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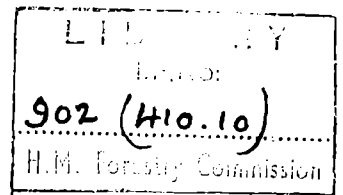
DRUMTOCHTY

FOREST

ECS) CONSERVANCY

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FORESTRY COMMISSION

HISTORY

of

DRUMTOCHTY FOREST

1926 - 1951

EAST (SCOTLAND) CONSERVANCY

DRUMTOCHTY FOREST HISTORY

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HISTORY OF DRUMTOCHTY FOREST

CHAIRMAN'S COMMENTS

Mr. Maxwell's account covers adequately my inspections and directions. It was clear to me in the early stages, as it is to others now, that planting was pushed too rapidly on to difficult land, that is to say into conditions outside the experience of myself and of those locally responsible for the work. It was my consistent policy right from the beginning to restrict large scale work to "safe" land but simultaneously to experiment on types which were "doubtful". We would then return to the latter if and when we had the requisite knowledge for ensuring success. Unfortunately it has proved difficult to put across this simple philosophy. Where it has been followed the experimental areas have never failed to be helpful.

I find it necessary to state the general proposition because even today the old mistakes are being made, but with far less excuse because those mistakes are still there to observe and much guidance can be obtained from them and from such experimental work as was in fact done. Large scale mistakes have been made in recent years at Clashindarroch where I felt it necessary to intervene. As I remarked on my last inspection of Drumtochty on 6.10.49, "There is a great deal to be learned (at Drumtochty) which should be of immediate application to other forests such as Clashindarroch and Fetteresso." What I have just said should be impressed on every forest officer and forester. Put in another way it amounts to this, "If you don't know what to do, don't do it but submit the problem to higher authority."

As regards the rehabilitation of the land on which mistakes have been made an approach is indicated which is

similar to that stated above. Two alternatives have been suggested:

- (a) That apparently favoured by Mr. Maxwell on the basis of local evidence. It involves mainly the use of mountain pine into which Sitka will subsequently be introduced. No deer fencing is involved and the work can begin on a small scale to be increased as confidence is gained in the success of the method.
- (b) A more ambitious procedure involving considerable use of Pinus contorta. This could only succeed with the use of effective and very expensive deer fencing I have never seen even a passable Pinus contorta plantation to which deer have access in numbers. Obviously this alternative commits us to large scale and expensive work leading to speculative results.

As regards the silvicultural aspects of Drumtochty we were, in the late 1920's, developing the turf planting of spruces which was a great advance but not a solution in Calluna areas which, as we began to appreciate some ten years or so later, require a pine to bring on the spruce. Even then we had gradually to learn the disadvantages of too intimate mixtures. Today we have still to learn which pine to use in different sets of conditions. There is it seems to me an unreasoning preference for Pinus contorta, a relative neglect of Scots pine and a positive abhorrence of mountain pine.

It may be of historical interest to note that in 1912 I designed a series of mixed spruce/mountain pine experiments as part of a general research plan. (The reference is "Reports of the Advisory Committee on Forestry, 1912", Cd.6713, page 33; there is a copy in Alice Holt Library). I can only regret now that this item (as well as others) was not vigorously implemented.

I did not like the Japanese larch/Sitka spruce line by line mixtures because I anticipated that the Sitka spruce would be suppressed. We now know that bands instead of lines would have given reasonable results.

The development of the densely planted European larch has been interesting. When I first saw them in 1929 they were about 28 years old (according to my note), greatly overcrowded and of very poor growth. I do not recollect any "die-back" as we know it now, though it may have been present. It was by no means certain in my mind that the crop would respond to thinning as I knew from experience at Tintern that overcrowded 40-year crops in good soil were very slow in building adequate crowns. In the event the Drumtochty larch have responded though slowly to gradual thinning and underplanting and nobody seeing the result today would realize what they looked like 20 or so years earlier.

The small patch of oak grew very well from the start; the nurses have been a nuisance and as unnecessary with oak as they are necessary with beech.

(intd) R.

Mar. 9th, 1951.

DIRECTOR'S COMMENTS

Mr. Maxwell has compiled comprehensive notes on the forest and I need make few comments. He has briefly described the very variable geological formation that there is at Drumtochty and how confusing the changes in drift are for the forester. The experience at Drumtochty merely emphasises the need there is for a general geological drift survey. It would be both interesting and instructive to be able to correlate such a survey with the plantings that have been carried out and it would undoubtedly help choice of species in the future.

Maxwell gives it as his opinion that Sitka spruce has proved to be the best species in exposed sites. Rainfall and climate would certainly not seem to be ideal for Sitka spruce and it may well be that there are other species not yet extensively tried which may be equally good or better than this species at Drumtochty on exposed situations, for instance Abies nobilis which gets small mention in the report. Again, Maxwell recommends the planting of mountain pine on the checked ridges and upper slopes with a view to introducing Sitka spruce later on. I believe that similar results may be attained, and more quickly, by the planting of the coastal variety of Pinus contorta.

In discussing repair work and the treatment of checked areas, Maxwell refers to the very real problem of damage, particularly by roe. If such work is to be successful, I think we must face fencing and the cost of this per acre can only be brought down to a reasonable level if areas of, say, upwards of 100 acres can be enclosed. In other words, we must ignore small gaps and patches.

(signed) H. BERESFORD PEIRSE

Edinburgh,
March, 1951.

CONSERVATOR'S COMMENTS

The attached account was compiled by District Officer Maxwell, from records, from his knowledge of the forest, and from information from other sources, notably from Mr. D.H. Bird.

There is no well marked line of development, such as inevitably appears in, for example, "poor moorland" areas, in the Commission history of Drumtochty. It will therefore be useful if three broad considerations are stressed, before the detailed account is read:

I. At the time of acquisition, Drumtochty did not appear to be an area of special problems; the more so because a considerable area had carried a fine crop of conifers, largely harvested during and after the 1914-18 war.

In fact, it is really a particularly difficult and complicated afforestation project. It involves three slopes, differing very sharply in geology, soils, aspects, exposure and soil cover. The slopes are, in general, too steep for ploughing, and the technique for dealing with the poorer peats, on certain of the north-facing ridges is by no means certain even yet.

In the first Commission years at Drumtochty mechanical cultivation was little known, turf planting and slagging was far from standard, and the early success of European larch plantings gave no warning of the troubles to come. In addition, the early choice of species was unduly influenced by the advice of local lairds or landowners, who were more well intentioned than sound.

II. During the years from 1927 to 1950 there has been a continuous build up of knowledge and experience, and a continuous effort by the variety of officers concerned, to reach ever sounder afforestation techniques, on the basis of the results available now and becoming more apparent each year. There is much still to be observed and learned.

