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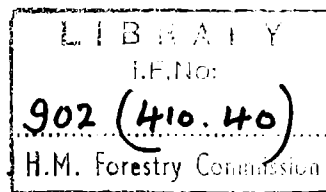
CHOPWELL

FOREST

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HISTORY

of

CHOPWELL FOREST

NORTH EAST (ENGLAND) CONSERVANCY

History of Chopwell Forest

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Widehaugh,

Hexham,

Northumberland.

July, 1951.

Preface

This history was prepared at the request of the Chairman of the Forestry Commission, Lord Robinson. Much of the information contained in it was obtained from the working plan published in 1908 and prepared by Mr. J. F. Annand of the Armstrong College, Newcastle. Assistance was also rendered by the Conservancy Office Staff, the Forester at Chopwellwood, and many others. To all my thanks are due for greatly simplifying my task.

Stan Forrester.

27/7/51

HISTORY OF CHOPWELL FOREST

Chairman's Comments

Mr. Forrester has compiled a careful history of the woods. My only recorded inspections were made in 1922 and 1932, though I must have visited the woods before the first date and probably after the second. I cannot, therefore, speak with any authority as to the course of developments over the last 20 years. There is an account of the woods, compiled under my direction, in the Joint Annual Report of the Forestry Branches for the year 1912/13 (Cd. 7488). The growth of timber at that time did not suggest that it was worth while persisting with either oak or European larch. The subsequent use of Sitka planted pure was obviously a mistake, though as we now know a mixture with pine would probably have done much better.

The woods are interesting from the fact that first A.C. Forbes for a short period, and after him J.F. Annand, had charge and that they were used in connection with the instruction of woodmen. Forbes went to Ireland and spent most of his long life in developing Irish Forestry; Annand was one of the first Divisional Officers appointed by the Forestry Commission, he was also one of the first three Advisory Officers appointed on October 1st 1912 to advise private owners. They were J.F. Annand, Armstrong College; Fraser Story, Bangor; and H.A. Pritchard, Royal Agricultural College, Cirencester.

For many years Chopwell was the Headquarters of the Commission's Divisional Officer and Hopkinson lived there for all or most of the 18 years (1922-1940) during which he was Divisional Officer.

R.

22/2/52

General description of the Forest

Situation

Chopwellwoods are a compact woodland area of some 800 acres lying in that part of County Durham which stretches north of the Derwent to the Tyne. The forest is ten miles south-west of Newcastle and is bordered on the south by the River Derwent itself. The district is predominately one of mining villages - the forest is surrounded by the villages of Rowlands Gill, Victoria Garesfield, High Spen and Chopwell.

The name of the woods appears to go back to before Elizabethan times. There are two farms, Chopwell Mill and West Chopwell, with the same origin for the name. The village, a comparatively modern one (19th Century), takes its name from the farms and the woods. "Chop" is believed to have come from a Danish word meaning "a market", although it may also have a shade of the meaning "a change" about it.

Area and Utilisation

The Past: (to 1923)

Chopwellwood became Crown Property in the reign of Queen Elizabeth on the attainder for treason of a John Swinburne. It gradually became an agricultural property and by 1801 was divided into five farms.

Part of the estate was resumed in 1812 and planted between 1812 and 1815. The lease of the remainder was surrendered in 1819 and this land was also planted.

Almost all of these plantations were of oak which on a great part of the area does not appear to have succeeded well. About 1850 the clearing of this inferior scrub and semi-scrub growth was recommended and commenced. Within about five years the whole of the area was cut over and replanted with larch (except where one or two bogs were planted with spruce and one or two ridges with Scots pine). One small plantation north of the nursery was made in, or about, 1893 but in 1900 all the rest of the crop was a mixture of the 1855-60 larch with coppice of the original oak planting. In some cases the coppice would be almost pure, due to the failure of larch on wet ground, and in places it was no better than scrub.

The Office of Woods, then managing the area, and the authorities of the Armstrong College, using the area as a forestry demonstration area and a training ground for foresters, made plans to cut over this poor crop, and to replant the area with conifers. This was commenced in 1906, the first plantations being planted in the spring of 1907. By 1914 fifty-three acres had been cleared and replanted, 16 acres had been underplanted and a four acre field had been planted up. During the Great War a further 285 acres were felled in an effort to obtain timber in the national emergency, and in 1923 one hundred and ninety-eight acres were still not replanted.

The "Present" (since 1923)

The woods were managed by the Forestry Commission from its formation in 1919 but it was not until the Forestry (Transfer of Woods) Act in 1923 that the area became officially into the hands of the Forestry Commission.

The area acquired in 1923 was 816 acres made up as follows :-

(a) Acquired plantations	596.3	acres
(b) Plantable ground (unplanted)	200.4	"
(c) Nurseries	6.8	"
(d) Agricultural	1.4	"
(e) F.W.H.	.9	"
(f) Unplantable	-	"
(g) Other. Buildings, dumps, etc. etc.	10.1	"
-		"
-		"
	<u>Total</u>	<u>815.9 acres</u>

‡ 4.5 acres nursery abandoned in 1949.

