots pine and Douglas fir appears to have been 3 ft. by 3 ft.

Forestry Commission plantings

<u>Scots pine</u>	4½ ft. x 4½ ft.
<u>Corsican pine</u>	5 ft. x 5 ft.
<u>Douglas fir</u>	6 ft. x 6 ft.
<u>Sitka spruce</u>	4½ ft. x 4½ ft. in earlier plantings up to 1930, then 5½ ft. x 5½ ft.
<u>Norway spruce</u>	5 ft. x 5 ft.
<u>European larch</u>	5 ft. x 5 ft.
<u>Japanese larch</u>	5 ft. x 5 ft. in earlier plantings up to 1930, then 5½ ft. x 5½ ft.

Other conifers are generally 5 ft. x 5 ft.

(b) Type of Plant

Scots pine. The plant generally used up to 1938 was a 2+1. Later plantings on barer, more exposed sites have been 1+1.

Corsican pine. Seed was sown in one area and 1 yr. seedlings were used in another section; a 2+1 transplant was used in the Venlaw section.

Pinus contorta. 2+1 plants were used on the small area of pure pine in Shielgreen. 1 yr. seedlings ex Devilla heathland nursery were used for mixing with Sitka spruce on the poor exposed site on Cademuir in the P.52 area.

European larch. A 2+1 transplant has been used throughout.

Japanese larch. 2+2 transplants were used from 1921-33 in the main Glentress section. 2+1 transplants were used in the Shielgreen section and from 1950 1+1 transplants on the Cademuir section.

Hybrid larch. 2+2 transplants were used.

Norway spruce 2+2 transplants have been used generally but 2+3 transplants were used on a small scale in earlier years.

Sitka spruce. In the main Glentress and Shielgreen section up to P.37 2+2 transplants were used. In later plantings on Cademuir 2+1 transplants have been used.

Douglas fir. Up to 1927 2+2 transplants were used. Very few Douglas fir were planted from then until 1950 when 2+1 plants were used.

Most of the plants up to 1937 came from Tulliallan or Fleet nurseries. From then they have come from various sources such as Ae, Mabie, Kirroughtree,

Bareagle, Wauchope and, from 1947, Glentress nursery.

(c) Methods of Planting

Up to 1927 both notching and mattock planting were done. From then to 1937 notching was the standard practice. The Corsican pine seedlings were dibbled in. The greater part of Cademuir P. 50 onwards has been mattock planted with notching only for Douglas fir on freer soil. Only a small area has been turf planted on Shielgreen and on Cademuir.

(d) Rate of Planting

The rate of planting has been very variable due to the availability of land for planting, labour supply in the early years of the war and to the heavy thinning programme. From the census figures of 1947, amended by a species survey of 1948-49, the figures below are the annual rates of planting by the Forestry Commission. These may be adjusted slightly by a compartment boundary survey to be done in 1952:-

P. 21 -	146	acres	P. 37 -	98	acres
P. 22 -	243	"	P. 38 -	39	"
P. 23 -	8	"	P. 39 -	19	"
P. 24 -	14	"	P. 40 -	-	"
P. 25 -	-	"	P. 41 -	25	"
P. 26 -	29	"	P. 42 -	-	"
P. 27 -	39	"	P. 43 -	49	"
P. 28 -	20	"	P. 44 -	21	"
P. 29 -	16	"	P. 45 -	-	"
P. 30 -	-	"	P. 46 -	6.5	"
P. 31 -	3	"	P. 47 -	16	"
P. 32 -	18	"	P. 48 -	20	"
P. 33 -	96	"	P. 49 -	-	"
P. 34 -	128	"	P. 50 -	75	"
P. 35 -	129	"	P. 51 -	91.5	"
P. 36 -	69	"			
	958	acres		460.0	acres
				958.0	acres
				1418.0	acres

(e) Manuring

Practically no manuring has been done in the forest. In P. 50, however, some Japanese larch seedlings were manured in accordance with instructions on experimental manuring of seedlings, but this provided no conclusive results.

(f) Success of Establishment

The area of Corsican pine sown with seed did well from 1924 up to about 1944, when they began to die off. Some of the early seedling plantings

did not succeed very well but later seedling plantings have been very successful. Earlier plantings (1921-24) using transplants did not do well and records show that intensive beating up over several years had to be carried out.