III. The forest now has a most striking value as a demonstration area of silvicultural problems, for north-east Scotland conditions but also for a wider field. The Chairman, in his October 1949 visit, stressed the value of Drumtochty in this respect. One can think of very few areas which present, in a limited acreage, such a variety of problems and treatment. Among points which repay study are these: -

- (1) Differences between north- and south-facing slopes, in similar soil conditions.
- (2) Sites and races in relation to "die-back" of European larch.
- (3) Recovery from die back, as seen in acquired plantations.
- (4) Use of Japanese larch and mountain pine as pioneer species.
- (5) Form of Japanese larch on varying sites.
- (6) Underplanting of European larch with various species.
- (7) Conifer "mixtures"
- (8) Treatment of sites where soil is suitable but surface conditions are unfavourable and ploughing is not feasible.
- (9) Scots and other pines in relation to exposure, difficult surface conditions, and frost.
- (10) The effect of tree cover in retaining moisture on a dry south-facing slope.
- (11) Drumtochty demonstrates - by default - the importance of maintaining accurate records of all tests on experimental work.

Most of these items, and others, are mentioned in greater detail in the history which follows.

(signed) F. OLIVER

Conservator.

HISTORY of DRUMTOCHTY FOREST

Date of Acquisition

The main block of Drumtochty Forest which comprises the north and south slopes of Strathfinella was bought in 1926. The Fordoun section which faces south and east to the Howe of the Mearns was acquired by purchase in 1928.

In 1950 a small area of 55 acres, known as the Phesdo Hill, was added to the forest. This ground adjoins the Fordoun section at its western boundary and was purchased from the Fasque Estate.

Name

Drumtochty was the name of the estate from which the major portion of the unit was derived. A castle of the same name still stands on the forest boundary.

Area

The total acreage of the forest is 3,340 acres. Of these, 235 acres were standing woodlands at the time of acquisition but approximately 35 acres were felled during the 1939-45 war.

Brief History prior to Acquisition

The estate of Drumtochty came into the hands of the Gammell family in 1822 and remained their property until 1916 when it was broken up. The last member of the family to live at Drumtochty was Sir Sidney Gammell, a keen Forester who carried out much experimental planting on his estate. There is little doubt that the information supplied by Sir Sidney influenced the Forestry Commission's early planting on this unit. Few records of the pre-Commission history are available but it is understood that when the estate changed hands in 1916, most of the lower slopes, on both sides of the glen,

i.e. the slopes below the 800 ft. contour, were well wooded and carried a fairly heavy crop of timber.

To the south of the glen road, European larch, of good quality, was the main species, with a few groups of beech and sycamore along the road and with some rather indifferent Scots pine on the higher knolls. Some of the European larch had been underplanted with Douglas fir, remnants of which still remain in Compartments 12, 17, 34, 35 and 36. North of the glen road there were hardwoods at the western end of the forest with a mixed stand of European larch and Scots pine on the steep south facing slope, known as the Abbot's face. Above the castle were European larch, Scots pine, Sitka spruce and Norway spruce, many of which survive today.

Along the lower slopes of the Hill of Burnieshag was a fair plantation of Norway spruce and European larch which was felled in 1919 while still young and yielded about 7 cu.ft. per tree on an average.

Apparently there has never been much Scots pine grown on Drumtochty and the tradition persists that this species will not do here. Whether this is so has still to be proved but it is a fact that the Scots pine taken over at acquisition was poor and the small amount of Scots pine planted by the Forestry Commission is not very promising. Past failures are more likely to be due to a poor race of pine coupled with a lack of knowledge of soil conditions rather than to any inherent inability of the ground to grow good Scots pine.

Geology

As the underlying rock formations have been potent factors influencing the growth of trees at this unit it may be worth while trying to describe them very briefly.

Drumtochty is of considerable interest geologically in that the Highland Border Fault passes through the forest, north of the glen. To the north of the Fault are schistose rocks, the altered grits, which are neither very rich nor very poor

in bases but are of medium quality. They tend to produce dry soils, at least on the upper slopes.

To the south of the fault is the old Red Sandstone formation. This is extremely variable and changes rapidly from almost impermeable conglomerate to heavy clays and to light sands. Although over much of Drumtochty the Old Red Sandstone is covered with glacial drift derived mainly from the underlying formation but mixed here and there with schistose material, the changes of texture from conglomerate to sand and clay must influence the choice of species and the growth of trees.

These rapid changes of rock type must be partly responsible for some of the failures on the south face.

The Acquired Plantations

(i) European larch and Japanese larch.

Of the 200 acres of acquired plantations which remain, 160 acres are of European larch from 40-65 years old. The greater part of these are in one block at the eastern end of the south face at an elevation of from 600 ft. to 1000 ft. and they were planted in 1904.

Early reports indicate that this European larch had been planted at 3 ft. x 3 ft. spacing and that at the time of acquisition was in a poor state suffering from what would now be termed 'die-back'.

When the Technical Commissioner, now Lord Robinson, visited these woods in 1929 he recommended that they be given a heavy crown thinning and underplanted with a shade tolerant species such as Douglas fir and Tsuga heterophylla.

The work of thinning these overstocked and apparently unhealthy woods was put in hand soon after the Commissioner's visit and underplanted with Douglas fir, Tsuga heterophylla, Abies grandis, Abies nobilis, and Cryptomeria japonica during the period 1930 to 1935. Other European larch acquired

plantations of a similar type situated in the northern part of the forest, in Compartment 44, were treated in the same way.

(It should be noted here that all the acquired European larch at the eastern end of the south face was not thinned and underplanted at this time. Much of it, between the 800 ft. and 1000 ft. contours was considered too poor for this treatment.)

The underplanting, particularly where Tsuga was used, was most successful and when the Chairman revisited the area in 1936 he thought that the composite crop looked very hopeful and remarked upon the great improvement in the European larch overwood.

The Chairman next saw the underplanted European larch in 1944 and, whilst noting the continued improvement in the larch, recommended that during the coming 4-5 years the overwood be reduced to 50 stems per acre.

Some thinning of the European larch did take place in 1946 and again, over a limited area, in 1949, but not to the extent advised by the Chairman on account of labour difficulties. There is no doubt that a heavy thinning of this larch is now over due and it has been scheduled for F.Y.51.

Two reasonably good stands of European larch of an earlier planting than those referred to above remain in Compartments 45 and 46. They are now 65 years old. In Compartment 45 the larch, though apparently of good quality, was found to be affected with butt rot to a high degree. When visited by the Chairman and Mr. Newton in 1941, it was decided that the stand would either have to be clear felled or heavily thinned and underplanted. The latter course was adopted and it was underplanted with Douglas fir in 1943. The Douglas fir is now growing strongly and a further heavy thinning of the big larch has been planned for F.Y.51. European larch of the same age in Compartment 46 appears to be reasonably sound. It has been thinned twice since it was acquired in 1926 and is now marked for a third thinning.