The utilisation by 31st May 1951 was changed to:-

(a) Plantations - Acquired	96.7	acres	
F.C.	<u>691.2</u>	"	787.9 acres
(b) In hand. Blanks after felling	8.8	acres	
Burnt areas	-	"	
Other Land	-	"	8.8 acres
(c) Nurseries			2.3 acres
(d) Agricultural (2 tenancies)			5.9 acres
			<u>804.9 acres</u>
	C/fd		

		B/fd	804. 9 acres
(e)	F.W.H. (4 holdings)		0.9 acres
(f)	Unplantable		-
(g)	Other.		
	Christmas tree plantations	1.0 acres	
	Buildings, dumps, etc.	<u>9.1 "</u>	<u>10.1. acres</u>
		Total	<u>815.9 acres</u>

The table (Appendix IV) shows how the crop itself has changed in the last fifty years as a result of fellings and replanting over two world wars. The change from mixed forest to a coniferous crop is clearly shown.

Felling

All plantations made by the Forestry Commission have been made on the site of previous woodlands which have been felled.

All planting from 1923 to 1928 was carried out after fellings made during the Great War, coppice growth arising since then being cut back. From 1929 until the outbreak of the Second World War, small scale felling and replanting were carried on. The timber was generally sold standing, tenders being invited and the trees being measured standing; invoices were submitted on this measurement.

The 1908 and 1910 plantations in Compartments 19 and 21 were originally introduced under an overcrop of almost pure larch. The overcrop was removed from 1924 onwards.

The Ministry of Supply (Home Grown Timber Production Department) cut a considerable area throughout the forest during the Second World War. Most of this area was the old larch/broadleaved mixture but some of the Armstrong College Plantations were felled. These were largely pines (Scots and Corsican) which had suffered badly from snowbreak. One plantation made by the Forestry Commission was felled, probably because of this same trouble. The 1893 plantation of Scots pine, by this time a fine stand, if not densely stocked, was also cleared.

Altogether 393 acres were felled during the recent war all of which were replanted by 1951.

Sporting

On account of the large amount of trespass taking place, sporting has not within recent years been of any great value. (A more detailed note is given in Appendix V).

Physiography

The forest slopes moderately from a small plateau in the north to the steep bank of the River Derwent in the south. Three streams flowing south in the southern half of the forest give local steep slopes with east or west aspects, although on the whole the area has a uniform south aspect.

The elevation varies from 200 ft. in the south to 700 ft. in the north. The area is moderately exposed to the prevailing south-west winds.

Geology and Soils

The area lies on the productive Coal Measures but almost the entire area is covered with a considerable depth (up to 75 ft.) of glacial drift which gives great variations in the soils. In general, however, the soil, east and north of a north-west to south-east line through Chopwellwood House is sandy, varying from pure sand to a sandy loam. The area south of this line consists of clays and clay loams. The Coal Measure rocks outcrop in the valley of the stream flowing past Carr House.

Vegetation

The vegetation throughout the open areas is basically one of grasses.

The principal species of this group are the fine bent (Agrostis palustris), with annual and woodland meadow grasses (Poa annua and Poa nemoralis). Also occurring commonly are the green panick grass (Setaria viridis), sweet vernal grass (Anthoxanthum odoratum), cocksfoot (Dactylis glomerata) and rye grass (Lolium perenne). Occurring throughout but in small quantity are tufted hair grass (Deschampsia caespitosa), rough-stalked meadow grass (Poa trivialis) and meadow soft grass (Holcus lanatus). These three species occur almost pure on sour clay patches in the forest, while on the sandy soils the finer species, mentioned first, predominate.

Mixed with the grasses are various proportions of other plants. Such species appearing frequently are :-

Bramble	(<u>Rubus fruticosus</u>)
Foxglove	(<u>Digitalis purpurea</u>)
Male Fern	(<u>Aspidium filix - mas.</u>)
Bracken	(<u>Pteris aquilina</u>)
Willowherb	(<u>Epilobium angustifolium</u>)
Pink Campion	(<u>Lychnis dioica</u>)
Speedwell	(<u>Veronica chamaedrys</u>)
Stitchwort	(<u>Stellaria graminea</u>)
Trefoil	(<u>Lotus corniculatus</u>)

Dog's mercury (Mercurialis perennis) and common horsetail (Equisetum arvense) occur with a high proportion of willowherb and campion in small flush areas to the exclusion of grasses other than tufted hair grass, rough-stalked meadow grass and meadow soft grass. Woody plants in small quantity on these sites are willow, alder and hazel.

On the drier sites bedstraw (Galium saxatile) occurs with the fine grasses, an increased proportion of bracken, and in the driest parts heather (Calluna vulgaris) and blaeberry (Vaccinium myrtillus).

Ivy and honeysuckle occur in small quantity in many parts of the woods.

