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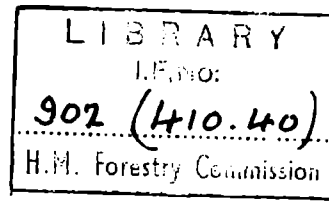
FORESTRY  COMMISSION

HISTORY
OF
HAMSTERLEY

FOREST
NE (E) CONSERVANCY

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FORESTRY COMMISSION

HISTORY

of

HAMSTERLEY FOREST

1927 - 1951

NORTH EAST (ENGLAND) CONSERVANCY

HISTORY OF HAMSTERLEY FOREST

CHAIRMAN'S COMMENTS

The large areas of Calluna moorland were recognised from the beginning as difficult subjects for afforestation; on the other hand it was thought that the steeper slopes were comparatively easy and could be afforested with reasonable confidence. Apart from the excessive use of European larch (which was common form at the time) reasonably good plantations have in fact been established on the latter types of ground.

My policy was that we should get on with the afforestation of the better land but proceed cautiously on the moorland until such time as the experimental plots which I asked to have established began to yield information.

The main interest of Hamsterley in its historical aspect is therefore the development of methods of treating the moorland, resulting, at the point which has been reached today, in soil cultivation (deep ploughing where possible) and the planting of mixed conifers. It is worth noting that much of the preliminary work was not done at Hamsterley (the only local effort being the abortive trial of a specially designed plough) but at other forests such as Allerston.

On the occasion of my last visit to Hamsterley in May 1952 I was able to get an extensive view of the work which has been done since the middle 40's. The results were better than I had expected to find, some of the older Scots pine/Sitka spruce mixtures showing excellent growth. It also seemed obvious from the experimental plots that as the trees built up mutual shelter the rate of growth would increase markedly.

There is evidence in Pennington Wood that beech should grow moderately well on prepared moorland and I suggested that some of the main rides should be planted with belts. It will require a nurse and it is not too late in selected places to replace Sitka spruce in Scots pine/Sitka spruce by beech. Starting afresh, Japanese larch might even be a better nurse as beech may start away more quickly than pine. On the latest evidence at Allerston, Japanese larch also acts more quickly than pine as a nurse for Sitka spruce.

The further development of the Hamsterley mixed plantations will be of great interest. There is the obvious risk that Sitka spruce may get pumped in the pole stage though there seems to be no concrete evidence.

Nevertheless the present technique is the logical outcome of what has gone before and I do not see what better could be done in the present state of knowledge.

R.

July 18th, 1952.

CONSERVATOR'S COMMENTS

I think that time will show that too much faith has been placed in Sitka spruce on the Calluna areas. A greater proportion of pine nurse, or even complete substitution by Japanese larch would have been better in places, and this applies to quite recent plantings.

I have not yet made up my mind as to future treatment of the areas quoted (in the first paragraph of "Development of the Plantations") thus: ".....Even now great areas of plantations made before 1933 are still in check.....". The problem is engaging my attention and an attempt will be made to reach conclusions and institute plans this winter.

With our future management and silvicultural practices based on the latest information and on experience, the areas other than of Calluna at Hamsterley should produce quite satisfactory plantations. The Calluna areas may well call for a radical change in management after the first rotation.

C. A. Connell

21st August, 1951.

H A M S T E R L E Y F O R E S T

An Historical Account

This account is prepared at the request of the Chairman of the Forestry Commission. The general lines of the report were laid down, but the writer has been left to amplify the headings to suit local conditions. Great assistance has been given by members of the conservancy staff in research into past records.

(Sgd) Stan. Forrester,
District Officer

20/3/51

HAMSTERLEY FOREST HISTORY

GENERAL DESCRIPTION OF THE FOREST

Situation and Area

The forest, acquired by the Forestry Commission in 1927, lies at altitudes of 500 ft. to 1,300 ft. in the Durham Hills, foothills of the Pennine Range. The present area of 5,510 acres includes an outlier, Black Banks Plantation acquired in 1937, and lying a few miles to the north-east. Over half the forest area is heather moor typical of this part of Durham but there are two steep sided valleys with a more fertile soil intersecting this moor. These valleys join to give the wide, relatively fertile valley of the Bedburn Beck. Black Bank Plantation is a heather moor which slopes down to the steeper bank of the River Wear.

Utilisation of Ground

The main area was formerly divided into two farms, Redford and Pennington. Both were sheep farms with stocks of about 2,000 and 700 respectively. Redford Farm was divided into small holdings in 1927 when the area was acquired, and the grazing lands on this farm were the first areas afforested. Pennington Farm was retained as a sheep walk - gradually being decreased in area - until 1942 when the whole of the remaining land was resumed.

Mayland Farm was a small mixed farm before acquisition when the grazing land attached to it was afforested.

Black Bank Plantation was also a sheep farm, the grazing land being a plantation felled in the first world war. This was afforested over a period immediately following acquisition, leaving the in-bye land as a small holding.

The whole area has been largely used in the past as a grouse moor. Apart from the regular burning of the heather for the benefit of the grouse - an operation which was carried out for the benefit of sheep as well - little effect from this use is apparent.

T A B L E I

From	By	Date	Plantations Acquired	Plantable excl. Col. 4.	Nurseries	Agricultural	F. W. H	Unplantable excl. Col. 4.	Other Land					Total
									Land Permanently Transfrd.		Land Temporarily Transfd.		Land not Transferred	
									Description	Acreage	Description	Acreage		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	
Hamsterley from Major H. S. B. Surtees	Purchase	14.1.27												
Mayland Farm from Miss A. G. Brownless and others	Purchase	1.10.32	58	5036	5	138	177	28	-	-	Part of Black Banks Farm to M. A. F. 13.5.51	45	23	5510
Black Banks Farm from F. W. Brown	Purchase	27.11.37												
Totals			58	5036	5	138	177	28				45	23	5510

TABLE II

(a) Plantations:-			
Acquired	58		
Formed by Commission	<u>4948</u>		5006 acres
(b) In hand, awaiting planting			
Blanks after felling	24		
Burnt areas	-		
Other land	<u>64</u>		88 acres
(c) Nurseries			5 acres
(d) Agricultural			
Number of Tenancies	4	Area	138 acres
Land Transferred to M.A.F.		Area	45 acres
(e) F.W.H. Number 13		Area	177 acres
(f) Unplantable land in hand			28 acres
(g) Other land			23 acres
			<hr/>
			5510 acres
			<hr/> <hr/>

Geology and Soil

The geological formation is millstone grit into which is intruded a whinstone dyke. Overlying the rock are glacial deposits which, although giving sandy soil in places, result generally in heavy soils. On the western half of the forest, the moorland conditions have given rise to deep peat in places.

Meteorology and Physiography

The rainfall is about 45 in. per year and the western half of the area is fairly well exposed. All slopes from level to very steep, and all aspects, are represented.

Vegetation

The following are the vegetation types in the forest.

1. Calluna Moor. This consists of almost pure heather (Calluna vulgaris). Occurring very sparsely are heaths (Erica tetralix and Erica cinerea). When the heather is burnt very hard, Aria flexuosa and sheep sorrel re-colonise the area first. Bracken commonly encroaches on the Calluna vegetation.
2. Nardus pasture. Although there is little evidence to prove it, the vegetation on the rides is an indication that an area near Pennington Farm consisted of a pasture in which Nardus stricta dominated but in which bents (Agrostis spp.) were also present. Fescues were probably also growing but in small quantity.
3. Moor peat. Where drainage has been impeded peat forms on the moor and on this there is a vegetation of Scirpus, heather (Calluna), bog-cotton and on the wettest parts, Sphagnum. Molinia may be present in small amounts.
4. Moor flushes: occur where minerals leached from a higher area come near the surface in free running water. Typical vegetation is characterised by the presence of Juncus with possibly Holcus lanatus and Aira caespitosa. On the moors the surrounding Calluna vegetation may invade the area but this occurs as isolated bushy plants among the grass species present.
5. Grass Banks: Some of the more stable valley sides are covered with a grass turf largely of Agrostis but with both fescues and Nardus also

- present. Bracken is a common but not essential addition to this type.
6. Herbaceous Slopes. Where the slope is too steep for a complete carpet of grass to form, there are greater opportunities for other plants and ferns to establish themselves. Such are foxglove, hardfern, primrose and mosses. It is on this type of vegetation that the natural birch scrub of the valleys appears.
 7. Old Woodlands. In the lower part of the valley are more gentle slopes that have had woods at some comparatively recent date. There is a basic vegetation of grasses (Holcus lanatus and Aira caespitosa chiefly with some bents in the drier parts). In addition to this there is a tangle of brambles, bracken and willowherb mixed among coppice of several hardwood species.
 8. Silt and Gravel beds are not extensive but are present on the stream-sides and have a vegetation almost entirely of Holcus lanatus, Aira caespitosa, Agrostis spp., and Festuca spp. in that order of prominence.
 9. Juncus flushes, appear to a limited extent at the foot of steep slopes on lower areas. These have a vegetation of Juncus, Holcus lanatus and Aira caespitosa.
 10. A transitory form between 7 and 1 occurs with Calluna invading the old woodland type as degeneration occurs. The woodland vegetation is present but there are areas and patches more or less dominated by heather.
 11. A vegetation of bilberry occurs under the beech of Pennington Plantation.

Risks

The risks to a forest crop in this area are not great, but those with some significance are as follows:-

Fire. The practice of moor burning by farmers and gamekeepers raises some element of risk but a fire in heather such as the vegetation is here is not so fast moving as in a grass area. There is also a certain amount of danger from the public lighting fires or throwing away matches and cigarette ends for a period in the spring and in the autumn. One fire in 1941 of about 100 acres is the only one known to have caused any damage. It was replanted the same year.

Neomyzaphis on Sitka spruce is causing some defoliation in one or two areas but does not appear to be spreading rapidly or causing a severe check to growth.

Larch shoot moth (Argyresthia laevigatella H. Sch.) and the larch leaf Miner (Colephora laricella Hubn) have done considerable damage on larch, but this could be attributed primarily to the wrong site for the species.

Black game damage was considerable in isolated experimental areas but little serious damage has occurred in the plantations.

Rabbits, although numerous at the east end of the forest, are not now an important factor although a continual watch is necessary.

Roads

The farm tracks of the area served for the early years' operations. In the late "thirties" the Ministry of Labour Camp at Bedburn was built for the rehabilitation of the unemployed. They completed, by 1939 the road from Bedburn to the Grove - apart from the final bridge across the Euden Beck.

This bridge was completed and roads constructed up the two valleys from the Grove and on to the ridge between, by the Engineering Branch formed after the war. These were partly to allow afforestation of the remaining area (the least accessible) and partly to permit economic extraction of thinnings from the established plantations.

Labour

At no time until the late war years has there been a shortage of labour although the quality has not been all that could be desired in many cases. Before the war and up till 1942 as many as 90 men would cycle in from considerable distances. Many conscientious objectors were included in this number during the war years. With the post-war expansion of the planting programme and the onset of thinnings the labour force, now reduced somewhat has not been sufficient to keep so well up on the work.

Thirteen forest workers holdings were formed in the early "thirties" (180 acres) and there are three agricultural holdings totalling 140 acres.

SILVICULTURE

Acquired Plantations

There are several pieces of natural and semi-natural woods, and two plantations existing now to give a guide to what can be grown on the area.