At the eastern end of the south face, in Compartments 36 and 37 there are some 30 acres of mixed European larch and Scots pine. Early reports indicate that these woods looked far from promising at the time of acquisition. Two thinnings since the Forestry Commission took them over have brought a great improvement. The larch is good and the pine quite reasonable. This wood is now marked for a third thinning.

Sir Sidney Gammell appears to have been more interested in the growing of larch than of any other species and he experimented with it at high elevations and on exposed sites. One of his experiments in this direction is still to be found at 1000 ft. in Compartment 33. Here Sir Sidney planted a narrow strip of Japanese larch in a matrix of European larch. According to the existing records, Japanese larch was planted in 1908 and must have been the first of its kind in this part of the country. It has been of great interest to many foresters as it demonstrates what might be expected of this species when grown at high elevations on heather sites.

The European larch which surrounds the Japanese larch was planted at the same time as the underplanted larch of which mention has already been made, but it was so poor that in 1929 the District Officer reported that it had completely failed. Unlike most larch plantations, however, it has neither recovered nor has it died out and remains a problem area. No one seems able to account for this as it is known that a previous crop of larch grew here and was felled when 55 years old averaging 50 ft. in height. The late Forester on Drumtochty estate declared that the unhappy state of this European larch was due to the bundles of plants (which incidentally were said to have been of Silesian origin) having fallen into the Aberdeen harbour when they were being unloaded. It seems doubtful whether the effects of this immersion could have lasted so long!

When the Technical Commissioner visited this Compartment in 1929 he recommended that experimental plots be made in the failed

European larch alongside the successful Japanese larch using Norway spruce, Sitka spruce, Japanese larch, Tsuga and Pinus contorta. This was subsequently done and the results are described in the paragraph headed "Later Introductions".

On a later visit in 1936, Lord Robinson suggested that the Japanese larch strip be lightly thinned and underplanted with Sitka spruce and Tsuga as this would eventually provide a useful guide for the treatment of similar areas. Unfortunately this was never done because of labour shortage. The Japanese larch has now had a second thinning in F.Y.49.

(2) Douglas fir

At least 30 acres of Douglas fir were acquired in 1926. Some 10 acres of these were felled by the Timber Production Department and the remainder though of low grade are steadily improving with selective thinnings.

Most of this Douglas fir was originally planted under European larch but the larch had been felled before the woods were acquired by the Forestry Commission. At the time of acquisition the Douglas fir appeared to be worthless and no charge was made for it. It was apparently full of blanks which were filled up with Sitka spruce on the advice of the Technical Commissioner.

Considered in the light of this unfavourable beginning, the present stands of Douglas fir in Compartments 17, 33 and 34 are encouraging. They will be thinned again in F.Y.51.

(3) Sitka spruce.

There are two fine, but small stands of Sitka spruce planted by Sir Sidney Gammell. The better of these is in Compartment 16 and is just over 1 acre in extent. It was planted in 1911 and is now being thinned for the fourth time. The last thinning yielded just under 1000 cu.ft. per acre and the volume now standing is estimated at 5200 cu.ft.

The second stand is 4 acres in area and is in Compartment 44

It is about the same age as the stand in Compartment 16 but the volume is much smaller. The cankers of Nectria curcubitula were noticed on some of the stems in 1947 but these infected trees were removed in 1948 and the disease has not developed.

The Research Branch established a sample plot in this wood in 1948 and the volume per acre under bark was found to be 3259 cu.ft.

(4) Other conifers

In Compartment 45 there is a 10 acre stand of mixed European larch, Norway spruce, Douglas fir and Abies grandis aged about 65 years. Though slightly under thinned there are some very fine trees in this plantation. Of particular interest are the Abies grandis of which there are some excellent specimens. This species is regenerating freely along the southern edge of the wood.

(5) Beech

5.2 acres of old beech remain in Compartments 39, 41 and 42. These narrowly escaped felling during the war, but fortunately they are still standing. They should be thinned now and if rabbits are excluded it may be possible to obtain natural regeneration.

Forestry Commission Plantations.

Planting.

Planting started at Drumtochty in 1927 and, with the exception of odd corners and the replanting of small areas felled during the last war, was completed by 1937.

Work was begun at the western end of the south block and continued eastwards until the whole of the area south of the main Glen road was completed. This was done by the end of 1929 and thereafter the Fordoun section and the main Drumtochty block north of the road were planted up concurrently.

It was perhaps unfortunate that the most difficult part of the unit was tackled first when Commission officers had comparatively little experience of high, peaty ground.

Choice of Species.

In the old woodland areas which occupied both sides of the Glen up to about the 800 ft. contour, where soil conditions were good, the choice of species must have presented little difficulty.

The previous crop had obviously been taken as a guide and larch, European, hybrid and Japanese, was extensively planted, and Sitka spruce with Norway spruce/on the moister sites and with the introduction of a limited amount of Douglas fir, Abies grandis and Abies nobilis.

Some interesting mixtures were used and these will be described in a later paragraph.

Practically all the plantations on the lower slopes have grown extremely well and there are now some really excellent stands of hybrid larch, Japanese larch, Norway spruce and Sitka spruce.

A few checked areas occur on the old woodland ground. These are mainly on dry knolls where a pine or Japanese larch should have been used instead of one of the spruces or European larch.

It is a pity, perhaps, that apart from a few small groups of oak, sycamore and grey alder on the north face, very few hardwoods were planted. Soil conditions just above the valley would have justified a much more extensive use of oak, beech and sycamore.

Problem Areas.

The problem areas at Drumtochty are on the exposed ground above the 800 ft. contour and it is a matter of regret that these were planted in conjunction with the lower and easier areas instead of later when a fuller understanding of the problems had been obtained.

South Face.

On his first visit to Drumtochty in 1929, the Technical Commissioner emphasised the risk of planting the high exposed sites until further knowledge of their capabilities had been obtained. He said that the right procedure should be to concentrate on the planting of the lower land where the soil was known to be good and that only small scale experimental planting should be undertaken on the heights.

Unfortunately this excellent advice was not wholly followed and during the first three planting years the high ground was planted up to what appeared to be the planting limit. Not until F.Y.31 was a small experimental plot of Sitka spruce, European larch and Japanese larch, and oak laid out on high ground in Compartment 20. Of the various species planted here, only the Sitka spruce now remains.

The principal species used for the upper slopes during the first three years of planting were Scots pine, Sitka spruce, Norway spruce and Japanese larch, and the original plantings of these species really only survive in the flushes, leaving a series of bare ridges.