Throughout the area, coppice shoots and natural seedlings of several forest trees appear, the chief being birch, oak, sycamore and ash. Larch regenerates moderately freely, Scots pine appears in places and Norway and Sitka spruce seedlings have been found.

Under the shade of a forest crop many species disappear, the last three being foxglove, bramble and male fern in that order. Under the light shade of larch the three meadow grasses mentioned increase in proportion and luxuriance, the only other plants appearing to any extent being the three "shade bearers" just listed.

Meteorology

The rainfall is the usual for the part of the country, i.e. 25 in. per annum. This is spread fairly evenly throughout the year but dry spells are common in the spring of some years.

Due to the even slope there are not many areas where frost normally lies. Some frost hollows appear to have been formed in the past by the damming effect of mature crops on the cold air flowing down the hill.

Snow does not normally lie longer than on ground with similar conditions. Serious damage was done by snowbreak in the early part of the war by one very severe winter (1939 or 1940).

High winds are not troublesome in this part of the country. Temperatures recorded at Chopwell are the usual for the part of the country.

Risks

Fire. The chief danger to the forest is fire. There is a high population in the area surrounding the forest and the amount of trespass is great. There is also grave danger from the colliery railway traversing the north end of the forest. The number of fires is high - in most years we can expect five or six - but up to date all have been controlled in the early stages. At no time in the year is danger absent but there is a peak between February and April and another lesser danger period in August and September.

In recent years the public have been very co-operative in the spotting and fighting of fires. Up till about 1945 there was a fire tower covering the eastern part of the forest. At present there is a tower from which three-quarters of the area (all except the eastern side) can be seen clearly, covering most of the dangerous part of the forest.

The area has now been well divided up by ash roads while the Fire Brigade is within easy call, and is willing to turn out promptly to a fire.

Weather. The danger from frost is so slight, that, apart from bearing the subject in mind when selecting species no preventive measures are required.

All the wind blows on the forest at the present time can be attributed directly to the removal of shelter to windward of an underthinned crop.

Drought in the spring is common and early planting is usually an advantage.

Snow caused considerable damage to Scots pine in 1939 or 1940 but the worst areas were felled and there is now no sign of the damage.

Insects. During the recent war pine beetles and weevils threatened to be a problem but trapping and good forest hygiene prevented their getting out of hand.

Larch Shoot Moth (Argyresthia laevigatella) and the Larch Leaf Miner (Coleophora laricella) have caused considerable damage in past years to two plantations made in 1934. The larch appear to have thrown the trouble off and it may well have been due to a frost hollow caused by a strip of older wood cutting across the slope.

The Douglas fir chermes (Adelges cooleyi) has been found without serious effect on its host.

A chermes has also been found on Pinus strobus but the area of this crop is very small.

The Sitka spruce aphid (Neomyzaphis abietina) has played havoc with the large area of Sitka spruce planted in the forest. The intensity of attack varies from moderate to severe, some plantations growing reasonably well despite the attack. As the rainfall is only 25 in. or so it seems that the primary cause is lack of water supply.

Fungi. Only two fungal diseases are worthy of note here: a few odd Sitka spruce have been apparently killed by honey fungus; and larch at about ninety years of age suffers to a certain extent from buttrot.

Trespass. Repeated examples of small amounts of damage can be found throughout the woods attributable directly to passers by. The amount of damage is seldom sufficient to affect the final crop.

Vermin. A small amount of damage is frequently done by the three roe deer which have been resident in the forest for a number of years. This number is occasionally increased in the winter by a small herd coming from further up the Derwent Valley.

Rabbits have been rather infrequent in the forest but in the past year their numbers have increased rapidly and damage has been done to red oak newly planted. It is recorded that about 1903 the woods for a short period were overrun with rabbits.

Roads

There are two public roads passing through the forest making most parts of it reasonably accessible. In addition there were numerous tracks and rides passable for tractor and trailer. Some of these on drier ground, and a few which had been ashed would be accessible by motor lorry throughout most of the year.

In 1949 advantage was taken of the very fine weather conditions to lay in at a very low cost a complete network of ash roads which would fulfil the three functions of providing:- fire breaks; access for fire fighting; and access for the extraction of thinnings. This network is being continued in the present year in the eastern part of the forest which was previously omitted.

Labour

Labour of some sort or another has always been plentiful. At the present time an ample staff of good men with a suitable proportion of younger men and boys is employed. They are reasonably reliable.

This has not always been the case, the position varying considerably from time to time. In the early years of the recent war apparently the staff was completely unreliable.

SILVICULTURE

Preparation of Ground

Where planting has immediately followed felling, little or no preparation of ground has been necessary. The small amount of scrub and brushwood left by the timber merchants was cleared and burnt before planting, and drains were cleaned.

During the two post war periods of the last thirty years clearing and burning of considerable coppice and scrub growth has been required. During the last four years this has cost £5 or £6 per acre.