Behind Pennington Farm is a 14 acre plantation of beech, about 150 years old with Scots pine scattered through and particularly to the western end. The beech is of moderate growth and reasonable form, considering the locality factors, and must have been nursed up with Scots pine on ground which seems to have been ploughed.

In the upper part of the Spurlwood Valley are several groups of beech and other hardwoods which vary from extremely good, on the streamside to scrub on the exposed western slopes. Lower in this same valley are some groups of oak on a steep grassy slope. These are about 150 years of age, but are short boled and with very heavy crowns.

Near "The Grove" is a six acre plantation of Japanese larch planted (according to local information) in 1900. This apparently had very little thinning, if any, before it was acquired by the Forestry Commission. It was apparently thinned very lightly in 1930 and instructions were given in 1932 for it to be thinned again immediately. In 1949 the crop was still standing very dense and a very heavy thinning was carried out in 1950. The trees before this were still showing little sign of growing vigorously. The dimensions now (1951) are approximately:-

Average breast height diameter	-	5 $\frac{3}{4}$ "
" total height	-	48 ft.
number of trees per acre	-	225

(80 trees per acre were removed in the latest thinning).

The State of the Ground

The ground when operations commenced could be divided into two main types.

- (a) The heather moor with dominant Calluna giving way to grasses in small flush areas and where intensive grazing has resulted in the suppression of the heather. The soil in this area is generally hard, stony, and compacted.
- (b) The slopes and lower areas where generally a woodland flora appears

with grasses and such plants as foxglove, hard fern, bracken, bramble and willowherb. The grasses are largely Agrostis species but with fescues on the better areas and with Holcus lanatus and Aira caespitosa on the wet areas. The soil of all the lower areas and slopes is generally loose and friable.

Choice of Species

In the P.27 and P.29 areas European larch was planted on any sites on which there was hope that it might grow, the remainder of the area being mostly Norway spruce in 1927 and Sitka spruce or Scots pine in 1929.

In the P.28 areas Sitka spruce and Scots pine (separately) were planted on the moor with European larch on the upper part of the slopes and Douglas fir lower down. This year's plantations were two of the most successful in the early years' work.

In 1930, 1931 and 1932, larch were planted over the whole of the steep slopes, both European and Japanese species being used. The moorland part was planted with areas of Scots pine and Sitka spruce with small patches of Pinus contorta. In all these areas a considerable amount of beating up with other species has been done masking the original plantation.

During the period 1933-38 the lowland areas of the forest were planted giving a very free choice in the selection of species. Most of these areas were woodland sites and on banks of Japanese larch and Douglas fir have done very well. A plantation of Abies grandis and Norway spruce (a 25% to 75% mixture) is growing very well after its sixteen years. Strips of European larch and oak (8 yards width of European larch with 30 yards width of oak) were planted in 1936, 1937 and 1938. Generally Norway spruce was planted in the low lying "haughs".

Planting of this type of ground continued at the same time as planting of the moor during the period 1939-43, Japanese larch, European larch, Tsuga and Scots pine all being used extensively. Ash was planted in appropriate moist areas.

On the moor at this time Sitka spruce was planted pure in parts, with a greater part of the area planted with Scots pine and Sitka spruce mixed (two rows of each alternately). In 1942 and 1943 Corsican pine was planted to a limited extent, a fair proportion of the trees being of the ursuline variety.

Up to 1949 much the same selection was made although Pinus contorta was introduced to the extent of 33% or 50% in mixture with Sitka spruce in small areas. A small plot of each of Picea alba and Picea omorika were introduced in 1948.

The 1950 area includes the steep slopes along the Euden Beck and again a chance to plant Japanese larch occurred. This was planted on the more broken bracken slopes with Scots pine on the harder heather part. Sitka spruce and Scots pine were mixed over the whole of the moor.

A similar selection has been made for 1951 but beech is being planted under some dense scrub birch, Douglas fir among some that is more open, and Norway spruce on a grass flush area.

Methods of Planting

The method of planting used first was screefing and notching. All the P.27 area was planted by this method and it was carried on for the P.28 and P.29 areas with, or without, the screefing.

By P.30 the desirability of planting on turves was being realised and in that year Pinus contorta were planted on turves on some infertile peats. In 1931 the Sitka spruce were planted on turves with, in parts, very good results. From then to the advent of the plough, turf planting of Sitka spruce was the rule with notch planting of other species until 1932, when this method gave way partly to the more expensive pit planting.

The first attempts at ploughing were made in 1938 and this method of ground preparation became general in 1940 in which year experiments were laid down on ground which was ploughed and subsoiled. This ploughing was carried out by some machine like the Ransomes Solotrac plough hauled by a D.2 or similar tractor.

After experimenting in the Yorkshire and Hamsterley areas, among others, a plough was found strong enough to cut a furrow 15 in. to 18 in. deep. This was the R.L.R. plough which has been used generally at Hamsterley since 1943. In 1951 it has been found advisable in addition to use the Cuthbertson draining plough on some of the peat areas, the Cuthbertson keeping on the surface better and making a better drain. These ploughs are used to cut one furrow at the distance at which the trees are to be planted, throwing the furrow slice on to the ground between.

In the first years of ploughing (up to 1946) planting was done on the side of the furrow but between 1947 and 1950 all planting was done on top of the furrow slice. In 1951 all planting, except on Cuthbertson ploughing is again on the side of the furrow. Small areas of hand turfing have been found necessary where the ploughs have been unable to work due to deep sikes, etc.

Screening and notching, usually with a mattock is still used on the bank sides.

Planting Rates

The Forestry Commission commenced operations by planting 168 acres in 1927. Between 200 acres and 300 acres were planted each year until 1932. After this a reduction was made in the programme, and the lower more fertile areas were planted at a rate of 30 to 60 acres a year until the pilot plots (P.29, P.30) would give more guidance on species selection. In 1937 operations on the moor were resumed and at the end of the war considerable increases were made in the programme so that the P.50 and P.51 programmes (660 acres and 480 acres) will complete the planting of the forest.

Development of the Plantations

In the early plantations on the moorland sites the death rate was high and all species were slow to start so that a great deal of beating up has been done chiefly with Sitka spruce and Scots pine. Even now great areas of plantations made before 1933 are still in check. Areas, chiefly with flush conditions, have got past this stage and two notable areas, one on the P.28 area and one in the P.31 and P.32 plantations, are nearing the thinning stage over a fair area. These were probably grass areas at the time of planting.

On the valley sides generally a different picture is to be seen, thriving plantations of Douglas fir, Japanese larch, Norway spruce and Scots pine being thinned now. The European larch in much of this type of ground has been disappointing having suffered from dieback and canker. A particular exception to this is the larch planted in 1928. The larch in the P.27 and P.29 areas has been very largely a failure and much of it has now been beaten up with other species.

Of the lower plantations made in the intermediate stage of the forest's history Japanese larch, Norway spruce and Douglas fir have all been very

successful. The Abies grandis mixed with Norway spruce (P.35) is growing at a very great rate. The larch strips between those of oak are growing well but patches of the oak in heathery areas are not very successful. Much of it, however, will give a good crop. In the more recent plantations European larch, Japanese larch, Tsuga and Scots pine are all growing extremely well.

On the recent moorland plantations the shallow ploughing has had considerable effect on the length of check experienced, particularly by the spruces, and the deeper ploughing has allowed a very early start to speedy growth.

Thinning

Some thinning of acquired woods was carried out before the recent war, and a few advanced plantations have been thinned since then, but the main thinning programme is due to commence this year (1951).

Measurements of the Growth

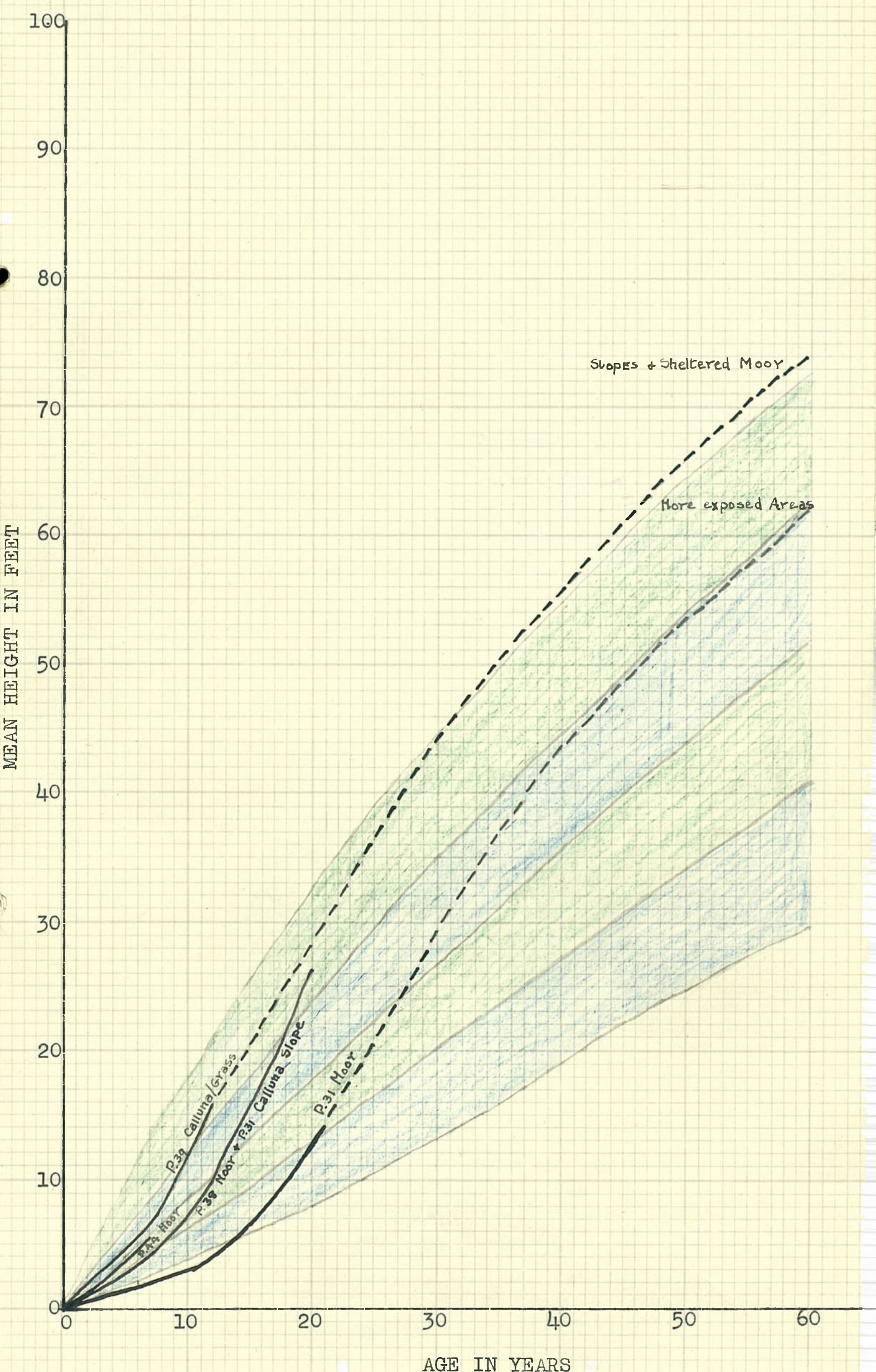
On the following pages are graphs on which the height growth of various species can be compared with the growth given in the Forestry Commission yield tables.