It must be recorded, however, that belts of Pinus contorta and mountain pine were planted around the contours of the hills at what then appeared to be the planting limit. The object of these belts was to form a snow break and it is doubtful if they ever served any useful purpose as such. They have, however, given us a useful guide to the correct choice of species for high, exposed sites.

North Face.

Just as on the south face, belts of Pinus contorta and mountain pine were planted round the upper slopes and these have developed satisfactorily. Below these belts and above the old planting line, the slopes are dry and steep. At the time of planting they were covered with a mixture of bracken and heather. This vegetational cover seemed to indicate larch and most of the

middle and upper slopes were planted with European larch though both Norway spruce and Sitka spruce were introduced into the dens and flushy sites.

The European larch made a promising start but 'die-back' set in about the 10th year after planting and about 75% of the areas above the 800 ft. contour have failed on that account.

The north face is not unduly exposed and not all the European larch used was of poor origin. It seems reasonable to assume, therefore, that much of the European larch failure is due to insufficient moisture.

The Fordoun Section.

Part of this Section (the eastern end) previously grew good European larch and there have been comparatively few failures among the Forestry Commission plantations.

The choice of species here has been mainly larch, with European larch on the sound ground just above the arable and Japanese larch on the middle slopes. Although the European larch has suffered from die-back, sufficient stems remain to form a crop and recovery has been most noticeable here during the last three years. Exceptions to this are ⁱⁿ Compartments 108 and 125 where the European larch was of Swiss (Munstertal) origin. Here the failure has been almost complete.

The Japanese larch above the European larch has been very successful and although growth does fall off with elevation, there are only a few blanks between the Japanese larch and the strip of mountain pine and Pinus contorta.

In P.34 there are race lots of 12 origins of Japanese larch reputed to have come from different elevations in Japan.

The failures which have occurred on the Fordoun section are where Sitka spruce and Norway spruce have been notched into the heather on the steep sides of the burns and on the hard heather ground at the western end of this Section.

Hardwood Planting.

As mentioned in the paragraph on choice of species above, hardwood planting has probably not received the attention which the soil conditions on the lower slopes warranted.

As far as is known the planting of hardwoods was limited to four areas. These are:-

In Compartment 43 above the sawmill, oak was planted and sown in rows at 2 ft. spacing with European and Japanese larch nurses. This treatment extended to some 4 acres. The oak grew remarkably well but as much of the European larch failed and was replaced with Japanese larch which soon tended to smother the oak, better results would have perhaps been obtained had the oak been planted as a pure crop.

The larch has been thinned twice and will probably be removed completely within the next three years.

Two acres of sycamore were planted in Compartments 38 and 39 in P.33. These were very slow in developing but are now coming away satisfactorily.

One acre of grey alder was planted along the Friar's Glen Burn in P.33. The site chosen was perhaps too wet for this species but sufficient have survived to form a crop.

Beech was planted under the acquired European larch in Compartment 34. Much of it has died out and the survivors are not looking happy.

Experimental Mixtures.

No record of Forestry Commission work at Drumtochty would be complete without some reference to the various mixtures which have been tried out at that unit.

Japanese larch/Sitka spruce.

The one which has been applied most extensively is the single line mixture of Japanese larch and Sitka spruce. This was originated by Mr. D.H. Bird and about one sixth of all the Japanese larch planted at Drumtochty was in mixture with Sitka spruce. The object of the mixture was sound. It was to produce

an early and profitable crop of Japanese larch for sale locally as fencing material etc., leaving a reasonably open stand of Sitka spruce which could be expected to develop without the danger of loss of crown.

Unfortunately, with the exception of about 15 acres in **Compartment 16** the two species have not grown well together and in most cases the larch has suppressed the spruce. In fairness to the mixture it should be stated that had labour been available to free the spruce at an earlier stage, the results might have been better. Unfortunately this has not been the case and we are left with rather rough stands of pure Japanese larch.

Had the mixture been planted in rows of three instead of in single lines, the results would have been very different and might have been a guide to the treatment of many sites in new areas.

Norway spruce/Pinus contorta

In **Compartment 77 P.29** there are some 10 acres of Pinus contorta/Norway spruce mixture on heather ground. Here again the mixture was in single lines and the fast growing contorta has more or less obliterated the Norway spruce. In just a few places the two species have grown together with interesting results.

Had Sitka spruce been used instead of Norway spruce and planted with the pine in a multi-line mixture, or if the spruce had been introduced as groups after the contorta had started to kill out the heather, the results might have been very different.

Norway spruce/Scots pine.

In **Compartment 28 P.29** Norway spruce was planted in an intimate mixture with Scots pine. On the lower slopes, just above the new forest road, the results are encouraging. Here the pine has done its job of killing out the heather and the spruce is developing strongly.

On the higher slopes, however, the Scots pine has largely

died out and the Norway spruce is still firmly in check.

The mixture cannot be condemned for this failure which is probably due to other causes which will be discussed in a later paragraph.

Later Introductions.

There is heartening evidence that the local staff were very conscious of the difficulties in establishing a tree crop on the higher, exposed sites and were constantly seeking ways and means of overcoming them.

This is proved by the experimental introduction of spruces into previously planted pines and other species.

(1) The most revealing of these introductions is the inter-planting of Sitka spruce among a strip of acquired mountain pine which runs north-west and south-east up the Blackhill in the Fordoun Section in Compartment 34.

Here in spite of extreme exposure and hard soil conditions, the Sitka spruce is growing vigorously and is very much better than Sitka spruce planted about the same time on a more sheltered slope, about 100 yards to the north-east of the mountain pine strip.

The Sitka spruce was introduced in F.Y.30 into a stand of 17 year old mountain pine at an elevation of 1000 ft. The spruce now averages 14 ft. in height and the best stems are 5 ft. above the pine nurses.

The mean annual increment of the interplanted spruce is 8 ins. Sitka spruce of the same age, planted pure on the adjacent site is only 6 ft. high with a mean annual increment of $3\frac{1}{2}$ ins.

Of all the known experiments at Drumtochty, this inter-planting seems to point the way most clearly.

(2) At the southern limit of Compartments 10 and 13 at a height of over 1000 ft. in full exposure to the prevailing

wind, Sitka spruce was introduced in 1938 into a strip of mountain pine which was planted in 1928. The spruce is growing well and shows no sign of check.

Here the average spruce is now 4 ft. 9 ins. high with a mean annual increment of $4\frac{1}{2}$ ins. and a current annual increment of 12 ins. It can be compared with Sitka spruce planted pure on an adjacent site. Much of the pure spruce is still in check but a few are now overcoming the heather competition and are beginning to develop. The most vigorous of these were 4 ft. in height with a mean annual increment of $3\frac{3}{4}$ ins. and a current annual increment of 8 ins.