In the area scheduled for replanting in 1951 considerable numbers of straight coppice shoots and a fair number of natural seedlings, particularly larch, were found. Consequently an experimental cleaning up of this area was carried out in an effort to form a plantation more cheaply than would otherwise be the case. Only about 15% of the usual number of plants was used and the cost of the first clearing was less than complete cutting and burning would have been.

Fencing against rabbits has not been necessary. The boundaries normally have stock fences and formerly the sides of the two public roads were fenced. These latter fences have fallen into disrepair and have been removed.

Choice of Species

In the original plantings of the area in 1812-15 and 1820-21 oak was the principal species used, and probably almost the only one.

In 1855-60 when the poor quality oak was cleared, the price of larch timber was very high and it may well have been this that led to the replanting of the whole area with European larch.

The first of these crops was very largely a failure and the larch, although only a little failed completely, was not a success. The crop was very thin and was filled up to a great extent by coppice shoots from the previous crop. Examples of this crop are still to be seen on the forest. (Compartments 13, 14 and 20). Much of the failure of these two crops may be attributed to lack of weeding as this must have been a problem when such large areas were planted within a short period.

Proposals for the planting to commence in 1907 were :-

European larch to be used on the best loam soils.

Oak and beech, along with a nurse crop of larch was to be used for the planting of a field near Carr House. Beech was recommended as a soil improving species throughout the forest.

Corsican pine was envisaged as the principal species over much of the wood. Scots pine should be planted on the drier and/or poorer soils.

Spruce, preferably Sitka spruce, was suggested for wet peaty areas and Douglas fir for sheltered hollows.

In addition to these species, Japanese larch and Pinus strobus were planted to a small extent and Lawson's cypress, Thuja plicata, Abies grandis and Abies concolor were used for underplanting.

In 1923 when the Forestry Commission acquired the area policy was changed somewhat. Sitka spruce after planting, grows very quickly for a few years. Probably it was this that prompted a great increase in the amount of Sitka used.

In 1923 to 1926 about half the area was planted with Sitka spruce. The other species were used as had been recommended in 1907 except that Japanese larch was substituted for European larch and was used largely in mixture with beech, and was planted to a slightly greater extent than European larch had been.

By 1930 all planting was of Sitka spruce except for the use of a little Scots pine on sandy hills and slopes. In 1933 and 1934 almost all the small amount of planting was of larches in mixture with beech, no other planting being done until 1939.

In the period from 1939 to 1946 no overall plan seems to have been in force, the following plantations all being made:

Oak groups in an European larch matrix.

Pure Corsican pine and Sitka spruce in equal amounts, and Japanese larch to a lesser extent.

Sitka spruce and European larch in pure blocks intermingled over an extensive area.

By 1947 it was agreed that Japanese larch was the most suitable

species, but because of shortage of plants, Corsican pine was planted for two years with Japanese larch in belts along the rides and paths. A plantation of Thuja was laid down in 1947. Subsequently Japanese larch has been used entirely, apart from the planting of red oak in 1951.

Planting

(a) The spacing recommended in 1907 was 4 ft. with 3 ft. 6 in. for some species. As far as is known this was put into practice until 1918.

Spacings since then have varied a great deal but the following notes summarize the position

Scots pine	5 ft. (usually) or 4 ft. 6 in.
Corsican pine	4 ft. 6 in. or 5 ft.
Douglas fir	6 ft.
European larch	4 ft. 6 in. (usually) or 5 ft. (exceptionally 3 ft.)
Japanese larch	5 ft. (usually) or 4 ft. 6 in.
Sitka spruce	5 ft. (usually) or 5 ft. 6 in. (exceptionally 6 ft. and 4 ft. 6 in.)
Beech	5 ft. (usually) or 4 ft. 6 in.
Oak	2 ft. x 2 ft. in groups among European larch matrix.
Sycamore	5 ft. (usually) or 4 ft. 6 in.

(b) The plants normally used have been 2 + 1 or 2 + 2 transplants. A fair proportion have come from Chopwell nursery but importations have come from other nurseries of the division - particularly Rothbury, Hamsterley and Widehaugh, and from nurseries throughout the country.

Pines and larches have been either 2 + 1 or 1 + 1 plants. Sitka spruce has usually been 2 + 2 but 2 + 2 + 1 and 2 + 3 have frequently been used. Douglas fir have usually been 2 + 1 plants. Oak have been 1 + 0, 2 + 0, and 1 + 1. Beech and Sycamore used have generally been "1 + " plants, subsequent management varying considerably (1 + 1, 1 + 2, 1 + 1 + 1, 1 + 2 + 1 etc. etc.)

(c) The method of planting has varied little, the usual method being notching. Pit planting has been used in special cases and for a period about 1940-44.

(d) The annual rate of planting has varied considerably from time to time, the following table giving the areas planted since 1923 (including replanting of fires; and to the nearest acre).