To obviate discrepancies in comparison, due to delayed beating up and to thinning, "top" heights were measured, this being the height of the 100 tallest trees per acre.

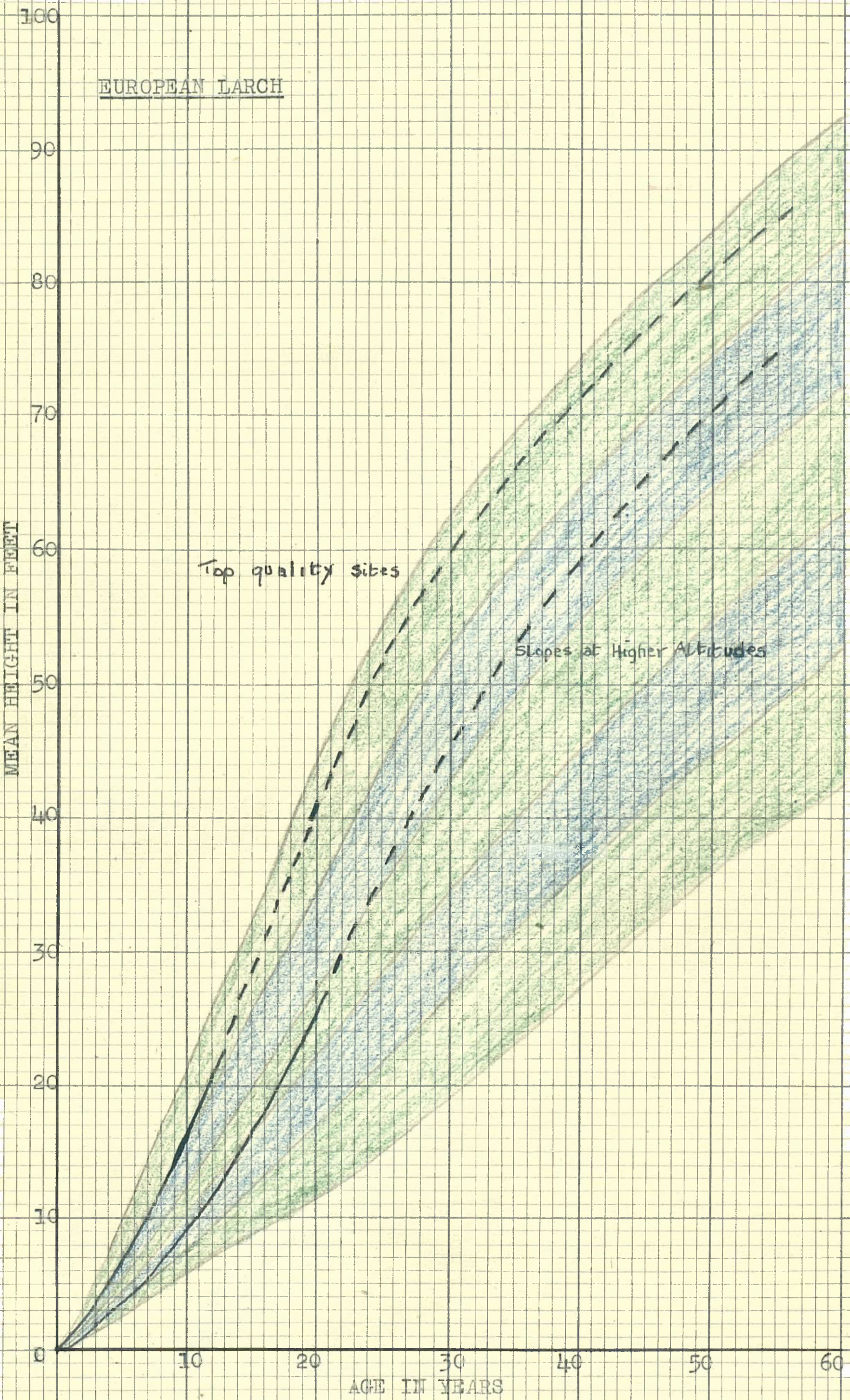
The coloured portions show the various quality classes of the yield tables. The solid lines show actuals and the broken lines expected height growth.

Research - Note by the Research Branch

Hamsterley experiments form only a small part of a much larger series on the heaths of North East England, but they lie fifty miles north west of the main concentration in the Allerston district of Yorkshire. The higher rainfall of over thirty inches at Hamsterley and the fact that the experiments in this forest lie on the great millstone grit series make the Hamsterley group an interesting extension of the main series. They become increasingly important as interest develops in the possibility of afforesting high lying areas on this formation in the Pennines.