In both Compartments 34 and 13 the soil was a mixture of Old Red Sandstone and schistose drift with a top layer of peat which varies from 4 ins. to 12 ins. The drift was generally compacted and there was slight podsolisation.

(3) Norway spruce was introduced into mountain pine in Compartment 16, P.28. Here the pine has done very little to kill out the strong heather and much of the spruce is still in check. Where the spruce has been planted close to a pine, however, it is coming away and appears to be making full use of its nurse.

(4) In Compartments 13 and 16 at 1100 ft. Scots pine was planted pure in 1928.

On a visit of inspection in 1936 the Chairman recommended that the Scots pine be interplanted with Sitka spruce.

The pine has now died out, probably as a result of exposure, but the spruce, though patchy, is beginning to come out of check and the growth this year has been from 8 in. to 12 in.

(5) In 1930 Mr. Bird on the recommendation of the Technical Commissioner, planted some blocks of Pinus contorta, Sitka spruce and Norway spruce amongst the poor acquired European

larch on either side of the strip of acquired Japanese larch in Compartment 33.

Unfortunately the European larch nurse was subsequently cut out by a forester who was not aware of the nature of the experiment but the results today are interesting.

The Japanese larch has failed almost completely, the Pinus contorta and the Sitka spruce are reasonably good and the Norway spruce rather poor.

Perhaps the main interest in this experiment lies in the fact that the Sitka spruce, although growing in a relatively sheltered site, is much less vigorous than the Sitka spruce which was introduced into the acquired mountain pine, about 100 yards to the south, in fuller exposure and on a harder site.

These plots do show that Japanese larch should be used cautiously on high exposed ground, particularly if ploughing is not possible.

Underplanting.

There are now almost 45 acres of European larch underplanted with Douglas fir, Tsuga, Thuja, Abies grandis, Abies nobilis and Cryptomeria japonica. The most successful of the underplanted species has been Tsuga with Douglas fir a close second. Unfortunately the Douglas fir used does not appear to have been of the best type and this may account for the somewhat poor form of many of the stems.

The Cryptomeria and silver firs have suffered from roe deer damage and it is doubtful if any of these species will give full stocking without the retention of a high proportion of the over-wood.

Method of Planting and Plants used.

No records exist which give details of the planting methods used at Drumtochty but as far as can be ascertained from forest

workers, simple notch planting with the spade was the practice for the first two years and turfs were used for spruces only when the ground was exceptionally wet. From 1929 onwards all the larches were mattock planted and the use of turfs for spruces extended. At no time, however, was the turfing method practised as widely as it is to-day.

Until 1933 much larger plants were used than foresters would care to accept today. For the first five years the spruces were either 3 + 2s or 3 + 3s and the larches 2 + 1s or 2 + 2s. The use of such large larch plants not unnaturally led to failures and after 1933 larch 2 yr. seedlings and 1 + 1s were being tried out.

Unfortunately, until the completion of most of the planting in 1937, at least half the larch plants were 2 * 1s.

For the underplanting in Compartments 22-32 the Tsuga and Douglas fir were all very large. In the case of the former species, 3 + 5s and 3 + 3s were common and for Douglas fir 3+2+1, 3+3s and 3+2s.

It is interesting to speculate whether the results on some of the difficult heather sites would have been better if smaller plants had been used on turfs.

Past Errors and their resulting Problems.

Out of a total plantable area of 2052 acres at Drumtochty, it has been estimated that 230 acres are either in complete check or have failed and in addition about 150 acres of European larch have suffered severely from 'die-back'.

Most of the checked and failed areas, which had originally been planted with Sitka spruce, Norway spruce, Japanese larch or Scots pine are on the south face and most of the die-back larch on the north face or at the western end of the Fordoun section.

Apart from lack of experience at the time of planting and the failure to test out conditions with pilot plots, the errors

must be attributed to a lack of appreciation of soil and moisture conditions.

When the estate was acquired, Sir Sidney Gammell told local officers that the whole of Drumtochty was dry and that draining was not a problem.

Although this was undoubtedly the case on the north face, the reverse was true of the southern portion of the forest and a great deal of draining had to be done after planting and, indeed, is still being done.

It is a well known fact that on the south side, the growth in the dens is reasonably satisfactory and that the failures are on the ridges which run up and down the slopes. At the time of planting it is doubtful if the geological history of these ridges was understood as it is today. It is now believed that fairly recently in geological time, probably subsequent to the burning of the forests in the 9th and 10th centuries, these ridges were heavily eroded and the true soil removed to the valley bottoms where tree growth is now so good.

The erosion left exposed a compacted silicious material which is now covered with sphagnum and heather and the result is what the geologists call a truncated podsol.

Such soil conditions cannot, in the first instance, support shallow rooted spruce crops in competition with heather.

We cannot yet say with any certainty, how far it is possible to afforest such failed and checked areas, most of which are very exposed. If soil preparation by ploughing could be undertaken, the problem could be more easily resolved but this has to be ruled out on account of the steepness of the ground. It would seem, therefore, that a pioneer species which can stand heather competition and is not too attractive to roe deer, must first be established. Mountain pine is perhaps the only species available which meets these requirements.

The larch 'die-back' which is a serious problem only on the north face, must be connected with the dry conditions and,

in part, to unsuitable races of European larch having been planted in the first case through European larch of Scots and Silesian origin have been included in the failed areas. It is fairly evident that there has been a more complete failure of the larch on the upper and drier slopes.

Most of the 'die-back' areas have been underplanted with Sitka spruce. This is doing well on the lower slopes (where some of the European larch is recovering) but is checking among the heather on the dry upper slopes.

Perhaps a better treatment for the failed European larch areas would have been to plant Sitka spruce on the moister sites and to have introduced Japanese larch or Pinus contorta on the drier ones.

Research - Note by District Officer.

Experimental work by the Research Branch is not strongly represented at Drumtochty and apart from the laying down of Sample Plots in 1948, no official research work was done until 1950.

In 1928-29 Dr. E.V. Laing of Aberdeen University laid down experiments on the Hill of Annahar to determine the cause of the inhibition of tree growth on peat.

As far as the writer knows, this experiment was never fully recorded or the results assessed. A great many different species were planted on a very exposed peaty site on the top of Annahar and the experimental area surrounded by a stockade. The stockade collapsed some years ago and the survivors are now in full exposure. Many of the species have gone but Pinus contorta, mountain pine and Sitka spruce survive.

The Sitka spruce is by far the most successful and is now growing strongly. If this proves anything, it must be that provided Sitka spruce is given initial shelter (such as would be supplied by a pine nurse) it will stand exposure and grow better

than any other species now available.

It is significant that the Japanese larch on Annahar has practically died out, just as it has done in Compartment 33 at a high elevation.