1923 - 77	1931 - 22	1944 - 19
24 - 41	33 - 2	45 - 17
25 - 25	34 - 29	46 - 12
26 - 27	39 - 30	47 - 89
27 - 17	40 - 23	48 - 60
28 - 11	41 - 24	49 - 35
29 - 5	42 - 20	50 - 38
30 - 39	43 - 25	51 - 32

(e) No manuring has been undertaken in the forest

(f) The success of the plantations has been reasonable throughout.

No areas are in prolonged check and on the whole the extent of beating up has not been great. The one partial failure has been Sitka spruce which in some plantations is only just at brashing stage after 20 - 24 years.

Records are not sufficiently clear covering a long period to be able to assess the proportion of beating up for different types of plants or species.

Ploughing

No ploughing has been carried out on the forest.

Beating Up

Beating up has seldom been necessary to a great extent on the forest. Where carried out it has been done up to three years after planting but seldom longer. Generally a plant one or two years older than the original planted has been used for beating up. The percentage of success has generally been higher than the original planting because of the greater care taken in the work.

Weeding

Due to dense coppice and the undergrowth of woodland plants weeding at Chopwell has been an expensive item. Coppice of oak, ash and sycamore in places has been very dense. Birch is a common weed but not as serious as in some areas. The usual ground vegetation weeds are bracken, bramble and grasses. The damage to the young crop by the coppice is mainly by whipping although shading is also a harmful effect (light demanding trees have mostly been used for planting). Bracken and grasses have a smothering effect in addition to the shade they cast but the damage by bramble is largely due to the shade cast.

Weeding, at least in the past few years, and probably for a long period, has been carried out very intensively for the first year or two of the life of the plantation. Thereafter it has fallen off rapidly as soon as the crop gets its head clear of the weeds.

On most ground in Sitka spruce and Japanese larch plantations the crop has been clear of weeds in two years. Where bracken is present, however, a third, and exceptionally a fourth year's weeding has been found necessary. Bracken is generally cut twice, at least in the first and second years. The slower growing Corsican pine and Scots pine require up to four years weeding and in some cases seven years where there is dense bracken growth. The oak planted in groups in 1941 and 1942 is only just clearing the weeds, chiefly bracken, after nine years weeding - the last one being very light.

Weeding is essential for the establishment of a full crop as the dense growth of weed species would quickly destroy the planted trees to such an extent that a very patchy, thin crop would result.

Mixtures

The only cases in which mixtures have been laid down with a definite object in view are

- (a) where oak has been planted in groups in a larch matrix in 1941 and 1942 and
- (b) where beech has been planted along with larch in several compartments.

In both these cases the two species were planted at the same time by the same method. The first case is showing development in text-book style, the larch being 3 ft. - 8 ft. above the oak and presumably having a beneficial nursing effect. The oak were planted two feet apart with sixteen plants in the group, and 100 groups approximately to the acre. The larch were planted at 5 ft. It is difficult to say whether any benefit is resulting from the mixture of beech with the larch. The beech, however, is showing definite signs of improving the soil texture. One of the earlier plantations of this mixture (P.07) was apparently planted with the object of a beech final crop. This is now taking shape and the few good oak present will improve the value of the crop. Most of the other beech on the forest is too poor to follow on after removal of the larch but a mixed final crop should be easily obtained.

Other mixtures have resulted from the beating up of one species with another. This has happened in several cases with Scots and Corsican pines. Judging from past experience the mixture is less likely to snow damage than a pure crop of Scots pine. The mixture of larch with various broadleaved species resulting from the poor take of larch about 1860 (two examples of which still exist) has probably been better for the soil and for the larch than a pure crop of larch would have been.

The P.08 and P.10 areas of Compartments 19 and 21 were originally formed as underplanting, the overcrop being removed in 1924 or about then. No other underplanting has been carried out.

Rates of Growth

Chopwell is not noted for a high rate of growth in any species. The best that can be expected is to ensure that all crops grow reasonably well and that as few as possible areas have a slow-growing crop.

The form of all the coniferous species is good although some strains of Scots pine and Corsican pine have a tendency towards producing large nodal swellings which spoil the timber. Larch in almost every case has very few twisted stems.

Beech, on the whole has been very disappointing although one or two patches show the potentialities of the area. Most of the beech planted from 1923 onwards is very crooked and some is very coarsely branched. Among the worst, however, there are sufficient straight stems to give a reasonably good final crop, or to form a reasonable final crop in mixture with the larch. Some of the earlier plantations, however, have some very good beech.

The table (Appendix III) gives samples of measurements taken throughout the forest to show the height growth of various species.

Past Treatment of Established Plantations

Brushing of all the trees has until three years ago been normal practice. Usually a height of six feet has been cleared of branches and all the trees brushed. The present practice - to save expense - is to brush 70% of the crop endeavouring to leave those trees which will be removed in the first thinning.

Various small amounts of high pruning have been carried out but to no

set plan. Cleaning has also been necessary in some places where weeds have got up among the canopy. It has not generally been needed, the mis-shapen trees of the crop being removed in thinnings.