EUROPEAN LARCH



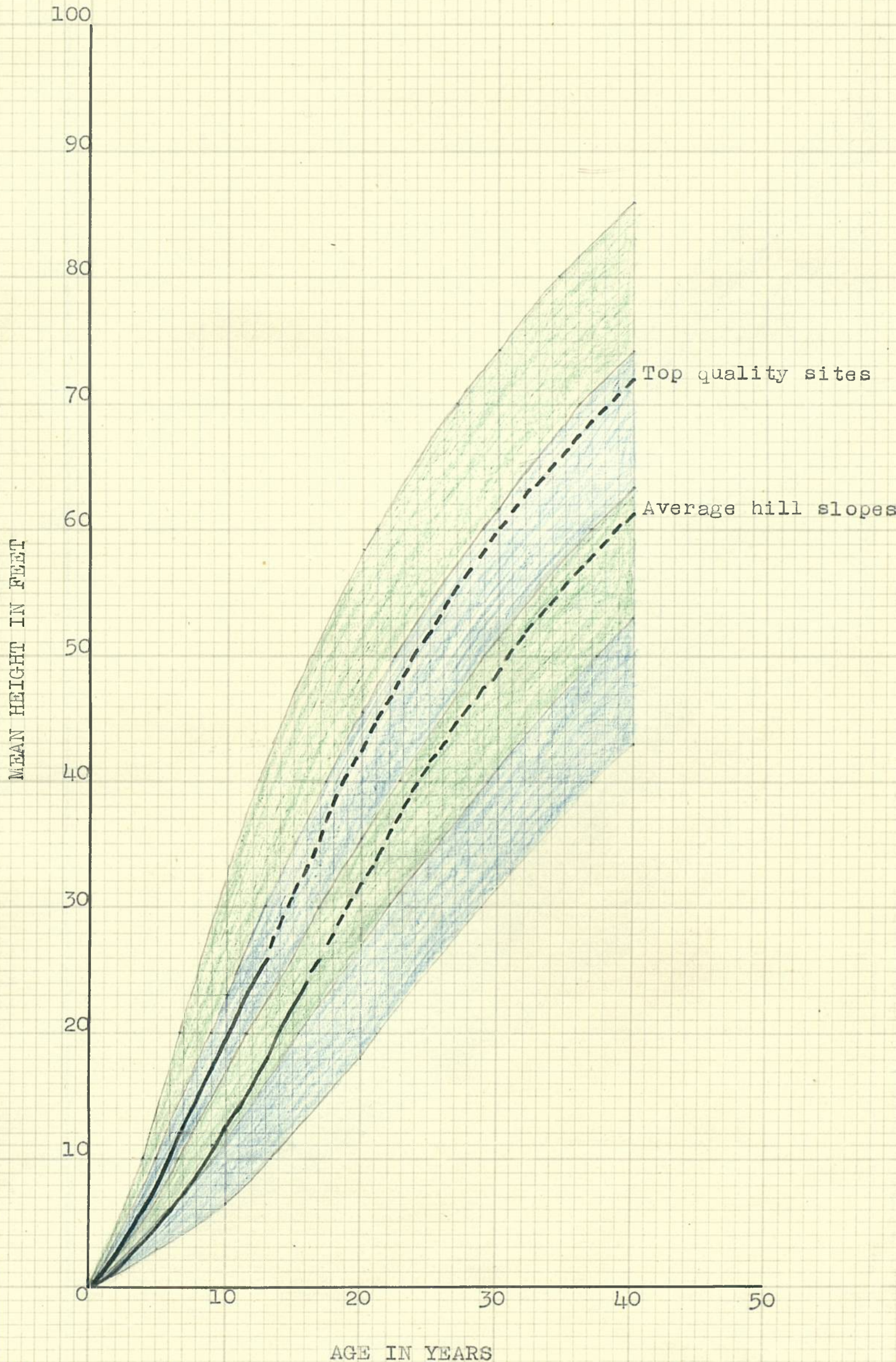
Top quality sites

Slopes at Higher Altitudes

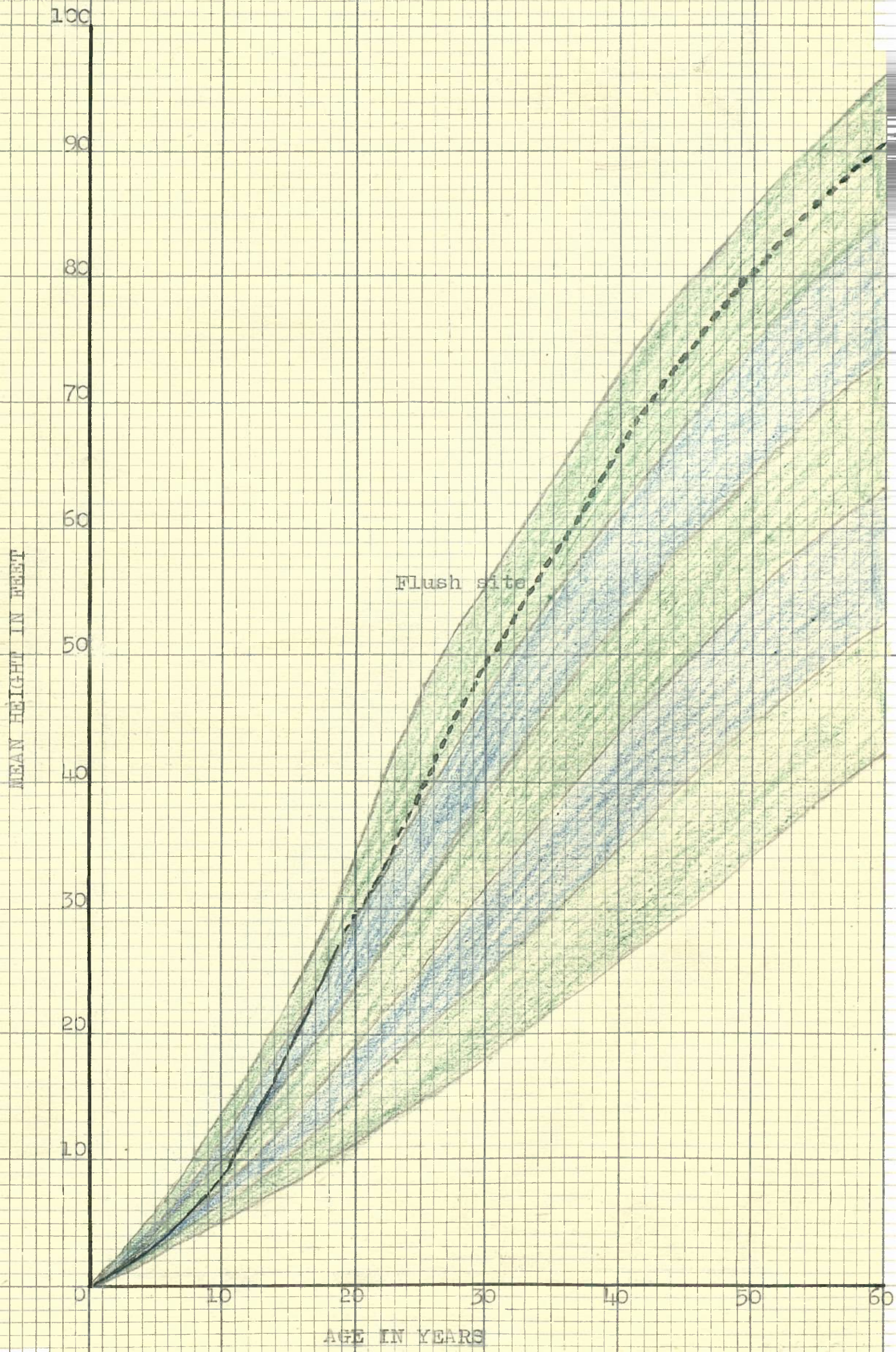
MEAN HEIGHT IN FEET

AGE IN YEARS

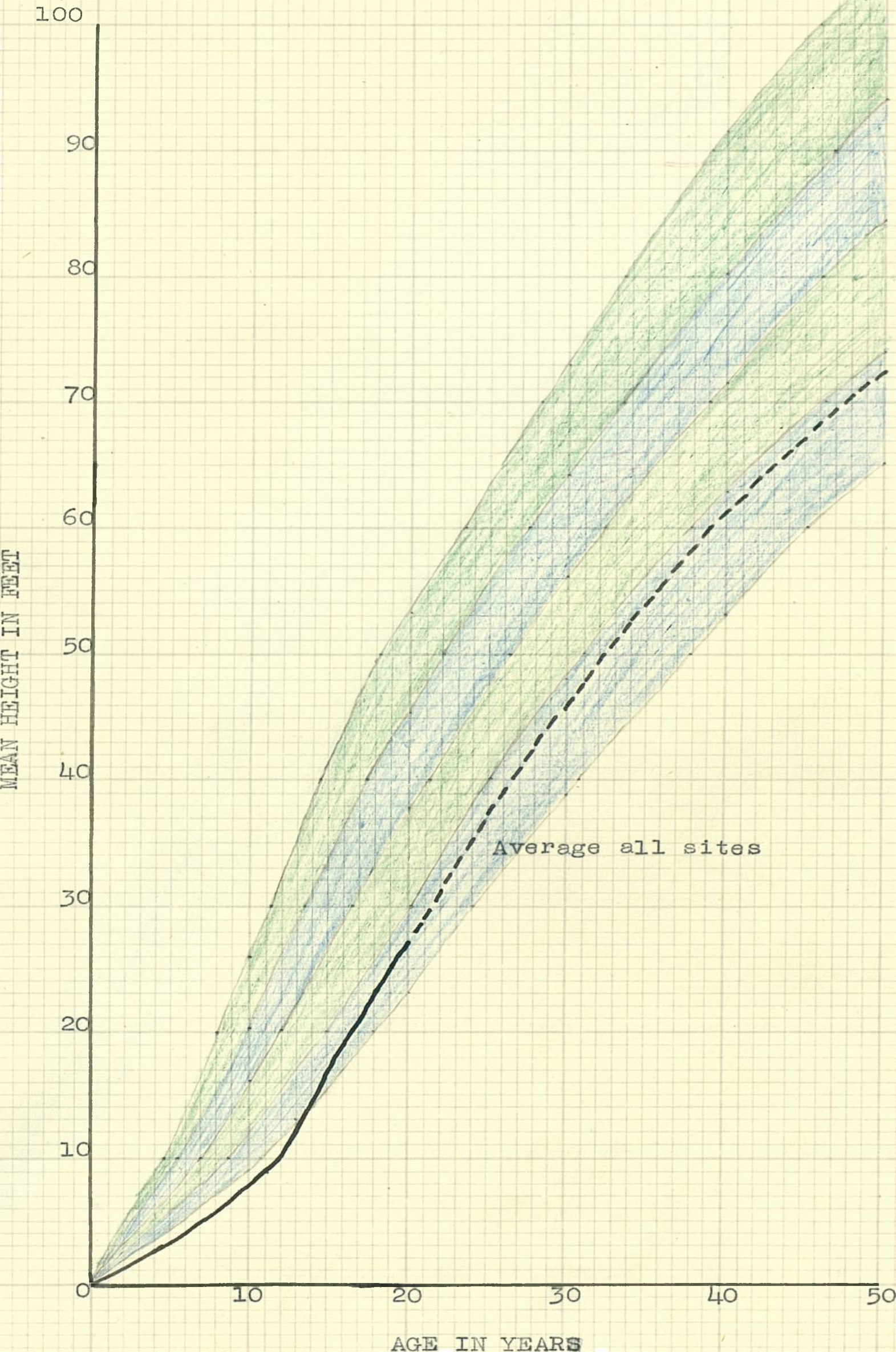
JAPANESE LARCH



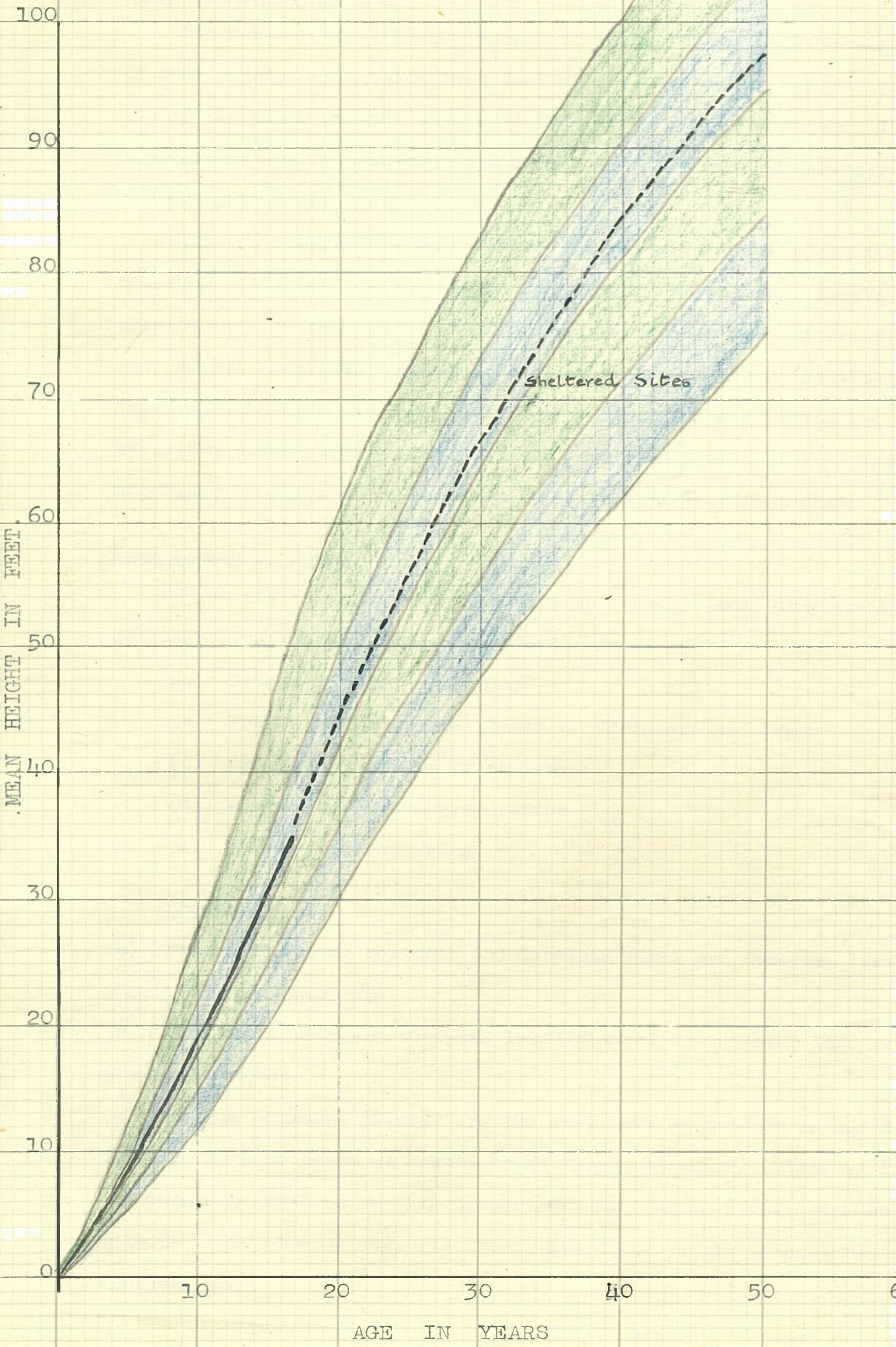
NORWAY SPRUCE



SITKA SPRUCE



DOUGLAS FIR



There are nine separate experiments on the Hamsterley heaths and one on the less important peat type.

1929 - 1930 Experiments

The earlier (or 1929/30) series of six heath experiments form one block of some twenty acres which lies just on the edge of the plateau and at the top of the slope looking down into the valley above the Grove. These experiments are, considering their relative elevation, moderately sheltered, facing north north-west.

All six experiments were planted by direct methods, ploughing not being employed until ten years later in the second series. Experiments 1 and 2 planted in 1929 are trials of afforestation methods for conifer planting and were almost completely repeated in experiment 5 in 1930. Similarly Experiments 3 and 6 were trials of hardwoods planted in these two years, while 7 was laid down to find out how much damage was actually inflicted by blackgame, certain plots being enclosed in a wire netting cage.

Experiments 1, 2 and 5

These are so alike both in object and results that they are best considered together. The main objects are :-

- (a) Trials of various species
- (b) Trials of Scots pine plants of different age types
- (c) Trials of mixtures of conifers
- (d) Methods of ground preparation
- (e) Effects of basic slag

Treatments

- (a) Trials of Scots, contorta and Corsican pines and European larch planted pure by direct notching.
- (b) Pure Scots pine and European larch planted by notching into mattock prepared notches.
- (c) Various mixtures planted for the most part on mattock prepared patches, but also in some cases on mounds or by direct notching. Mixtures included are European larch in varying proportions with Scots pine; Japanese larch with Corsican pine or contorta pine; and Sitka spruce with birch or contorta pine.

(d) Three age types of Scots pine plant were used in directly notched plots in both years.

(e) In almost all cases plants in half of each plot received one ounce of basic slag at the time of planting.

Results

Losses in the first year were heavy particularly of Scots pine and the larches. These were replaced but losses mounted steadily reaching by 1939 sixty per cent over all for these species and almost eighty per cent for Corsican pine and Sitka spruce. All the plots were beaten up again with these last two species in 1939. As a result the crops are now extremely uneven and ragged. In many plots one of the original species is entirely absent and the main crop consists of beat up plants. For these reasons it has been necessary to use top rather than mean height as the basis of assessment.