Ploughing

Only 14 acres on the Cademuir section have been ploughed in preparation for P.52. Contour ploughing with a Begg plough was adopted.

Beating Up

Records indicate that this was heavy in the early years of the Forestry Commission plantations. (See also report on Mr. Sangar's visit of May, 1933). This was mainly due to the poor type of plant, possibly poor planting and the wrong choice of species for certain sites and neglected weeding. On the Shielgreen section (P.33 - P.38) beating up was fairly heavy and regularly carried out. In more recent plantings (P.50, P.51) on Cademuir section the beating up required has not been heavy and occurring only in small patches.

Weeding

This has been necessary on all sections where Juncus, Aira caespitosa, bracken and willow-herb occurred. The plantations from P.21 - P.27 were on fairly heavy bracken slopes but the top third of these areas did not require much weeding. On the Shielgreen section the bracken growth on the lower slopes was very strong and at least two cuttings a year have been necessary. The bracken survived in the European larch crops and was found entangled in branches seven feet from the ground. Where the European larch was opened out and interplanted in 1949 bracken has had to be vigorously controlled. Establishment of some of the underplanted Norway spruce in the 1903 European larch areas has been delayed due to neglect to weed odd pockets of bracken. On the Cademuir section willow-herb growth is very strong and requires two cuttings a year. Bracken is not so strong. Although elder is plentiful in the lower slopes no weeding of it has been necessary.

Mixtures

Scots pine and European larch. Originally planted as pure European larch in 1921, the area was beaten up with Scots pine in 1921 and 1924, and in 1927 a few Sitka spruce were added to fill the blanks. The site was a rather dry slope, with Holcus, other grasses and bracken and fairly exposed at elevations from 1000 ft. to 1250 ft. The crop (in Compartment 4/5) of European larch was dying off and the Scots pine had suffered severely from snowbreak so that the crop was uneconomic. In 1950 it was decided to remove the dead European larch and the worst Scots pine in strips and interplant with Norway spruce on the lower ground and with Sitka spruce on the higher slopes and on the top ridge. Where the Sitka spruce had been added in 1927 there is a prospect of a final crop of Sitka spruce as thinnings will be made to favour this species.

Underplanting. A considerable area of underplanting has been done in the 1903-1906 acquired European larch woods. In Compartment S.1/9 the crop was about 350 trees per acre in 1938 when it was underplanted with Abies grandis at 1250 per acre. The larch overcrop has been thinned three times since then and now carries about 120 stems per acre with a total height of 65 ft. The Abies grandis have done very well and average about 10 ft. in height with annual height growth of up to 18 in.

The underplanting of European larch in 1927 with Norway spruce has been very satisfactory and in Compartments S.2/6, S.2/7 the larch overcrop was completely removed in 1945-1946 and has left a very good crop of Norway spruce with an average height of 14 ft. at an elevation of 1100 ft.

In 1928-29 the underplanting of European larch and Japanese larch with Norway spruce in Compartments 2/5, 2/9 and 2/10 has been very successful and there now exists a fine two-storied forest. Most of the poor larch stems have been removed.

In 1943 underplanting was undertaken when the larch overcrop was fairly dense on the ground. Due to neglect of weeding in places, it has not done very well but now shows signs of better growth. In Compartment 2/6 the average height of the spruce is now only 2½ ft.

Rates of Growth

(a) Acquired Woods

1. European larch. Some of the best larch in Glentress at an elevation of 800 ft.- 1000 ft. planted in 1903, now have a height of 65 ft. and with about 120 trees per acre carry a volume of 1800 cu.ft. per acre. The Quality Class lies between II and III.

2. Norway spruce. Growth of this species, planted in 1903 at an elevation between 1000 ft.- 1200 ft. shows a height of 65-70 ft. and comes into Quality Class II. (See Sample Plot S.142).

3. Douglas fir. The 1903-1906 plantations have shown very good growth and although they are only Quality Class IV this is a good return in a comparatively dry climate at 1000 ft. elevation. (See Sample Plots S.143 and S.23).