Thinning of the plantations made in the early part of the century do not appear to have commenced until about 1930 although records are not available to confirm this. Light thinnings were the rule and now many of these crops are typical of plantations insufficiently thinned in the early years. In 1941 the first small amount of thinning in plantations formed by the Forestry Commission was carried out but most of the thinning in this year was of acquired plantations. Thereafter small amounts of thinning of Forestry Commission plantations have been done in most years. No thinning cycle has been in force, two to four years being the usual period. The present proposal for the thinning which is increasing considerably is four years.

No figures are available for past outturn in produce but the present thinnings are running out at 200-250 cu.ft. per acre for a moderate second thinning after a light first thinning and cleaning. The actual acreage thinned after 1935 (no figures before this date are available) is given in the following table:

1935	30 acres	1943	16 acres
36	27 "	44	3 "
37	42 "	45	4 "
38	32 "	46	6 "
39	27 "	47	6 "
40	33 "	48	52 "
41	65 "	49	59 "
42	-	50	116 "

The thinning programme for the next five years, 1951 - 5 is as follows:-

1951	103 acres
1952	76 "
1953	103 "
1954	129 "
1955	129 "

The produce dispatched has mostly been pitprops with the usual run in boxwood, stakes, pulpwood, firewood, etc. which are cut as waste. During the recent war, a considerable amount of saw timber was felled by the Timber Production Department. They also felled some of the younger plantations and thinned others to obtain pitprops.

Research

No research work has been carried out in the forest by the Research Branch.

Conclusions

Species. The three principal conclusions to be drawn from the silviculture at Chopwell in the past are all negatives, i.e. oak, European larch and Sitka spruce are all unsuitable for large scale planting.

Oak in mixture with beech and/or European larch has a place on the best deep loams and clay loams, the extent to which it is used depending on overall policy. European larch can also be used to the same limited extent on these sites. None of the Sitka spruce in the forest is wholly successful and its only place in the plan for the forest is on the very wet patches where there is some peat formation and a typical bog vegetation. These patches are all comparatively small and are not very frequent. Norway spruce, to judge from the only plantation over ten years of age is not suitable for Chopwell.

The most uniformly successful species are Japanese larch and Corsican pine. Japanese larch has grown reasonably well on a number of varied sites and is probably the tree producing the greatest volume that can be grown. Corsican pine grows nearly as fast on all sites once it gets away but an extra two or three weedings are necessary before the crop is established.

Of other conifers, Abies grandis, Douglas fir, and Thuja plicata all deserve mention. Abies grandis, where it has been planted as an understorey in Compartment 19, the overcrop being removed about fifteen years later, has grown well and has produced a high volume. In Compartment 15, Abies grandis mixed with Sitka spruce in 1925 is growing very well on a sheltered site. The indications are that this species could be used on sheltered sites, or that it could be used for underplanting other species either as a replacement or for the improvement of the soil and crop. Douglas fir is a useful species for loam sites in sheltered situations and in such places produces a high volume. Thuja plicata has grown reasonably well in two small patches now forty years old. A limited amount of it might prove useful particularly with the ready market in the area for the foliage at Christmas.

Scots pine is generally behind Corsican pine in growth and probably in no case would it take preference over Corsican pine. Lawson's cypress has in the past been a tree with a great tendency towards forking of the main stem and cannot be considered for future work.

Oak can be grown at Chopwell but owing to its high requirements in soil quality for a good crop of timber, there are not many sites for it, and a careful survey will need to be done to find these in the very variable soils of the forest. The method of establishment could conveniently be that in practise in Compartments 39 and 40 where the oak have been planted in groups in a larch matrix. Ash could be planted on similar sites where the water table is higher provided the water is not stagnant.

The poor quality of the beech in much of the forest can be attributed to bad seed as there are places, particularly in the beech planted before 1918, where fine straight stems have been grown. There are three main uses for the species; (it cannot be used well as a pure crop on a felled area due to difficulty of establishment).

(a) Beech can be planted along with larch to improve the soil and increase the duration of vigorous growth in the larch.

(b) It can be planted along with larch to form the final crop, the larch being removed almost completely in intermediate thinnings.

(c) It can be used for underplanting.

Beech is a very useful long term species for Chopwell as it grows well on a variety of soils, it can stand the smoke pollution which there is in this area, and it produces a valuable timber. The larches have been showing signs of heart rot, particularly in the 1858 European larch, and Japanese larch may be more susceptible. An admixture of beech, either in the planting, or as an understorey would help to retain vigour and there would be an alternative species in the event of widespread trouble with the larch. Also if Japanese larch proves unsuitable for more than a forty year pitwood rotation, beech established under the larch would prove a useful crop to follow. (The oldest Japanese larch at Chopwell is 42 years).

Preparation of Ground

It is too early to state definitely whether the technique of rehabilitation which was tried in 1951 is suitable for this area. Apart from this the best procedure is to cut and burn as much of the undergrowth on the areas as possible without unduly increasing the cost of this operation.