Species

Scots pine suffered severely from blackgame until 1933 and to a lesser extent in later years. In 1939 the species was severely attacked by Evetria and Myelophilus. Losses have been high ranging from thirty to seventy per cent, and growth has been disappointingly poor, top heights at twenty years averaging from 8 ft. 3 in. to 13 ft. Slag appears to have been responsible for an increase of at most one foot.

Pinus contorta now has a top height up to fifteen feet in Experiment 5 and thirteen feet in Experiment 1. It has been the best species from the start although from 1937-42 there was a period during which growth was poor, the needles being deformed and falling early. The trees have now quite recovered and stem form is good. Losses ranged from sixteen to forty-two per cent, the higher figure referring to plants which were directly notched and unmanured. This species is starting to suppress the heather where in full crop.

Corsican pine suffered very heavy losses. Some units failed completely and the mean death rate was eighty per cent. Ten years ago the few survivors were described as the most promising species but since then some have been windblown and some now show symptoms of "Brunchorstia".

European larch is in very poor condition having suffered heavy losses and being cankered and infested with Chermes and Argyresthia.

Japanese larch has also suffered very heavy losses up to ninety per cent in one case; this species, however, shows better stem form than the European larch. Top heights range from eleven to fourteen feet, but generally speaking the species is not satisfactory, although the growth of some individuals has been surprisingly good, being the tallest in these experiments.

Sitka spruce unfortunately occurs only in mixture. Beat up plants of this species in Experiment 1 are growing slowly, now at ten years old being four to six feet high and having suffered considerably from late frosts. In Experiment 5 this species is variable in vigour, but not very healthy looking - Aphis does not improve its appearance. Losses are between twenty to forty per cent in this experiment and heights are about ten or eleven feet.

The only other species present - birch - suffered heavy losses, has made scrubby growth, and recently shows signs of dying back.

Mixtures

Mixtures have in most cases been unsatisfactory, partly because of the very severe losses suffered by the nurse species. One trend is visible in the records of the Scots pine/European larch mixtures and that is a reduction in Scots pine top height from thirteen to nine feet as the proportion of European larch in the mixture rises. This is almost certainly due to the increased open-ness of the stand.

The contorta pine/Sitka spruce mixture is growing slowly, the Sitka spruce having reached eleven feet and being one to two feet taller than in the birch/Sitka spruce mixture. Growth of the Scots and Corsican pines which had been planted in mixture with other species is generally somewhat poorer than where these species had been planted pure. Again this is almost undoubtedly due to the open-ness caused by the failure of the other species. It is particularly unfortunate that Japanese larch losses in the Pinus contorta/Japanese larch mixture have been so heavy as to make any forecast dangerous, for this mixture where slagged looks likely to prove successful ultimately.

Method of Planting

The heaviest losses generally occurred with direct notching. In the case of European larch and Corsican pine planting on mattock prepared patches resulted in lower losses and slightly improved growth of the larch. With Scots pine, however, there has been little benefit from the more intensive and expensive method of planting. There can be no legitimate comparison between the pines planted directly and those in prepared patches in Experiment 5 since the former were in pure crop and the latter in "plant about" mixtures, where, as already mentioned, the poorer growth was probably due to the open crop. Intensive assessments were carried out in 1938 and 1940 in Pinus contorta/Sitka spruce plots, planted partly on patches and partly on mounds but they showed no differences resulting from planting method, either in losses or in height growth.

Types of Scots pine plant

Damage from black game was so severe as practically to invalidate these trials, in the first of which losses of 2+1 transplants were rather lower than those of 1+1 or 2+0; while in the second trial early growth of the 2+0 was better than that of the transplants though all differences have now disappeared.

Manuring

A one ounce application of basic slag slightly reduced pine losses and almost halved larch losses in Experiment 1. In Experiment 5 the effect was again to increase the survival per cent of larches (and of birches) and to a smaller extent that of the pines and Sitka spruce. The manure has had little effect on the height growth of any species.

Experiments 3 and 6

These experiments consisted of small plots or lines of hardwoods within Experiments 1 and 5 and were planted by direct notching or on prepared patches; slag was added in certain cases. Rowan is the only species which has made reasonable growth and is now about six feet tall; the others, including beech, chestnut, sycamore, alders and laburnum have almost completely failed, as also has a plot of Tsuga heterophylla which was included in the experiments.

Experiment 7

The last of this series, this experiment, was laid down in 1930 after

severe damage by blackgame had been observed in Experiment 1 during the first year after planting. A small area within the 1930 experiments was enclosed by a wire netting cage and planted with single plots of Scots, Corsican and contorta pines, European and Japanese larches, Sitka spruce and beech. The adjacent plots of the main experiment (No.5) were to act as controls.

Beech failed, the larches suffered heavy losses, and the remaining species made a slow start. In 1937 when the cage was removed the pines were about one foot taller within the cage. This difference has increased since that date, Scots and Corsican pines now being about thirty per cent taller, averaging fourteen feet, where originally caged, and eleven feet in the control. Contorta pine was less affected by blackgame and the corresponding heights are sixteen and fifteen feet. The growth of the pure Sitka spruce plot has been exceptional, top height now being almost twenty feet compared with eleven in the mixtures outside. In the absence of replication or control plots of pure spruce it is impossible to decide whether or not this is due merely to local soil variation, this being the only plot of pure Sitka spruce in the whole of this experimental area.

Experiment 8

Planted in 1938 this experiment forms a link between the earlier direct plantings and the later ploughings. It lies within the 1929-30 experimental area and the ground was prepared by hand in 1938 to imitate double furrow ploughing of the type then being used in the Allerston experiments. The objects of the experiment were :-

- (a) To try mock ploughing in order to compare results with those in the earlier directly planted experiments.
- (b) To compare two methods of mixing contorta pine with Sitka spruce.
- (c) To compare differential slagging rates for the two species in the mixture.

Treatments and results are best considered separately for the different objects.

Mock ploughing

Both species are now, at ten years from planting, almost level in height with those directly planted eight years earlier in Experiment 5; heights

being for contorta pine P.30 11.9 ft. and P.38 11.4 ft; while for Sitka spruce heights are P.30 10.9 ft. and P.38 9.2 ft. The newer experiment will of course have received some shelter from the older but for the main part the faster growth may be attributed to the increased intensity of ground preparation. In addition losses were fewer, and the crop is more even.

Mixtures

Some plots were planted line about with contorta pine at 3 ft. and Sitka spruce at $4\frac{1}{2}$ ft. others with the species plant about at 4 ft. So far no differences have been observed and these treatments will become of greater interest as canopy closes.

Manuring

In some plots Sitka spruce alone received one ounce of basic slag, in others the spruce received two ounces and the pine one. The heavier rates have increased height growth by about six inches.

1939-40 Experiments

The last two experiments at Hamsterley mark a new stage in the technique of moorland afforestation. The first experiment, number 9 planted in 1939, is a joint Conservancy and Research demonstration of ploughing and hand methods of ground preparation. In the second, number 10 planted the following year, ploughing is the accepted basic treatment and the problems of species, planting method and manuring are re-opened in the light of this new development.

These experiments lie on the plateau of Pennington Rigg about $\frac{1}{4}$ mile (No.9) and $\frac{1}{2}$ mile (No.10) to the south east of the earlier series. The sites are rather more exposed than that of the earlier series. The first lies slightly higher, the second lower than the main group; all other factors of geology, soil and vegetation are very similar.

Unfortunately both areas were grazed by sheep for some years in the early part of the war, losses were few but growth was slowed down with the probable effect of obscuring treatment differences. Recovery from this damage has been good.

Experiment 9

The Conservancy demonstration experiment had for its object the comparison side by side of direct planting methods and ploughing.

Treatments were :-

- (a) Direct notching
- (b) Pit and mound planting, the plants being notched into a heap of spoil dug by hand from the pit.
- (c) Shallow single furrow ploughing
- (d) Shallow single furrow ploughing with sub-soiling, the method then in use in Conservancy areas at Allerston.

The species used were Sitka spruce pure and in mixture with Scots or contorta pine. The three crops are in unreplicated adjacent blocks and there is some evidence of a steady variation in the site, the Sitka spruce planted pure lying on the best ground and that in mixture with contorta pine on the poorest. Once again, however, in the absence of replication it is not possible to decide finally whether the use of mixtures or ground variation is in fact the cause of the growth differences.

Ploughing was found to be difficult on account of boulders and rocky outcrops, in particular the subsoiling was only effective over part of the area.

Results

First year losses of all species were high on the ploughing, forty-five per cent for contorta pine and twenty per cent for the other species. On the direct notching only about half as many failed, while with pit and mound planting the pines lost ten and Sitka spruce only one per cent. Ploughing had been carried out only one month before planting. There is abundant evidence in other experiments to show that this may result in heavy losses in certain years. The soil was in fact recorded as very dry at planting in this experiment, and so it is probable that these losses may be attributed to planting into unconsolidated ploughing which had dried out.

Sheep damage continued from 1940-43 and has severely set back growth. For the pines there is practically no difference in growth. Scots pine is now about five feet high and contorta pine slightly less. Sitka spruce, however, shows a consistent increase with intensity of preparation, the averages for the whole experiment being: - notched 4.2 ft. pit and mound 4.9 ft. and ploughing 5.6 ft.

Experiment 10.

The latest of the Hamsterley experiments planted in 1940, is primarily a trial of four mixtures on ploughed moorland. Subsidiary objects were:

- (a) to test two methods of planting on ploughing,
- (b) to test phosphate on ploughed ground.

Treatments are again best considered under the objects.

Mixtures

Seven of the commoner species were used in four mixtures: - Scots pine with Norway and also with Sitka spruce, Corsican pine with European larch, and contorta pine with Japanese larch.

First year losses were low, under ten per cent, except for corsican pine which lost thirty five per cent. Subsequently browsing by sheep caused damage in 1940-43 particularly to the pines and Japanese larch; losses, however, have not been high and recovery much faster than in Experiment 9. The present position is:-

Scots pine/Norway spruce. Heights are 8.5 ft. and 6.4 ft. respectively. The pine is making steady growth while the spruce after a surprisingly good start is now yellow and with short needles, this being associated with the re-invasion of the plough furrows by Calluna.

Scots pine/Sitka spruce. Heights 8.8 ft./8.3 ft. The Sitka spruce is at present of rather poor colour and suffering from Aphis attack.

Corsican pine/European larch. Heights 8.1 ft./12.2 ft. The larch has grown very well but the stems are of poor form and leaning, probably due to exposure. Some of the poorer pine are being suppressed as also is the heather in these plots.

Contorta pine/Japanese larch. Heights 13.0 ft./11.1 ft. Both species are growing well and the difference in height is attributed to sheep damage. The Calluna is being suppressed. It can be seen that height growth in this experiment now approaches that in the directly planted experiments, which are twice as old. The crops are in addition more complete and more uniform.

Planting Method and Manuring

The normal divisional method of planting on ploughing at this time was to plant spruces on the ridge with the Belgian spade and other species by notching in the furrow bottom. In sub plots of the experiment this method was compared with one in which all species were notch planted into prepared

mounds in the furrow bottom. On the whole this last method has given slightly better growth, the maximum effect being an increase of 1.5 ft. with Corsican pine.

Application of one ounce of basic slag has resulted in a small increase of height, the maximum increase being two feet with Japanese larch.

Both these treatments, improved planting technique and use of slag, are ones which would be expected to give the maximum effect in the early years of growth. It was at this time that the severe sheep damage occurred and this may well to some extent have masked the effects of these treatments.