4. Sitka spruce. Although not planted pure, but in mixture with Norway spruce and Japanese larch, this species has grown very well. The Quality Class attained is only Quality Class IV but the stem form is very good. (See Sample Plot S.141).

(b) Forestry Commission Plantations

Scots pine. The 1924 plantations at 800 ft. elevation are Quality Class I. (See Sample Plot S.150).

On the Shielgreen section at just over 1000 ft. plantations made in 1935 have reached an average height of 14-16 ft. and appear to be growing well. At elevations above this, Scots pine does not compete well with the exposure and snowfall.

Corsican pine. The P.27 stand on Venlaw between 800 ft. and 1000 ft. shows the following growth. Total height - 22 ft., mid quarter-girth over bark - $2\frac{1}{2}$ in., volume per tree 1.2 cu.ft. and volume per acre 1300 cu.ft. over bark. This does not reach Quality Class III.

European larch. Growth of this species has not generally been good and it has suffered badly from die-back. At elevations between 900 ft. and 1000 ft. on an exposed site it has reached a height of 29 ft. in 29 years. Quality Class IV.

Japanese larch. This species has done very well at elevations between 1100 ft. and 1200 ft. where it has reached Quality Class II.

Between 800 ft. and 900 ft. it has reached a height of 43 ft. in 29 years, again Quality Class II. (See Sample Plots S. 144, 145, 146, 158 and 159).

Hybrid larch. The P.27 area of this species has a total height of 36 ft. at 24 years. The average breast height quarter-girth over bark is $6\frac{3}{4}$ in. The plot has been fairly heavily thinned and now carries 1800 cu.ft. per acre.

Norway spruce. This species is doing well on the moist sites at elevations up to 1000 ft. On the drier sites where it was used for underplanting and where height growth had been delayed by the overcrop, it has been slower but satisfactory. Between Quality Class II and III.

Sitka spruce. Growth of this species has been very favourable. On moist and fresh sites (Compartment S.3/15) at elevations up to 1000 ft. the average height is 60 ft. at 30 years (Quality Class II). On the dry heather, grass, sparse blaeberry sites between 1500 ft. and 1600 ft. the following data have been obtained in the P.27 plantings - total height at 24 years 28 ft.; mid quarter-girth O.B. $2\frac{3}{4}$ in.; volume per tree 1.5 cu.ft. volume per acre 2000 cu.ft. Some of the leaders had been damaged by winter snow between 1945 and 1947, otherwise growth is satisfactory at this exposure and elevation, and on this type of ground with no ploughing or breaking up of soil. (See report by Conservator (S) of 16/12/49).

Douglas fir. Growth of this species has been fairly good although stem form in some sections is poor. The quality class generally obtained is Quality Class IV. (See Sample Plots S.147, 148 and 149).

Abies grandis. The small patch of P.27 Abies grandis has reached the following dimensions in 24 years; average total height 40 ft.; breast height quarter-girth over bark 5 in.; average volume per tree over bark $2\frac{1}{2}$ cu.ft.; the volume per acre being 2500 cu.ft.

Past treatment of Established Plantations

(a) Brashing. Up to 1946 complete brashing had been done on all areas thinned. From 1946 onwards in the Glentress section very small areas have been brashed. In the Shielgreen section 50% brashing was done in stands of European larch, and 70% in stands of Scots pine and spruces. By 1951 all the established woods in the Glentress section had been brashed and about 50% of the Shielgreen area had been done.

(b) High Pruning. Small areas of the P.03-P.06 Douglas fir,

Norway spruce and Sitka spruce had been high pruned and the stems up to 20 ft. show high quality when sawn for housing timbers. Small patches of P.21, P.22 Douglas fir and Sitka spruce have been high pruned by school students to demonstrate high costs of this operation. (The actual cost was 1d. per cu.ft. standing quarter-girth over bark volume).