Planting. The screef and notch technique, using the planting mattock,

gives very good results and is comparatively cheap. Unless very valuable trees are being used pit planting is not worth the extra expense.

Thinning.

A fairly heavy thinning must be carried out to retain the vigour of the crop which in many species is liable to fall off rapidly. This is particularly the case with Sitka spruce which, if it is allowed room to grow vigorously may throw off some of the symptoms of the Neomysaphis attacks. Larches and Corsican pine, likely to be the main species on this area, must all be kept growing vigorously as they do not recover quickly after a delayed thinning.

Rotation.

Little in the way of definite conclusions as regards rotation can be drawn from the existing crop and the following remarks are largely conjecture but are based on some evidence in the forest.

European larch, to judge from the 1858 crop which is showing signs of butt rot may be unsuitable for rotations over seventy or eighty years unless greater vigour is retained with a definite beech understorey or admixture. For Japanese larch a figure of sixty years may be near it. This is also a likely figure for Corsican pine and Douglas fir. At this age sawmill timber will be produced.

A composite rotation may be suitable with beech going on to a hundred and twenty or a hundred and fifty years, larch being removed (either overcrop or admixture) chiefly when it is forty to seventy years old. Oak will require a rotation of at least a hundred and fifty years.

The growth of the Sitka spruce on the area is already falling off so much that plans are in hand to replace this species over a period of about ten years, when the crop is anything from twenty to thirty years old. Two methods are planned, one by underplanting (principally with beech but experimentally with Abies grandis) and the second by replanting, (felling alternate two chain strips of the spruce and replanting with Japanese larch).

Conclusion.

Rates of growth at Chopwell cannot be expected to be high but given good management on the above lines a regular supply of useful timber should be obtained and a reserve of standing timber built up.

APPENDIX I

Notes from Inspection Reports

Very few inspections of this forest have been made by officers from Headquarters, but the following notes have been made from the reports on the inspections which have been made.

Mr. Roy L. Robinson - June 1922

The nursery was in good condition, Corsican pine apparently being the main crop.

Sample plots of underplanting laid down about 1908 by Mr. Annand were found to be at a stage at which the larch overcrop - tending to heart rot - could be removed.

Mr. O. J. Sangar in October 1930 remarked on the planting method - vertical notch with Schlich spade. There was some very heavy coppice weeding being done particularly in Douglas fir.

Sir Roy L. Robinson - January 1932

The choice of species recommended on this visit was Sitka spruce on the Aira caespitosa vegetation, Japanese larch on the more open soils and Corsican pine on the definitely sandy soils.

It appears that thinning was somewhat in arrears at this time, probably in the 1907-1914 plantations.

Mr. A. P. Long - July 1942

On this visit remarks were made on several of the species on the area.

Abies grandis, although thin in the crown was growing well and showed up slightly better than Abies concolor.

Lawson's cypress, where it was seen in one area, was very badly forked.

Thuja plicata in a very small group was growing well.

Sitka spruce was showing thin in the crown although growth in the early plantations (P.08) was quite good.

Mr. A.H. Gosling in November 1947 remarked on the very badly forked Lawson's cypress. Beech mixed with Japanese larch were found promising despite the large number of useless stems, and some pure Japanese larch (P.08) were

thought particularly good.

Mr. O. J. Sangar - September 1950

The opinion was expressed on more than one occasion that thinning had been rather delayed in earlier years. Many crops, particularly Corsican pine were showing a lack of vigour which could be attributed to this cause.

European larch and Douglas fir were found to be rather better than might have been expected. Beech in many parts was disappointing but one or two places indicated that it could be grown well.

On this visit it was agreed that on most sites Sitka spruce was a partial failure and that the widespread planting of this species must not recur.

Commissioners' Visit - October 1950

Many controversial matters were discussed without any definite decisions not expressed on Mr. Sangar's visit the previous month.

APPENDIX II

Supervision

The supervision at Chopwell, as far as can be ascertained, has been:-

Conservators

R. E. Fossey (Acting)	1946-47
G. J. L. Batters	1947-50
C. A. Connell	1950 to date

Divisional Officers

A. D. Hopkinson	1922-40
R. E. Fossey (Acting)	1940-46

State Forests Officers

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

District Officers

J. H. Mackay	1926-28
G. J. L. Batters	1930-31
A. S. Dicker	1931-35 (Estate Officer)
Good	1935-36
G. J. L. Batters	1936-40
W. Forsyth	1940-42
J. H. Edwards	1942-43
M. F. Adams	1943-49
S. Forrester	1949 to date

Foresters

T. E. Anderson	1919-25
(No forester)	1925-29
W. Hodgson	1929-36
J. Rowell	1936-39
N. Wray	1939-43
J. Cumming	1943-49
W. B. Harbin	1949 to date.