Experiment lying mainly on peat. No.4.

On the plateau there are areas where Sphagnum peat has developed following waterlogging of small depressions by springs. On the edge of one of these areas an experiment was laid down in 1929 to compare results on the peat and adjacent moor. The boundary of the two types is not sharp and plots are extremely variable. The layout is thus not ideal and the main differences are best seen by comparing the growth in individual plots. The main objects were:-

- (a) to try out various mixtures
- (b) to try turf planting and basic slag as an aid to the establishment of a contorta pine/Sitka spruce mixture.

Mixtures

All were directly planted without slag. Twenty per cent of rowan, beech, and sycamore were planted in matrices of Scots, Corsican and contorta pines respectively. "Plant about" mixtures of Scots pine/European larch, Japanese larch/Sitka spruce and contorta pine/Sitka spruce were also used and in addition birch was planted as an advance crop for Sitka spruce. Almost all these species have failed completely on the deepest peat areas. The only survivors elsewhere are Scots and contorta pines and Sitka spruce on the heath plots and intermediate peat/heath areas. The Scots pine was badly damaged by blackgame and forms only ragged crops. The contorta pine/Sitka spruce reach ten to twelve feet in the best plots. Many of the plots which failed were R.L.R. ploughed in 1946 and planted with contorta pine and Sitka spruce.

Turf planting and Manuring

Certain plots of contorta pine/Sitka spruce received each of these treatments and others received both. On the peat the mixture survives in all whereas without either it failed; in the best plots the pine average ten and the spruce twelve feet. On the heath too the treatments have been effective, increasing height growth by fifty per cent where combined, so that in the best plot Sitka spruce, now eighteen feet high, is suppressing the pine. It was clearly unfortunate that these methods were not adopted for the planting of some of the other mixtures.

Summary of Results

The Hamsterley experiments form only a small part of a large series on the heaths of North East England. They were laid down in two groups, one in 1929-30, the second in 1938-40. In the intervening period ploughing was introduced and the effect of this is well demonstrated by the fact that the crops in the newer experiments are now in many cases as advanced as those in the older series.

Both series have undergone severe setbacks to growth. In the P.29-30 experiments the main species, Scots pine and to a lesser extent the other pines, suffered severe damage from blackgame. The P.39 and P.40 experiments were browsed by sheep soon after planting and this, though not causing heavy losses, has apparently had the effect of reducing all treatment differences, such as those due to planting method and manuring, which would normally express themselves to the greatest extent in the early years. There are many anomalies in the detailed results which can probably only be explained by the chance incidence of damage. To draw any new conclusions from experiments so severely damaged would be rash, and the results are best considered as confirmation of those obtained in the Allerston Area.

Ground Preparation

In general losses have been much lower and growth faster in the P.38-40 experiments, planted on mock ploughing or tractor ploughing, than in the P.29-30 series, planted with only hand preparation of the ground. As in other areas ploughing very shortly before planting may result in heavy losses in dry years.

Methods of Planting

Three methods of direct planting have been used. In most cases there is very little difference either in growth or losses between pit-and-mound planting and notching into prepared patches, both of which are slightly superior to direct notching.

On ploughed ground the 1940 divisional practice of planting spruce by semi-circular spade on the plough ridge and notching other species in the furrow is possibly slightly inferior to mounding all species in the furrow.

Species Trials

Contorta pine is consistently the best species when losses, rate of growth, and form are all taken into consideration; Scots pine has suffered attack by beetle and shoot moth in addition to black game. These two species and Sitka spruce were the only ones which formed crops at all where directly planted. Corsican pine has suffered heavy losses in all the experiments, but survivors were of good appearance until recent years when symptoms of Brunchorstia appeared.

Japanese and European larch failed almost completely where directly planted but have made a good start, apart from sheep damage, in mixture with pines on ploughing. Japanese larch is of better form than European.

Norway spruce made a good start on ploughing, but when re-invasion of Calluna took place growth rapidly fell off; the effect of suppression of the heather by the Scots pine nurse must now be awaited. Sitka spruce has been most promising in mixture with contorta pine, but is at present going through a bad phase of defoliation. There is not sufficient evidence as to its growth where planted pure. One plot has done remarkably well.

A large range of hardwoods were tried in the earlier series of directly planted experiments but all failed with the exception of rowan.

Mixtures.

Up to the present the following mixtures have been established: Pinus contorta/Sitka spruce by direct planting and Pinus contorta/Japanese larch and Corsican pine/European larch on ploughing. Not yet fully established are Scots pine/Sitka spruce and Scots pine/Norway spruce. Failure of many other mixtures tried was due to the use of direct planting. In certain of the older Pinus contorta/Sitka spruce plots suppression of the pine by the

spruce seems to be likely at an early stage.

Age and Type

Two trials of various types of Scots pine plant have been ruined by black game damage.

Manuring

Basic slag has had comparatively little effect on the growth of any species, but reduced losses with direct planting. The greatest effects have been with larches.

Protection

Caging against blackgame increased the height of Scots pine by fifty per cent. It improved the growth of Corsican and contorta pines to a lesser extent.

The results for Experiment 4, lying mostly on peat, but partly on fairly typical heath, were that a large number of species, including Scots and contorta pines and Sitka spruce, failed on the peat where directly planted. With turf planting or slagging growth of contorta pine and Sitka spruce was slow, the combination producing a further improvement.

J. W. L. ZEHETMAYR.

General Conclusions

One of the principal points is the need for cultivation of the moorland types of site to allow satisfactory growth. If cultivation on modern lines had been carried out in the early days many plantations at the moment in partial check would have been growing vigorously.

The other clear lesson is that European larch has been carried on to ground which would have been very much better under Sitka spruce, Norway spruce or Scots pine. In places it is on heather slopes and in others on wet flushes.

It would appear from the P.28 area that there was more scope for Douglas fir on the lower steep slopes. Another species which might have been used to a greater extent on Calluna-Scirpus peats at high altitudes is Pinus contorta, its value being as a nurse for Sitka spruce. Corsican pine from recent developments in experimental plots, is not a reliable species at the altitude at which it has been planted. A more detailed survey might have shown incipient heather on the area planted with oak and larch in strips. The areas where the oak has been less successful are, however, comparatively small.

Beech, although growing well in Pennington Plantation and in small proportions in much of the larch, is not otherwise represented in plantations. It would doubtless succeed on suitable sites which are comparatively small in size and number.

Recommended Selection of Species

On the various vegetation types the following species are recommended in the light of the experience gained at Hamsterley. Modern cultivation techniques are assumed.

1. Calluna Moor Sitka spruce/Scots pine in mixture, three rows of each alternating on ploughing.
2. Nardus Pasture Pure Sitka spruce on ploughing.
3. Moor Peat Sitka spruce/Scots pine on lower areas and shallower peat. Sitka spruce/Pinus contorta at higher elevations and on deeper peats on ploughing.
4. Moor flushes Sitka spruce on ploughed ground or on turves.

5. Grass Banks. Japanese larch or Douglas fir, notch or pit planted.
 In general Douglas fir should be planted on the lower parts of the slopes with Japanese larch above. Norway spruce on any damp parts low down, on turves.
6. Herbaceous Slopes. As 5 or beech planted under birch scrub.
7. Old Woodlands European larch/Japanese larch, Tsuga, oak (on the best loams in small quantities). Norway spruce (on moister parts); notched or pitted.
8. Silt and Gravel Beds. Norway spruce or Douglas fir notched.
9. Juncus flushes. Norway spruce on turves.
10. Transitory Form Japanese larch or Scots pine notched (if Scots pine only the heather area should be planted. Japanese larch can be carried on to the neighbouring woodland type).
11. Pennington Plantation. Regeneration of beech should be possible.
 Planting of beech is recommended otherwise.

History of Hamsterley Forest

APPENDIX I

A summary of the main points made by inspecting officers

Sir Roy L. Robinson (Technical Commissioner)

10th December 1929

The Technical Commissioner considered that European larch had been planted in P.27 where conditions were too wet. He noted that the European larch and Japanese larch in the P.29 Experiment No.1. had done well considering the heather moor on which they were planted, but stated a preference for Japanese larch on the moor if any larch was to be used.

Sir Roy agreed with Mr. Hopkinson's note on the inspection that most of the moor was spruce ground. The Divisional Officer thought that the difficulty was only to get the spruce started and that partial ploughing would assist this. (Mr. Sangar on his visit of October 1930 ruled out this possibility as the ground was too hard for ploughing).

Mr. H. A. Pritchard (Assistant Commissioner)

4th September, 1930

Mr. Pritchard noted an abundance of natural seedlings under the quite well grown beech of Pennington Plantation. He criticised the layout and execution of the drainage system on the P.30 area (Compartment 70 - 76 and 81 - 83) and he considered that the high death rate in Pinus contorta was due to thick turves drying out.

Mr. O. J. Sangar (Assistant to Technical Commissioner).

October, 1930.

Mr. Sangar spent most of his visit considering what had been planted, how, and on what types of vegetation. (This information is embodied in the appropriate sections of the report).

Sir Roy L. Robinson (Technical Commissioner)

15th January, 1932

On the P.30 area the Technical Commissioner criticised the choice of species on the moor as he considered that primarily it is ground for Sitka spruce. He also thought that Sitka spruce could have been, with advantage, carried further on to the bracken slope at the expense of Japanese larch.

On an area near Compartment 83 the view was expressed that turf planting would be very suitable.

In the P.29 and P.30 experiments Sitka spruce whether slagged or not were found to be very good. Pinus contorta was also growing well.

In notes on the report of this visit Mr. Hopkinson explained that the choice of so much pine had been dictated by experience at Rothbury and Allerston where planting of spruce in Calluna had had unsatisfactory results. He decided that planting would be kept off the moorland for two years to allow the experimental plots to develop and provide fuller information. Agreement was expressed, following past experience at Hamsterley, with Sir Roy's opinion that most of the moor is spruce ground.

Mr. O. J. Sangar (Assistant to Technical Commissioner)

July, 1934

Nothing of note was recorded on this visit.

Mr. W. L. Taylor (Assistant Commissioner)

20th March, 1935

The Assistant Commissioner had the following points to make on various crops.

European larch P.27 was growing slowly and damage to leading shoots was noticed.

European larch P.31 was poorly stocked where seedlings had been used and was to be beaten up immediately.

Pinus contorta P.31 had been badly beaten up, the trees being notched instead of pitted and carried too near fast growing trees.

Douglas fir P.28 was very open due to delayed beating up
(carried out in P.30 and 32).

Sir Alexander Rodger (Commissioner)

22nd - 23rd, March, 1935

Sir Alexander found the same unsatisfactory European larch in the P.27 area on which other officers have remarked. He also found that the P.29 area was rather ragged although a fair amount of the Scots pine was getting away. The Divisional Officer and Sir Alexander fully agreed on the necessity of soil cultivation on the moorland areas.

Sir Roy Robinson (Chairman)

9th September, 1937

The first area of ploughing for planting on Hamsterley was available for inspection. After inspecting this and the two sets of pilot plots the Chairman had the following points to make.

The main species for the moors should be spruce and pines mixed. This would be planted on ploughing, the Sitka spruce on the furrow slice and the Scots pine on the furrow side. He suggested that the valleys and bracken slopes should be tackled first while the moorland and peat areas should be left till after this. He thought that the planting could now go ahead on a large scale on this basis.