(c) Thinnings and Clear Fellings. The areas thinned and value of produce sold in the earlier years are extracted from a Working Plan Control Sheet and are as follows:-

F.Y. 21	-	203	acres	Value	£ 426.
F.Y. 22	-	239	"	"	£ 747.
F.Y. 23	-	35	"	"	£284.3.
F.Y. 24	-	8	"	"	£ 670.
F.Y. 25	-	-	"	"	£114.6.
F.Y. 26	-	41	"	"	£ 673.
F.Y. 27	-	71	"	"	£ 908.
F.Y. 28	-	36	"	"	£ 174.
F.Y. 29	-	29	"	"	£ 273.
F.Y. 30	-	6	"	"	£ 252.
F.Y. 31	-	2	"	"	£176.3.
F.Y. 32	-	11	"	"	£ 338.
F.Y. 33	-	112	"	"	£ 287.
F.Y. 34	-	273	"		none given
F.Y. 35	-	295	"		none given
F.Y. 36	-	89	"		none given
F.Y. 37	-	93	"		none given

From 1938 to 1947 the thinnings were not on a heavy scale and at this period the rate of growth was coming to its maximum in the 1903-1906 acquired woods. The volumes removed per acre cannot be stated but the light grade of thinnings is borne out by the number of stems per acre in 1947 when the thinning plan was prepared. The areas thinned annually from 1938 to date are given from the R.O. Records but no volumes are available until the latter three years. See table below:-

F.Y.	1st thinned	2nd and subsequent thinned	Total Area thinned	Clear Felled
38	-	115	115	-
39	62.6	71.8	134.4	-
40	-	179	179	31.6
41	-	10.5	10.5	-
42	22.0	195.6	217.6	1.3
43	14.0	202.8	216.8	34.8
44	-	199.8	199.8	-
45	5.0	42.0	47.0	11.0
46	12.0	3.0	15.0	15.9
47	61.0	8.0	69.0	7.7
48	83.8	38.4	122.2	15.1
49	84.1	172.2	256.3	.6
50	116.8	106.15	223.0	-
51	14.3	215.6	229.9	-

The volumes removed for the last three years are:-

F.Y.49 Area thinned - 256 acres; Total volume 101,890 cu.ft.
Volume per acre = 400 cu.ft.

F.Y.50 Area thinned - 223 " ; Total volume 100,034 cu.ft.
Volume per acre = 450 cu.ft.

F.Y.51 Area thinned - 229.9 " ; Total volume 63,173 cu.ft.
Volume per acre = 280 cu.ft.

In 1947 the thinning plan prepared for a five year period aimed at covering a larger area in the first few years in order to get over the heavy arrears of thinnings which had accumulated. (See report on visit by Director (Scotland) on 30/9/47). The aim in the thinning plan was that the faster growing species, Douglas fir, Japanese larch and Sitka spruce should be thinned every three years, Norway spruce and European larch every four years and Scots pine every five years. The thinning grade proposed was heavier than in the years up to 1947. In 1949 the average volume per acre removed was 400 cu.ft., in 1950, 450 cu.ft. and in 1951 it fell to 280 cu.ft. due to the inclusion of a fairly large area of very poorly grown European larch.

Produce was sold to the trade prior to the war and to the Home Grown Timber Production Department of the Ministry of Supply during the war years. Large quantities of pit props were produced and a fair quantity of sawmilling timber.

At the end of the war the Forestry Commission took over the small sawmill powered by a 20 H.P. Blackstone diesel engine with single bench and one crosscut bench. This has been a great benefit to the forest and to the Conservancy. 15,000 to 20,000 cu.ft. of millwood are produced annually. From the millwood, square and quartered stobs, rails, boards and battens are prepared for use in other forests in the South Conservancy. During the past year sawn timber from Glentress Forest, after kiln drying in Edinburgh, has been used for building British Timber Houses at a number of forests in the Conservancy.

From the smaller thinnings the produce includes sheep net stakes, round stobs, rustic wood and firewood. The pitwood is sold to the trade as long pitwood at the roadside.

A hot and cold open creosoting tank was built in 1950 near the sawmill

and this has helped greatly in the utilisation of conifers for fencing purposes.

Research. Note by the Research Branch

Glentress Forest has long been a site for mycological research work and it was here in 1920 that Phomopsis pseudotsugae on Douglas fir was first discovered and named by Mr. Malcolm Wilson, later consulting mycologist to the Forestry Commission. The spread and effects of Rhabdocline pseudotsugae were also investigated.