In 1950 the Research Branch laid down a high elevation pilot plot of 5 acres on ploughed ground in Compartments 14 and 15. The layout of this plot is similar to the high elevation plots at Kielder. A second plot, on similar lines, is being prepared at the west end of the unit in Compartment 118 and will be planted in F.Y.51.

These high elevation plots are the result of a visit of inspection made by Mr. J.A.B. Macdonald in February 1950 when the problem of Drumtochty's checked areas was fully investigated.

Mr. Macdonald was opposed to any attempt being made to repair past failures on the steep ridges and the upper slopes. He felt that roe deer would make the establishment of a pine crop on these failed areas expensive and, as ploughing would not be possible, the growth of the pine would inevitably be slow.

A more attractive proposition to him would be to plough experimental areas on the nice, gentle tops which had previously been considered as unplantable, and to try out a variety of species there.

Research - Note by the Research Branch.

With the exception of certain experiments conducted by Dr. Laing of the Forestry Department, Aberdeen University, Research Branch have had remarkably few connections with Drumtochty.

Beating up. Two experiments on the filling of gaps in larch plantations were laid down in 1934. In the first Japanese larch, Pinus contorta and beech were used to fill double and quadruple blanks made in a P.29 Japanese larch crop. In the second, European larch, Pinus contorta and beech were used in a similar way in P.29 European larch.

By 1940 the beech had failed and it became clear that only the Pinus contorta and larch beat-up plants placed centrally in the gaps would make a useful contribution to the canopy. In fact it is not worthwhile beating up even a two plant gap as late as five years from planting, even on a comparatively slow site for the initial species.

Pilot Plantations. In P.50 - P.52 a series of three trial plots each of five acres is being laid down by the local staff to research specifications. They lie at 1050 ft. to 1250 ft. and should explore the possibility of using the 300 acres of ground at present classed as unplantable on the broad ridge tops. Pinus contorta is the main or matrix species, mixed throughout with Scots pine. In addition, groups of Picea omorika and Sitka spruce, Tsuga, Abies nobilis and Japanese or hybrid larch have been put in at the rate of 60 groups per acre as the species most likely to do well in the shelter afforded by the pine.

Larch Die-back. At about 900 ft. elevation in the exposed slope of Burnieshag Hill a crop of European larch planted in 1932 (from seed collected in East Scotland) has recently died back. This site had formerly borne a crop of spruce and larch, felled in 1916. It is now proposed to clear strips through the partially dead larch and replant them with experimental plots of various provenances of Scottish, Alpine Polish, Sudetan, Japanese and hybrid larches, with a view to discovering which of them is the most suitable for this obviously difficult site and is resistant to die-back.

Thinning.

The thinning of acquired plantations has been carried out reasonably thoroughly since 1927 but labour shortage during the war years resulted in an accumulation of arrears which is only now being overtaken.

The first thinning of Forestry Commission plantations was

begun in 1944 and continued until 1949 in an efficient but unsystematic way.

In 1950 it was realised that as more and more of the young plantations became ready for treatment, careful planning was essential if some of the areas were not to be overlooked.

The writer prepared a detailed thinning plan in 1950 which prescribed for the thinning of one third of the woodlands each year, for the next three years.

In the preparation of this plan, each compartment was examined and the different stands within the compartment assessed. It is, therefore, possible to forecast with some degree of accuracy the thinning outturn each year. For the next three years the annual volume to be extracted will be about 40,000 cu.ft.

The majority of the first thinnings are felled by Forestry Commission labour. The produce, if larch, is either sold at rideside as rustic material or converted to fencing material, sheep stakes etc. in the forest. The other conifers are sold at rideside at so much per cu.ft. and not often by the ton weight.

The thinnings of the acquired plantations, other than those which have been underplanted, are generally marked and sold standing, to a timber merchant.

Roads.

When he inspected the Fordoun Section in 1929, the Chairman raised the question of contour rides and recommended that these be laid out to assist future extraction. This was never done at Drumtochty but in view of modern developments, the Chairman's suggestion of 21 years ago is interesting.

When the extraction of thinnings had to be tackled on the Fordoun side in 1948, the unsuitability of the rides laid out on the Grid system was realised and the necessity for contour roads became evident.

The first forest road was made by the Roads Branch in 1948 and ran from the Drumelzie access to the east bank of the West Den Burn and from the Sarah's Den access to the west bank of the West Den Burn. This road was probably over elaborate but when it is considered that it will have to carry the whole weight of the timber grown on the Fordoun face, perhaps it will prove more satisfactory than a cheaper road would have done.

From 1948 onwards roads have continued to be made at Drumtochty and recent construction has been of the simple fair weather type with metalling limited to the wet parts.

In 1950 the writer, assisted by an attached District Officer, prepared a comprehensive road plan for this forest. According to this plan about 15 miles of roads will be needed to meet the extraction needs of Drumtochty.

The Future.

Apart from the recently acquired area of 55 acres at Phesdo which is due to be planted in 1951 with Japanese larch after disc ploughing, there is no more straightforward planting land available at this forest. There are, however, 230 acres of checked or failed plantations; 237 acres of hitherto unplanted ground at a high elevation which was previously considered unplantable but which in the future might be ploughed and planted; 63 acres of mountain pine plantations which should be interplanted and 30 acres or thereby of old acquired European larch not yet underplanted.

Even if our knowledge and technical skill have increased sufficiently to warrant our tackling a great deal of this, there remains the problem of roe deer. The fight against these creatures is increasing but so far it has not been possible to reduce their numbers to any appreciable extent.

In the opinion of the writer the problem is now as much an economic as a silvicultural one and very little can be accomplished without deer fencing the blocks which remain to be treated.

If the outlay in fencing sizeable blocks is accepted, it is believed that over 300 acres could be tackled now and the hitherto unplanted areas on the tops left until the results from the high elevations pilot plots become available.

There appears to be sufficient evidence at Drumtochty to justify the planting of mountain pine on the checked ridges and upper slopes, at least on a limited scale, with a view to introducing Sitka spruce later on.

If Mr. J.A.B. Macdonald's recommendations are accepted and no effort is made to rehabilitate the failed areas, they are in danger of remaining sterile indefinitely for without some pioneer crop, such as mountain pine, the soil conditions will not improve.

The interplanting of the existing mountain pine is being started on an experimental scale this year without fencing and the writer believes that the small scale planting of the bare ridges with mountain pine should also be put in hand now.

There seems no reason to anticipate any major problems with regard to the treatment of the established crops. The existing thinning plan will be kept up to date and improved in the light of experience. Timber merchants will be encouraged to come in and buy the thinnings standing as soon as sufficiently large blocks become available.

(Signed) H.A. MAXWELL
District Officer.