Sir Roy L. Robinson (Chairman)

1st February, 1939

This visit was made to witness a demonstration of a new type of plough for afforestation on these moors. The plough could not stand the strain of ploughing the hard ground.

The Chairman was interested on this visit in the Pinus contorta/ Sitka spruce mixture in the pilot plots of Compartment 105.

Mr. A.P. Long (Acting Assistant Commissioner)

8th April, 1941

Stress was laid on the need for cultivation on the moor, or turfing on the peat areas, and Mr. Long thought that Scots pine and Sitka spruce were the two main species to be considered for the moorland.

Sir Roy L. Robinson (Chairman)

20th - 21st May, 1941

After a thorough inspection of the forest, Sir Roy formed fairly definite conclusions on choice of species. He stressed, however, the need for cultivation on the moor whatever species was being used.

The choice of species in the past had generally been a little too ambitious. This, coupled with lack of cultivation, which has been found essential on the moor accounts for the slow nature and patchiness of many of the plantations.

The suggestions were that Scots pine should predominate on the steeper parts of the slopes with Calluna. Sitka spruce should come on deeper peat, possibly with Pinus contorta; and Sitka spruce/Scots pine mixture should be planted where mineral soil is near the surface.

Mr. Fossey amplified these remarks in a note as follows:-

Douglas fir can be used on sheltered valley sites, possibly mixed with Scots pine on slightly poorer soils to encourage the "take".

Scots pine can be used on Calluna slopes and in mixture with Sitka spruce on the moor.

Sitka spruce will be the main species over the area, being used pure on peat (or in mixture with Pinus contorta); in mixture with Scots pine on shallow peats; or pure on damp slopes and verging on sites suggested for Douglas fir.

Corsican pine is suggested in lieu of Scots pine.

The Chairman disagreed with the use of Corsican pine and suggests limited use of Norway spruce on damp grassy areas and larches on fertile slopes.

Sir Roy L. Robinson (Chairman) with

Mr. W. L. Taylor and Acting Assistant Commissioner.

17th July, 1943

The European larch of the experimental plots had by this time fallen off. Sitka spruce, Pinus contorta and Japanese larch were still growing well. The "artificial ploughing" (by hand labour) had quick and good results. The Corsican pine was showing signs of Brunchorstia

The Chairman noted "the necessity of effective ploughing on the moorlands has become obvious. The new outfits should effect this."

Lord Robinson (Chairman)

14th May, 1949.

On a tour covering the whole forest detailed comments were made on many plantations but no discussion of future general importance resulted.

Lord Radnor (Chairman, National Committee) with Mr. O. J. Sangar.

7th June, 1950

Agreement was reached by the party on the selection of species for the P.51 area.

i.e. Scots pine and Sitka spruce mixed on the moor.

Sitka spruce where peat was deeper.

Scots pine on heather slopes

Japanese larch on bracken slopes

Norway spruce on grassy sheltered flushes

Beech and Douglas fir on the loose moist sides of the valleys (beech under birch).

History of Hamsterley Forest

APPENDIX II

Officers in Charge of the Forest.

Divisional Officers

1926 - 27 A. P. Long
1927-- 39 A. D. Hopkinson
1939 - 45 R. E. Fossey

Conservators

1945 - 47 R. E. Fossey (Acting)
1947 - 50 G. J. L. Batters
1950 - C. A. Connell

State Forest Officers

1947 - 48 R. E. Fossey
1948 - 50 W. Forsyth
1950 - P. F. Garthwaite

District Officers

1928 - 37 G. J. L. Batters
1937 - 41 W. Forsyth
1941 - 42 D. H. Edwards
1942 - 49 M. F. Adams
1949 - S. Forrester

Foresters

1927 - 35 C. Mc.Nab
1935 - 37 J. K. Massey
1937 - 39 W. T. Smith
1939 - 41 J. W. Shaw
1941 - 48 W. L. McCavish
1948 - T. Bewick

History of Hamsterley Forest

APPENDIX III

Areas planted each year at Hamsterley.

	<u>Main Block</u>	<u>Black Banks</u>	<u>Total</u>
P. 27	168.2		168.2
28	212.0		212.0
29	351.1		351.1
30	330.5		330.5
31	303.4		303.4
32	171.1		171.1
33	54.8		54.8
34	37.2		37.2
35	38.0		38.0
36	28.8		28.8
37	59.9		59.9
38	148.9	140.4	289.3
39	262.1	124.6	386.7
40	242.2	21.4	263.6
41	252.5	23.0	275.5
42	45.0	23.1	68.1
43	161.8	26.7	188.5
44	88.0		88.0
45	42.5		42.5
46	58.4		58.4
47	72.4		72.4
48	169.4		169.4
49	173.0		173.0
50	663.6		663.6
51	<u>480.1</u> †		<u>480.1</u>
Totals	<u>4,614.9</u>	<u>359.2</u>	<u>4,974.1</u>

† The programme as planned (March 1951)

There are also 67 acres of acquired woods

History of Hamsterley Forest

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APPENDIX IV

HEIGHT MEASUREMENT

The actual heights measured, from which the graphs were prepared, were as follows:-

<u>P. Yr.</u>	<u>Age</u>	<u>Ht.</u> <u>(ft.)</u>	<u>Site</u>	<u>P. Yr.</u>	<u>Age</u>	<u>Ht.</u> <u>(ft.)</u>	<u>Site</u>
<u>Scots Pine</u>				<u>Japanese Larch</u>			
38	13	11.2	Moor	35	16	24.3	Grass slope
	8	4.2			11	15.6	
44	7	5.1	Moor	40	11	14.8	Grass/calluna
	4	2.0			6	6.0	
30	21	15.2	Moor	43	8	11.1	Woodland
	16	7.3	(Much Checked)	38	13	25.5	do
	11	3.5			7	12.2	
31	20	26.3	Calluna Slope	38	13	17.7	Grass/calluna
	15	15.1			7	5.7	
	10	6.8					
39	12	15.6	Calluna/Grass	<u>Norway spruce</u>			
	9	10.0		33	18	26.4	Grass slope
	6	5.0			13	16.1	
<u>European Larch</u>				32	19	26.0	Juncus flush
32	19	24.2	Grass bank		14	16.2	
	14	15.1			9	6.5	
	9	6.3		42	9	7.4	do
31	20	26.2	do	43	8	5.3	do
	15	17.9		<u>Sitka spruce</u>			
42	9	15.1	Woodland	40	11	7.9	Moor
	5	7.8			7	4.9	
37	14	13.8	do	38	13	9.2	do
	8	5.5			8	4.2	
41	10	15.8	do	44	7	5.1	do
42	9	12.2	do		4	2.7	
43	8	9.2	do	31	20	27.8	Grass/Calluna
<u>Douglas Fir</u>					15	19.2	
33	16	33.2	Woodland		10	8.2	
	11	21.4		32	19	25.6	do
					14	15.3	
					9	6.9	
				32	19	24.5	Moor flush
					14	14.3	
					9	6.2	

Hamsterley

HISTORY OF HAMSTERLEY FOREST



P.52 three-row Scots pine/Sitka spruce mixture. Compartment 174 from corner of new road looking north-west.

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902 (410.40)
H.M. Forestry Commission



Compartment 131, P.47. two-row Sitka spruce/Scots pine mixture; from south end of Compartment 131 looking north. Neighbour Moor - Sharnberry Flat in distance.

HISTORY OF HAMSTERLEY FOREST

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H.M. Forestry Commission

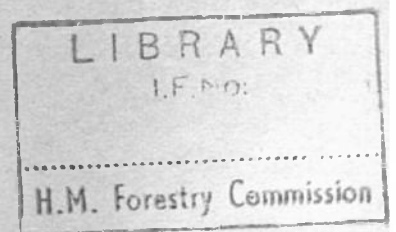


Middle of Compartment 182, P.44 Sitka spruce/
Scots pine showing uneven growth in both
species. Two-row mixture, planted on side
of furrows.

HISTORY OF HAMSTERLEY FOREST



Compartment 104, P.41. Intimate (almost alternate tree) mixture of Scots pine and Sitka spruce on 5' ploughing. In left background, the tops of the Scots pine and Pinus contorta of the pilot plot can be seen. Taken from south end of compartment, looking north.

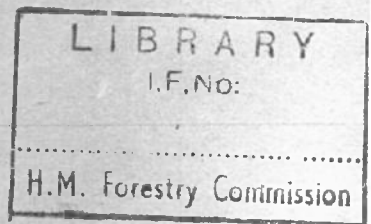


Compartment 99 from south-west corner, looking north. P.40 Sitka spruce.

HISTORY OF HAMSTERLEY FOREST



Compartment 87, P.38. Scots pine/Sitka spruce intimate mixture. From north-west of compartment looking south-east.



Compartment 48, P.28. Douglas fir, looking east on Spurlswood Road. Younger Norway spruce in foreground.

HISTORY OF HAMSTERLEY FOREST

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View of Neighbour Moor and Sharnberry Flat from Acton Currick Road, at S.W. corner of C.109. P.43 area in foreground.

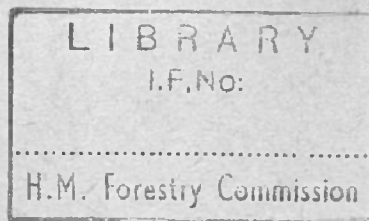


Two-row S.S./S.P. mixture, P.48, C.187 (east end); by Acton Currick. Vegetation, Calluna - heath; on 5' ploughing.

HISTORY OF HAMSTERLEY FOREST



C.80, P.31 E.L. on left; Spurlswood
Beck road by Irish bridge.
C,128 P.34 on right.



C.186 (both sides of road).
P.39 S.S. and S.P. on left.
P.39 S.S. on right, along Pennington
Road; looking east.
Southern limit of fire of 28/5/52.
Fire-blackened trees.

HISTORY OF HAMSTERLEY FOREST

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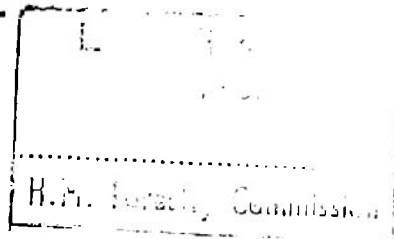


C.81 from W. corner, looking E.
P.30 E.L. with S.S., S.P., P.C.



C.98. P.31, from S.W. Corner, looking N.E
On left is C.99. This shows difference
in growth of S.S. and S.P. on heather
(S.S. is only 4'). In background,
growth is very much better on bracken
slope.

HISTORY OF HAMSTERLEY FOREST



C.95 on left, S.S.
C.70 E.L. on right, middle distance,
both P.35.
Mayland Bank in distance.



C.26. Looking north up side road, from
Acton Road, N.S. P.33.

HISTORY OF HAMSTERLEY FOREST



C.124 from Euden Beck road, looking N.E.
from S.W. corner of compartment.
P.42 N.S. and Ts. in foreground.
P.33 S.S. in background.

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S.E. corner of C.32. At RUP "B".* C.55.
P. 29 S.S. on left.
C.32. P.29 S.P. on right.

HISTORY OF HAMSTERLEY FOREST



C.127 P.36 N.S. looking west along road
to the Grove. The tall trees in the
background are those at the Grove.