In 1943 the Douglas fir provenance experiment was planted, with small replicated plots of both green Douglas from several parts of Vancouver Island and the grey variety from the interior of British Columbia. Though the experiment suffered badly from grazing it is now recovering. The best provenances, both in height, form and resistance to Adelges are at present those of the grey variety.

An experiment in heavy thinnings in European larch on the lines laid down by Craib in South Africa was started in 1943. It has been spoilt by die back, further confused by provenances ^{differences} between the larches first planted and those used for beating up.

In 1946 Glentress was the site of one of the experiments in a series of investigations into the die-back disease of European larch. This was designed to test an effect of insect factors by inducing die-back artificially. This proved difficult to do, the trees either regaining their full vigour quickly or dying completely and no definite results were obtained.

From 1944-1947 an experimental heathland nursery was sited on the heather moor on the upper part of the forest, but it was too exposed and the soil was too thin for the successful growth of conifer seedlings. A trial of selenium as an insecticide was commenced in 1947. It was planned to apply it to the ground in the forest for absorption by the roots of Douglas fir and European larch to control Adelges, and in the nursery for control of chafer larvae, wireworms, etc. No conclusions were reached owing to the transfer of the entomologist in charge and the experiments were abandoned.

The first small trial with electrical soil heating in frames under glass was operated in 1947 and 1948. The results were sufficiently encouraging for the problems to be pursued on a larger scale at other nurseries in the following year.

Conclusions

In regard to choice of species the use of European larch should be restricted. Japanese larch will produce a good volume on suitable sites and should be used as a pioneer species on poorer sites where exposure is not too great. Scots pine is suitable as a pure crop only up to an elevation of not more than 800 ft.- 900 ft. At higher elevations it should be planted mainly in mixture with Sitka spruce. Douglas fir, planted on selected sites, has produced excellent timber and this species should form an important part of future crops. Sitka spruce has proved very useful at high elevations and would have developed even better if some soil preparation such as ploughing had been carried out before planting.

Future thinnings should start earlier in the life of each species and should be of a heavier grade than in the past.

Attention must be paid to drains at all times on soils overlying the clayey soils as in the valley of the Cramb Burn.

General Notes

In November 1946 a Forester Training School was established in the buildings previously occupied by the Ministry of Labour Instruction Centre. The capacity is 60 students. Most of the practical work is done in Glentress Forest and this has helped greatly in reducing arrears of thinnings. As the amount and variety of work available on Glentress Forest is now restricted the students do work at Cardrona, Elibank, Yair Hill and Dreva Forests. The students also provide a useful reserve for mobile fire fighting squads and can be called on if necessary to fires at Stenton, Edgarhope, Wauchope, Craick, Yair Hill, Cardrona, Dreva and Greskine Forests.

The students have made species surveys of Glentress, Edgarhope, Newcastleton and Greskine Forests during the past five years. Meteorological records are kept by the students and also notes on bird life, including data obtained from bird nesting boxes established in the forest.

(Signed) T. A. Robbie.

HISTORY OF GLENTRESS FOREST

APPENDIX I

Notes from Inspection Reports

May, 1933. Visit of Mr. Sangar

"Intensive beating up on dry scree slopes. Fraser River Douglas fir dying from Rhabdocline. Scots pine suffering from windblow. Considerable vole damage. Sitka spruce at 1500 ft. are 3 ft. - 5 ft. and promising (presumably refers to P.27). European larch suffers much from canker and shoot moth. In Venlaw section gaps are due to trees being removed by visitors".

31/5/38. Visit of Chairman and Assistant Commissioner.

"Good progress on roads works by Ministry of Labour Instruction Centre. Thin P.03 Douglas fir lightly and every two years. Good clean pit props. Rate of growth excellent. Japanese larch in 3/7 and 3/8 to be cleaned and rough trees removed. Japanese larch not suitable at high elevations". (See Japanese larch sample plot measurements, Plots 144, 145, 146, 158, 159).

23/5/41. Visit of Chairman

"Compartments 2/7, 2/8 clearing of inferior P.03 European larch from underplanted Norway spruce to continue (see notes on underplanting). Thinning of P.03 Douglas fir should continue. Great danger of windblow if too drawn. Strip felling of rough Scots pine and European larch in Compartments 3/4 and 3/5 to continue and replant with Sitka spruce. (See report on visit by Conservator (S) on 16/12/49). Japanese larch in 3/7 and 3/8 looking much better. Tsuga suggested for underplanting at a later date. A lot of thinning required and must be pressed on with".