Sitka spruce/mountain pine mixture, Compartment 34.
In 1930 Sitka spruce was introduced into a stand of mountain
pine, planted in 1913. The site is fully exposed at an
elevation of 1000 ft. The average height of the spruce is
14 ft.

Photograph taken March 1951.

HISTORY OF DRUMTOCHTY FOREST

APPENDIX I.

For the compilation of this historical account of Drumtochty Forest reference was made to the following Inspection Notes:

- (1) Report of the Commissioners' visit to the North Eastern Division (Scotland) 16th to 20th September, 1929.
- (2) Report written by Mr. O.J. Sangar after his visit to Drumtochty in May 1933.
- (3) Report on the visit of the Chairman to Drumtochty on the 14th October 1936.
- (4) Report on the visit of the Chairman and the Acting Assistant Commissioner to Drumtochty on the 13th March 1941.
- (5) Report on the visit of the Chairman and the Acting Assistant Commissioner to Drumtochty on the 11th June, 1944.
- (6) Report on the visit of the Chairman to Drumtochty Forest on the 6th October, 1949.
- (7) Report on the visit of Mr. J.A.B. Macdonald (Silviculturist North) to Drumtochty Forest on the 14th February, 1950.
- (8) Extract from the diary of Mr. J.A.B. Macdonald for the 14th February, 1950.

HISTORY OF DRUMTOCHTY FOREST

APPENDIX II.

SUPERVISION.

The following officers have been responsible for Drumtochty Forest since it was acquired in 1926:-

Divisional Officers and Conservators-in-Charge.

Mr. J.F. Annand, Div. O.	1927-1932
Mr. R.G. Forbes " "	1932-1933
Dr. H.M. Steven " "	1933-1938
Mr. F. Scott " "	1938-1939
Mr. L.A. Newton " "	1939-1946
Mr. H.C. Beresford-Peirse, Conservator ...	1946-1947
Mr. F. Oliver " ..	1947

District Officers.

Mr. D.H. Bird	1927-1940
Mr. D.W. Harvey	26 Feb.-18 May 1940
Mr. D.H. Bird	1941-1946
Mr. T.H. Woolridge	1946-1948
Mr. H.A. Maxwell	1948-1951

Foresters.

Mr. R.R. Donald Grade II	1926-1928
Mr. J. Corbett " "	1928-1933
Mr. J.A.M. Kennedy " "	1932-1937
Mr. T. Allan " "	1937-1938
Mr. R.Y. Officer, Foreman ..	1938-
Mr. E. Grigor, Foreman and Forester Gd.II from 1943 ..	1940-1948
Mr. J. Hendry, Forester Gd.I	1948-1950
Mr. W. Macdonald " "	1950-

HISTORY OF DRUMTOCHTY FOREST

APPENDIX III.

RATES of GROWTH of VARIOUS SPECIES

The heights of all the commonly planted species at Drumtochty were measured over a wide range of sites. The information obtained from these measurements has been tabulated below. It must be made clear that the measurements were confined to those plantations which are developing normally. Those which are still in check have been referred to elsewhere in the history.

The only conclusions which can be drawn from the data collected are general notes but it seems fairly definite that

- (1) Growth falls off with increasing height and exposure.
- (2) Growth appears to be greater on the Old Red Sandstone drifts than on the Highland schists, and
- (3) Japanese larch and Sitka spruce appear to be the best species for high elevations and extreme exposure.

Compartment	Species	P. Yr.	Age	Geology and Soil	a. Altitude b. Aspect c. Slope d. Exposure	Mean Height of Ft. Dominants	Mean Annual Height Increment	Current Annual Height Increment during last 5 years.
12	S.S.	27	24	O.R.S. Conglomerate B.F.S. loamy gravel freely drained	a. 600 b. N. c. Slight d. Shelt.	35	1'6"	2'
11	D.F.	27	24	ditto	ditto	40	1'8"	2'6"
12	J.L.	27	24	O.R.S. Conglomerate Slightly Podsolized freely drained, loamy gravel	a. 700 b. N. c. Moderate d. Moderate	30	1'3"	2'
12	N.S.	27	24	ditto	ditto	30	1'3"	2'
16	S.S.	28	23	O.R.S. Conglomerate Peaty Podsol Slightly poorly drained. Heavy loam with gravel	a. 850 b. N. c. Moderate d. Moderate	30	1'3"	1'9"
16	S.S.	Acqd.	46	ditto	ditto	70	1'6"	1'6"
16	E.L.	28	23	O.R.S. Conglomerate Podsolized. Freely drained. Heavy loam with gravel	a. 900 b. N.W. c. Steep d. Exposed	15	7½"	10"

Compartment	Species	P. Yr.	Age	Geology and Soil	a. Altitude b. Aspect c. Slope d. Exposure	Mean Height of Dominants	Mean Annual Height Increment	Current Annual Height Increment during last 5 years.
13	J.L.	28	23	O.R.S. Conglomerate Peaty Podsol Slightly poorly drained. Peaty above, gravel below	a. 1000 b. N. c. Steep d. Exposed	18	9"	1'4"
13	S.S.	28	23	ditto	a. 1200 b. N. c. Steep d. Exposed	20	10"	1'6"
10	N.S.	28	23	O.R.S. Conglomerate Peaty Podsol Sl. freely drained Layer of peat over gravel	a. 850 b. N. c. Moderate d. Exposed	25	1'1"	1'
7	D.F.	28	23	O.R.S. Conglomerate B.F.S. loam with gravel, freely drained	a. 850 b. N.W. c. Steep d. Slightly Exposed	35	1'6"	2'
45	E.L.	31	19	O.R.S. Conglomerate B.F.S. Freely drained loam with gravel	a. 700 b. S. c. Mod.- Steep d. Shelt.	30	1'7"	1'3"
45	J.L.	31	19	ditto lighter soil with more gravel	ditto	40	2'1"	2'
44	N.S.	31	19	O.R.S. Conglomerate and Schist drift B.F.S. Moist loamy	a. 800 b. S. c. Slight d. Mod. Shelt.	15 (Variable)	9"	1'
53	E.L.	31	19	Quartzite Schist Podsol. Freely drained. Light loam.	a. 900 b. S.E. c. Moderate d. Mod. Exp.	15	9"	9"
55	J.L.	31	19	ditto	a. 1100 b. S.E. c. Moderate d. Exposed	27	1'5"	1'8"
54	P.C.	31	19	ditto (shallow)	a. 1200 b. S.E. c. Moderate d. Exposed	9	5½"	9"
58	P.C.	31	19	ditto	a. 1200 b. N.W. c. Moderate d. Very Exp.	7	4½"	6"