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A-B-C-D-E Panorama from Sharnberry
Flat road, At C.174.

HAMSTERLY FOREST

1

▪ P.52 three-row Scots pine/Sitka spruce mixture. Compartment 174 from corner of new road looking North West.

▪ Compartment 131, P.47. two row Sitka spruce/Scots pine mixture; from south end of Compartment 131 looking north. Neighbour Moor – Sharnberry Flat in distance.

2

Middle of Compartment 182, P.44 Sitka spruce/ Scots pine showing uneven growth in both species. Two-row mixture, planted on side of furrows.

3

▪ Compartment 104, P.41. Intimate (almost alternate tree) mixture of Scots pine and Sitka spruce on 5' ploughing. In left background, the tops of the Scots pine and Pinus Contorta of the pilot plot can be seen. Taken from south end of compartment, looking north.

▪ Compartment 99 from south-west corner, looking north. P.40 Sitka spruce.

4

▪ Compartment 87, P.38. Scots pine/Sitka spruce intimate mixture. From north-west of compartment looking south east.

▪ Compartment 48, P.28. Douglas fir, looking east on Spurlwood Road. Younger Norway spruce in foreground.

5

▪ View of Neighbour Moor and Sharnberry Flat from Acton Currick Road, at S.W. corner of C. 109. P.43 area in foreground

▪ Two-row S.S./S.P. mixture, P.48, C.187 (east end); by Acton Currick. Vegetation, Calluna – heath; on 5' ploughing

6

▪ C.80, P.31 E.L. on left; Spurlwood Beck road by Irish bridge. C, 128 P.34 on right.

▪ C.186 (both sides of road). P.39 S.S. and S.P. on left. P.39 S.S. on right along Pennington Road; looking east. Southern limit of fire of 28/5/52.

Fire-blackened trees.

7

▪ C.81 from W. corner, looking E. P.30 E.L. with S.S., S.P., P.C.

▪ C.98. P.31, from S.W. Corner, looking N.E. On left is C.99. This shows difference in growth of S.S. and S.P. on heather (S.S. is only 4'). In background, growth is very much better on bracken slope.

8

▪ C.95 on left, S.S. C.70 E.L. on right, middle distance, both P.35. Mayland Bank in distance.

▪ C.26. Looking north up side road, from Acton Road, N.S. P.33.

9

▪ C.124 from Euden Beck road, looking N.E. from S.W. corner of compartment. P.42 N.S. and Ts. In foreground. P.33 S.S. in background.

▪ S.E. corner of C.32. At RUP "B". C.55. P.29 S.S. on left. C.32. P.29 S.P. on right.

10

C.127 P.36 N.S. looking west along road to the Grove. The tall trees in the background are those at the Grove.

11

A-B-C-D-E Panorama from Sharnberry Flat road, at C.174.

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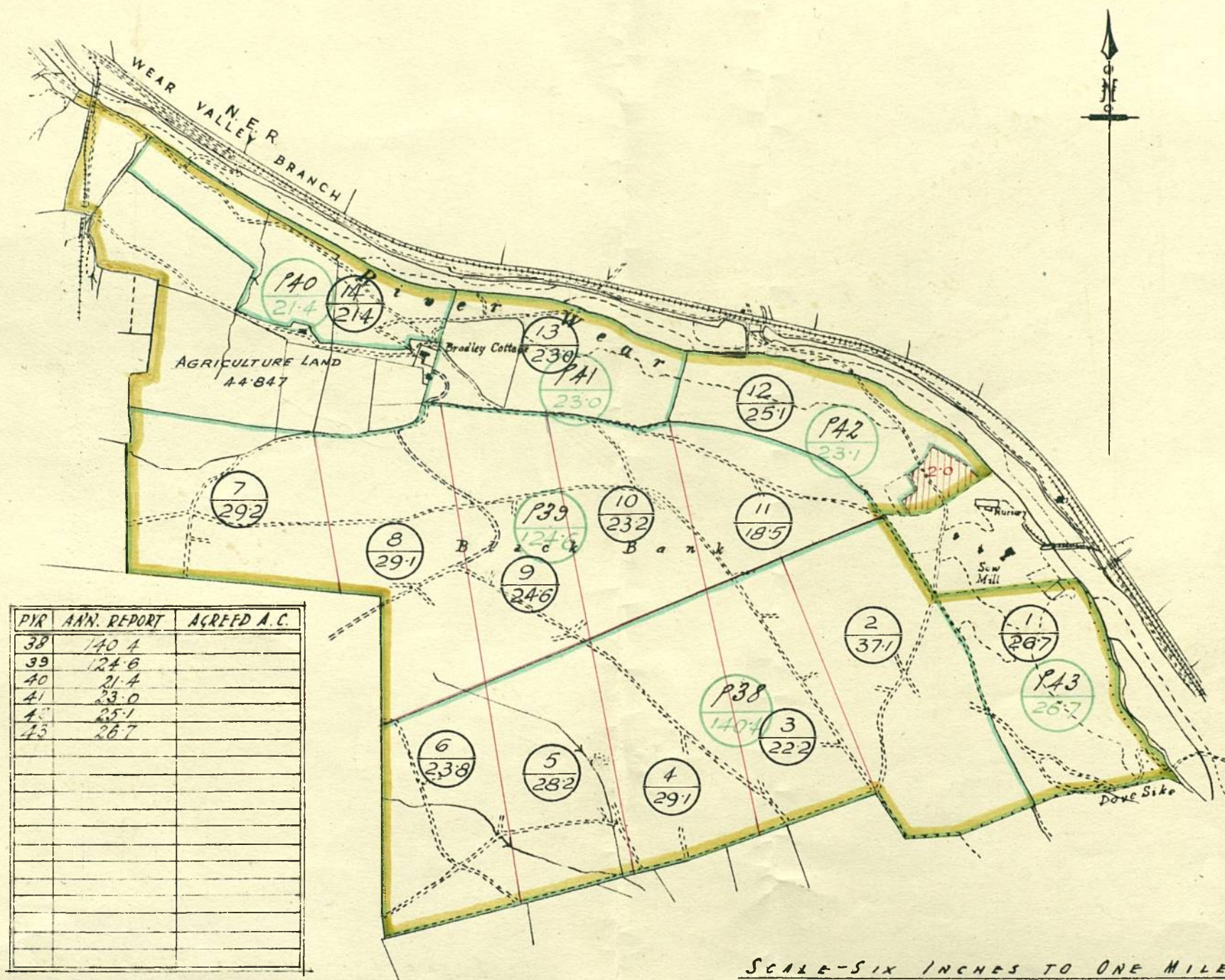
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P.Y. MAPHAMSTERLEY

DURHAM 33 N.W.

BLACK BANK - PURCHASE FROM F. W. BROWN - 27/11/37 - 406.047 ACRES.



P.Y.	ANN. REPORT	AGREED A.C.
38	140.4	
39	124.6	
40	21.4	
41	23.0	
42	25.1	
43	26.7	

SCALE - SIX INCHES TO ONE MILE.

LIBRARY

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DATE: 15.2.1952

INITIALS: T. Kudlyk

4/8/55

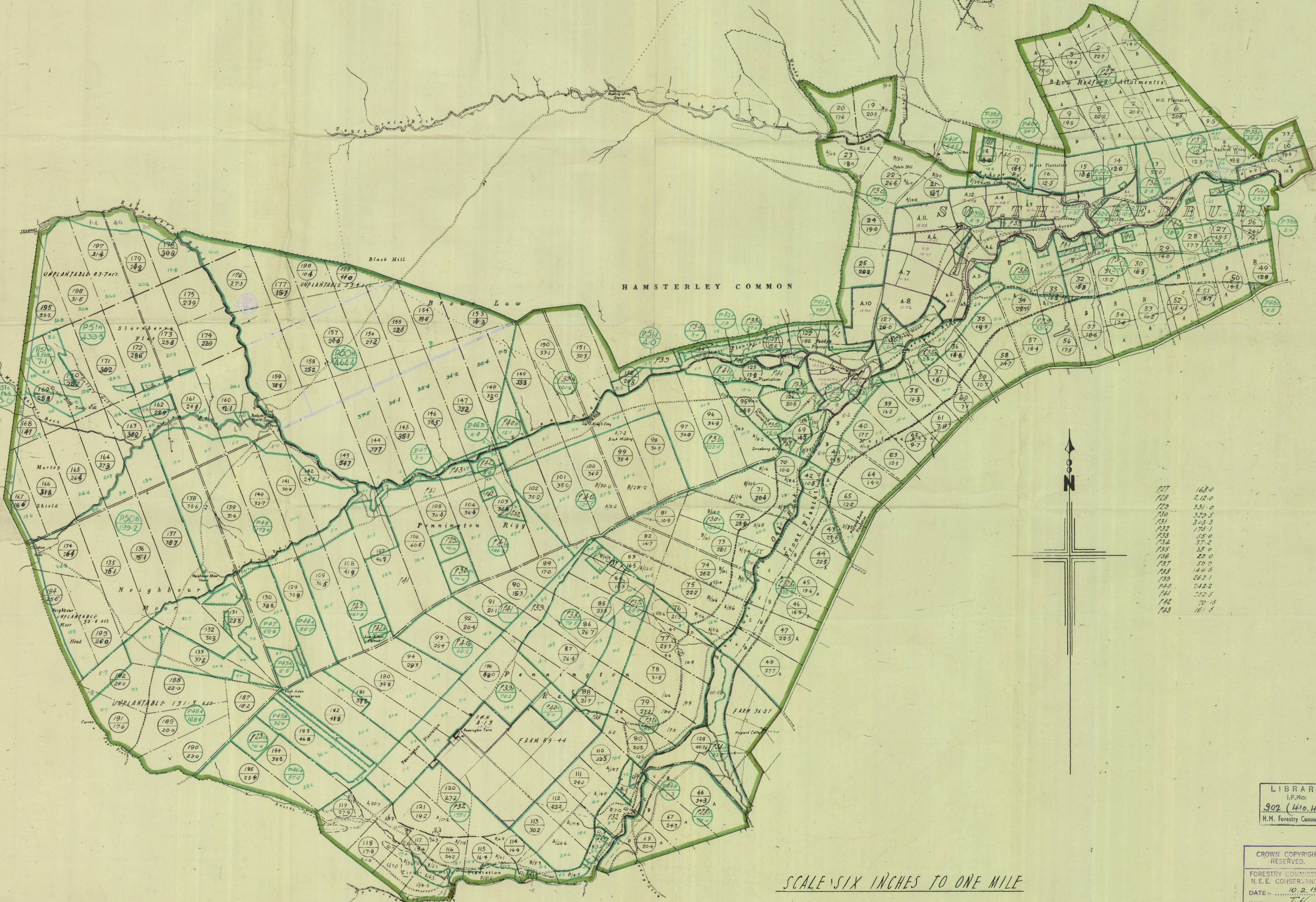
HAMSTERLEY

DURHAM 32.33.40 & 41-N.W.

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P I K E S T O N E F E L L

Lands common to HAMSTERLEY
LYNESACK AND SOFTLEY
& SOUTH BERRUM Parishes



127	163.0
128	212.0
129	331.0
130	329.5
131	303.3
132	175.1
133	55.0
134	37.2
135	38.0
136	20.0
137	50.0
138	146.0
139	262.1
140	242.2
141	222.5
142	70.15
143	161.8

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