4/11/43. Visit of Assistant Commissioner (Mr. A.H. Gosling).

"European larch and Japanese larch underplanted in 1925 with Norway spruce. Assistant Commissioner recommends that where larch trees are not good enough to make first class timber they should be

removed in subsequent thinnings. Regeneration of hardwoods on Janet's Brae to be encouraged as a fitting memorial to the late Mr. J.M. Murray".

21/8/44. Visit of Chairman

"S.2/6, S.2/7, more of the overcrop of the European larch could be removed to let underplanted Norway spruce get away. Fate of Corsican pine due to Brunchorstia noted in 2/1. Suggested interplanting with Sitka spruce. (Note:- actually cut out and replanted with Sitka spruce in F.Y.49). Further thinning of Japanese larch in 3/7, 3/8 required soon. P.03 Douglas fir still requires further thinning. Noted much useful thinning work done but Douglas fir will still give much useful produce".

30/9/47. Director (Scotland), Mr. H.C. Beresford Peirse.

"Road work to be started. Thinning plans to be prepared. Clear all blown and leaning Douglas fir in Compartment 2/11 (blown by northerly gale in February, 1945). Thinning at Glentress to be first priority and planting at Elibank by school students reduced and, if necessary, stopped".

9/5/49. Director (Scotland), Mr. H.C. Beresford Peirse.

"Die-back" of European larch in Shielgreen. Work of cutting out dead and dying trees to be restricted to three compartments, S.5/4, S.5/5 and S.5/6. Where areas have completely died out replant with Norway spruce as far up hillside as possible, then Sitka spruce near to Scots pine on the boundary. All upkeep of drains on Shielgreen area to be proceeded with before canopy closes".

16/12/49. Visit by Conservator (S) Mr. J.R. Thom.

"I was most interested to see the encouraging growth of the P.27 Sitka spruce between 1500 ft. and 1600 ft. I am quite certain that this justifies our extending the planting limit at both Cardrona and Elibank Forests. The P.45 Sitka spruce was also looking remarkably well".

2/6/50. Visit of Chairman (Lord Robinson).

"Douglas fir Sample Plot P.03 in 3/10 to be thinned immediately to prevent windblow". (See Sample Plot 143 measurements).

HISTORY OF GLENTRESS 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

1920 - 1934	J. M. Murray
1934 - 1938	O. J. Sangar
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

1935	J.S.R. Chard
1936 - 1946	J. W. Mackay
1946 to date	T. A. Robbie

Foresters

1920 - 1925	D. S. Spraggan
1925 - 1941	A. Graham
1941 - 1944	J. D. Dewar
1944 - 1946	A. Graham
1946 - 1948	W. F. Stoddart
1948 - 1950	J. Melville
1950 to date	W. H. Mackay

History of Glentress Forest

APPENDIX III

Distribution by Species - up to and including P.51 and Acquired Woods

Figures in acres

Series	S.P.	P.C.	C.P.	E.L.	J.L.	H.L.	N.S.	S.S.	D.F.	A.G.	H.L./ J.L.	E.L./ N.S.	E.L./ A.G.	N.S./ S.S.	S.P./ E.L.	S.S./ E.L.	S.P./ C.P.	E.L./ D.F.	Hwds	Total
Series 1	14	-	2.4	36.9	7.0	6.3	17.5	12.0	4.4	2.0	14.6	8.7	.9	1.1	24.6	4.2	-	-	22.4	179
Series 2	5.7	-	2.4	19.8	.4	-	54.7	26.8	22.9	-	-	57.1	-	-	27.8	-	8.4	2.2	-	228.2
Series 3	29.7	-	5.9	39.4	44.9	-	26.8	35.8	30.5	-	-	-	-	3.8	20.0	3.6	-	-	-	240.4
Series 4	63.4	-	9.8	64.7	41.5	-	6.8	7.4	48.0	-	-	3.6	-	.8	17.6	-	-	-	-	263.6
Series 5	233.1	1.6	-	202.2	28.6	-	42.6	98.2	-	-	-	-	-	-	-	-	-	-	-	606.3
Series 6	48.5	.5	-	-	70.3	2.0	11.6	16.3	15.0	-	-	-	-	-	-	-	-	-	2.1	166.3
Totals	394.4	2.1	20.5	363.0	192.7	8.3	160.0	196.5	120.8	2.0	14.6	69.4	0.9	5.7	90.0	7.8	8.4	2.2	24.5	1683.8
Percent- ages	23.4	.12	1.2	21.6	11.4	.49	9.5	11.9	7.2	.11	.9	4.1	.05	.3	.5	.46	.49	.13	1.5	