Compartment	Species	P. Yr.	Age	Geology and Soil	Altitude a. Aspect b. Slope c. Exposure d.	Mean Height of Dominants	Mean Annual Height Increment	Current Annual Height Increment during last 5 years.
45	E.L.	Acq.	56	Quartzite Schist B.F.S. Moist freely drained, light loam	a. 700 b. S. c. Steep d. Mod.Exp.	65"	1'2"	10"
45	N.S.	"	56	ditto	ditto	60	1'1"	1'
71	H.L.	28	23	O.R.S. & Schistose Drift. B.F.S. Moist freely drained	a. 400 b. S. c. Steep d. Shelt.	50	2'2"	2'3"
74	N.S.	29	22	O.R.S. Drift Podsollic, Light, Moist, Freely drained	a. 550 b. S. c. Moderate d. Shelt.	15	8"	1'6"
74	E.L.	29	22	O.R.S. Drift Podsollic, Light, Moist, Freely drained	a. 600 b. S. c. Moderate d. Mod. Shelt.	20	11"	1'6"
73	J.L.	29	22	ditto	a. 600 b. S. c. Moderate d. Slight	25	1'1½"	2'
75	S.S.	29	22	ditto	a. 550 b. S. c. Moderate d. Shelt.	30	1'4"	2'
77	P.C.	29	22	ditto	a. 600 b. S. c. Slight d. Shelt.	26	1'2"	1'3"
82	S.P.	30	21	O.R.S. Drift Podsollic, Light Freely drained	a. 650 b. S. c. Moderate d. Slight	20	1'	1'4"
99	E.L.	31	20	O.R.S. Drift Podsollic, Light Freely drained	a. 800 b. S. c. Moderate d. Shelt.	15	9"	1'3"
93	J.L.	31	20	O.R.S. Drift Podsollic, Light, Freely drained	a. 800 b. S.E. c. Moderate d. Shelt.	25	1'1"	1'6"
101	J.L.	35	16	O.R.S. Podsollic	a. 1000 b. S. c. Moderate d. Exposed	9	7'	1'2"

Drumtochty

DRUMTOCHY FOREST

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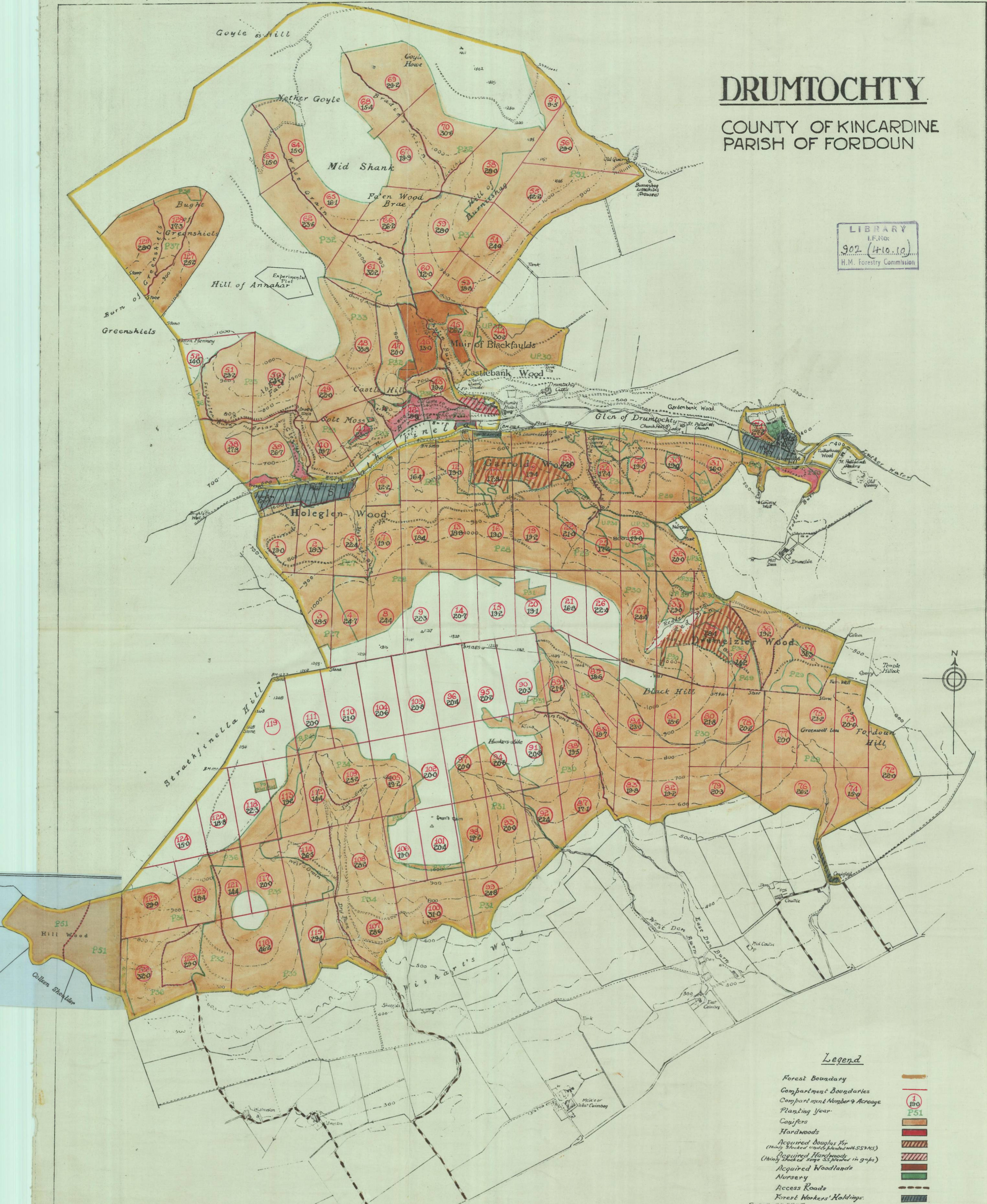
Sitka spruce/mountain pine mixture,
Compartment 34.

In 1930 Sitka Spruce was introduced into a stand of mountain pine, planted in 1913. The site is fully exposed at an elevation of 1000ft. The average height of the spruce is 14ft. Photograph taken March 1951.

DRUMTOCHTY

COUNTY OF KINCARDINE
PARISH OF FORDOUN

LIBRARY
I.F. No.
902 (4.10.10)
H.M. Forestry Commission



Legend

- Forest Boundary
- Compartment Boundaries
- Compartment Number & Acreage
- Planting Year
- Conifers
- Hardwoods
- Acquired Douglas Fir (thinly stocked wood, planted 1855-1865)
- Acquired Hardwoods (thinly stocked some SS planted in gaps)
- Acquired Woodlands
- Nursery
- Access Roads
- Forest Workers' Holdings



SCALE OF FEET
0 500 1000 1500 2000 2500 3000 4000 5000

REF
R 51 / N 20
INT 478