Figures from Re-survey of compartments and species in F.Y.48, plus R.I figures for F.Y.49, 50, 51.

History of Glentress Forest

APPENDIX IV

Sample Plot data

In August 1947, 12 permanent sample plots were established in Glentress Forest, five of these (144, 145, 146, 158, 159) are in a 22 year old Japanese larch plantation situated at an elevation of 1200 ft. The plots demonstrate five thinning grades (D, C, B, E and L/C) and now after their second treatment the B grade thinning with 752 trees per acre makes pronounced contrast with the E grade which is already reduced to 240 trees per acre. At the last measurement total crops production in basal area and volume was very close for all plots, but the E and L/C grades showed a smaller periodic mean annual increment probably owing to the fact that these grades had not yet fully utilised the available growing space, although their crowns have made good lateral development towards complete canopy.

In the adjoining Douglas fir area 3 permanent sample plots (147, 148, 149) were laid down to compare L/C, D and C grade thinnings respectively. There has been a marked improvement in the appearance of the crop since first treatment as the majority of the coarse branched and otherwise defective trees have been removed. With good height growth and a high basal area increment ranging from 8.0 to 8.9 sq.ft. per acre per annum, an excellent stand should result.

The Scots pine sample plot (No. 150) is in Kirn Law Plantation at an elevation of 780 ft. It has been thinned to a moderately heavy low grade and provides interesting information on the growth of the native species compared with the exotic. To date its production surpasses the Japanese larch and its volume increment is approximately 75% of the Douglas fir. With recent height growth averaging 21 in. per annum its present rate exceeds that of the other species but it is still shorter than them by about 1 ft. in top height.

Sample Plots in the 1903 Plantation

There are three permanent sample plots of Sitka spruce, Norway spruce

and Douglas fir respectively in the 49 years old plantation.

These plots indicate the comparative growth of the different species. The Sitka spruce plot (No. 141) was planted in mixture with Norway spruce, Douglas fir and European larch in the proportion of three Sitka spruce to one of the other species. Sitka spruce became dominant and so obtained ample growing space, although the crop received very little thinning treatment until it was 45 years old. Since the establishment of the plot two thinnings on a heavy low (D) grade have been made and a combined total of 1491 cu.ft. Q.G.O.B. per acre removed.

The Norway spruce in Plot 142 are 10 ft. shorter in top height growth compared with the Sitka spruce and Douglas fir plots. There was some windblow in the plantation prior to the establishment of the sample plot but it is hoped that moderately heavy thinnings and improved drainage will prevent further damage; 1181 cu.ft. Q.G.U.B. per acre were removed in two thinnings.

The Douglas fir in Plot 143 had been thinned twice before its establishment as a sample plot. Stocking was, however, still very heavy and the last two thinnings have together produced 2146 cu.ft. Q.G.U.B. per acre. The crop is growing vigorously and surpasses the other species in basal area and volume increment.

(Signed) Alex. M. MacKenzie,

17/1/52.

Sample Plot S.23 was established in the 1903 acquired Douglas fir in March 1921. This plot was unfortunately blown in the northerly gale of 1945. Records to that date are given overleaf.

Plot No. S. 23 Area: .320 acres. Species: Douglas Fir Quality Class: III
 Site: Glentress Forest, Peebles. Thinning Grade: D Q.G.

Record of Periodical Measurements per Acre.

Year of measurement.	Age of Crop yrs	Main Crop					Intermediate Yield from Thinnings					Total Crop Yield to Date		Entered & checked by	Periodic Mean Annual				
		Num-ber of trees per ac. after thinning.	Height		True Girth at 4'3" ins.	Basal area per ac. after thinning. Q.G.	Vol. per ac. (under bark) Q.G.	Crown % Bark	No. of trees	Av. Ht. ft.	True Girth at 4'3" ins.	Basal area per acre Q.G.	Vol. per ac. (under bark) Q.G.		Basal area Q.G.	Vol. (under bark) Q.G.	Main Crop Increment	Basal area Q.G.	Vol. (U.B.) Q.G.
			Average of 100 largest trees ft.	Av. of Crop ft.															
3/1921	18	810	36	35½	.336	14½	74.2	845 (March)	13	27	10	45.4	315	119.6	1160	-	-	-	
3/1926	23	647	49	56½	.390	19½	105.7	1919	11	29	13	37.7	345	171.9	2579	10.5	284		
9/1931	28	503	58½	56	.421	24	126.1	2985	12½	52½	19	22.1	478	214.4	4122	8.5	309		
9/1936	33	366	67	63	.384	29	133.6	3245	44 14½	57½	22	27.7	654	249.6	5037	7.0	183		
10/1940	38	284	78	73	.372	33	136.0	3702	38 12½	64½	26	24.2	635	276.2	6129	6.7	273		
12/1943	41	213	82½	79½	.355	37	125.3	3529	43 11½	74½	32	31.7	899	297.2	6855	7.0	242		
									Blown 1945										

Record of periodical measurements per acre

Q. G.

All Plots established in 1947

Year of measurement.	Age of Crop	Yrs.	Number of trees per acre	Main Crop (after thinning)								Intermediate Yield from Thinnings				Total Crop		Increment of Main Crop					
				Height		Form Factor	Girth at 4'3" ins.	Basal area per acre sq.ft.	Volume per acre (under bark) cu.ft.	Crown %	Bark %	No. of trees	Av. Ht. ft.	Girth at 4'3" ins.	Basal area per acre sq.ft.	Volume per acre (under bark) cu.ft.	Basal area sq.ft.	Volume (under bark) cu.ft.	Periodic		Periodic mean annual		
				Average of largest trees ft.	Average of Crop ft.														Basal area	Volume	Basal area	Volume	
8/1950	Q. G.	IV	48	127	82	81½	.415	49	124.0	4194	51½	9	47	79½	44½	34.4	1084	175.9	5685	D. Grade	4.6	259	
8/1950	II	48	303	71½	67	.430	31	126.1	3633	42	10	84	62	25½		23.9	680	170.8	4814	C/D "	5.7	231	
8/1950	IV	48	192	83	81	.395	39	126.1	4035	41	13	104	77½	32½		48.3	1428	204.6	6181	C/D "	6.6	312	
Japanese larch																							
8/1950	II	25	348	42½	40	.396	21	66.2	1049	45	18½	156	38	18		21.6	353	118.6	1737	D. Grade	5.3	128	
8/1950	II	25	540	41½	39	.391	19½	89.9	1459	44	18½	96	36½	16		10.5	140	120.2	1797	C. "	5.5	159	
8/1950	II	25	752	41	38	.385	18	108.0	1580	40	18½	52	34½	12		3.3	32	114.4	1628	B. "	5.0	114	
8/1950	II	25	240	42	40½	.398	21½	48.0	774	51	15½	124	36	18½		18.3	259	115.3	1625	E. "	3.5	90	
8/1950	II	25	492	41	38½	.382	18	68.2	1003	53	16	88	38½	18½		13.3	208	113.3	1669	L/C "	3.8	95	
Douglas fir																							
8/1950	IV	25	628	46	40½	.400	19½	104.4	1691	62	11½	88	41	20½		15.9	275	155.6	2421	L/C Grade	8.9	244	
8/1950	IV	25	304	47	44	.415	25½	84.4	1541	60	9½	180	40½	19½		29.1	471	146.8	2314	D. Grade	8.0	193	
8/1950	IV	25	512	47½	42½	.395	22½	112.8	1894	65	9½	80	38½	18		11.4	167	157.8	2437	C. "	8.5	220	
8/1950	I	27	558	36	34	.375	18½	83.9	1070	50	15½	218	32	16		23.9	282	136.6	1582	C/D "	6.1	144	

Glentress

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