APPENDIX III

SCHEDULE OF RATES OF GROWTH

Compt.	Species	P. Yr.	Age Yrs	Soil Drainage	Altitude Aspect Slope Exposure	Mean Height Dominants (feet)	Mean Annual Increment (inches)	Current Annual Ht. Increment over 5 yrs. (inches)
15	S.P.	13	38	Sandy Free	300 ft. East Moderate Sheltered	41	13	7
16	S.P.	23	28	Sandy loam. Free	500 ft. South Moderate Mod. Exposed	37	16	12
28	S.P.	27	24	Sandy loam. Free	500 ft South Moderate Exposed	34	16	14
8	C.P.	07	44	Sandy loam. Free	520 ft. South east Slight Mod. Sheltered	50	14	12
15	C.P.	12	39	Sand. Free	300 ft. East Moderate Sheltered	53	17	12
6	C.P.	18	33	Clay loam Mod. free	600 ft East Slight Mod. Exposed	37	14	14
13	C.P.	23	28	Clay loam Moderate.	450 ft. South east Slight Mod. Sheltered	38	16	14
25	C.P.	43	8	Sand Free	500 ft. South Moderate Mod. Exposed	9	14	17
17	J.L.	08	43	Loam Mod. free	250 ft. South east Moderate Sheltered	58	16	14
15	J.L.	25	26	Sand Free	400 ft. East Moderate Sheltered	42	19	17
5	J.L.	40	11	Clay (Peat) Moderate	550 ft. - Level Sheltered	23	25	25

Compt.	Species	P.Yr.	Age Yrs	Soil Drainage	Altitude Aspect Slope Exposure	Mean Height Dominants (feet)	Mean Annual Increment (inches)	Current Annual Ht. Increment over 5 yrs. (inches)
22	J.L.	43	8	Sand Free	480 ft. South Moderate Mod. Exposed	13	19	19
13	E.L.	58	93	Clay loam Moderate	500 ft. South east Slight Mod. Sheltered	58	7	5
35	E.L.	07	44	Clay loam Moderate	320 ft. South Slight Mod. Exposed	50	14	9
17	E.L.	12	39	Sandy loam Mod. free	360 ft. South Slight Sheltered	41	13	9
35	E.L.	26	25	Clay loam Moderate	290 ft. South Moderate Mod. Sheltered	26	12	10
34	E.L.	39	12	Sandy loam Free	420 ft. South Moderate Mod. Exposed	17	17	14
16	N.S.	43	8	Loam Mod. free	500 ft. North east Moderate Sheltered	15	22	17
19	S.S.	08	43	Clay Moderate.	350 ft. South Moderate Mod. Sheltered	42	11	10
19	S.S.	24	27	Clay Moderate	400 ft. South Moderate Mod. Sheltered	37	16	11
28	S.S.	27	24	Loam Moderate.	460 ft. South Moderate Mod. Exposed	22	11	10
34	S.S.	39	12	Loam Moderate	420 ft. South Moderate Mod. Exposed	11	11	12
4	S.S.	44	7	Clay Moderate.	600 ft. East Slight Mod. Sheltered	7	12	13

Compt.	Species	P. Yr.	Age Yrs	Soil Drainage	Altitude Aspect Slope Exposure	Mean Height Dominants (feet)	Mean Annual Increment (inches)	Current Annual Ht. Increment over 5 yrs. (inches)
17	D.F.	08	43	Loam Free	230 ft. South east Moderate Sheltered	59	17	12
36	D.F.	26	25	Clay Poor	260 ft. South Slight Mod. Sheltered	39	19	16
19	Th.	08	43	Clay Moderate	350 ft South Moderate Mod. Sheltered	40	11	7
19	Ab. gr.	08	43	Clay Moderate	400 ft. South Moderate Mod. Exposed	57	16	7
15	Ab. gr.	25	26	Loam Free	400 ft. South east Moderate Mod. Sheltered	53	24	19
35	Ash	07	44	Clay loam Moderate	320 ft. South Slight Mod. Exposed	47	13	10
35	Be.	07	44	Clay loam Moderate	320 ft. South Slight Mod. Exposed	52	14	11
17	Be.	12	39	Loam Moderate	360 ft. South Moderate Sheltered	42	14	12
35	Be.	26	25	Clay loam Moderate	290 ft. South Moderate Mod. Sheltered	27	13	12
14	Be.	34	17	Clay loam Moderate	500 ft. South east Slight Mod. Sheltered	20	14	14
35	Oak	07	44	Clay loam Moderate	320 ft. South Slight Mod. Exposed	50	14	10
35	Oak	26	25	Clay loam Moderate	290 ft. South Moderate Mod. Sheltered	25	12	12
39	Oak	41	10	Clay loam Moderate	300 ft. South Moderate Mod. Exposed	7	8	8

APPENDIX IV

SUMMARY CLASSIFICATION OF THE WOODLANDS BY TYPES AND AGE CLASSES

At 1st. October of each year.

Scrub	Felled	Planted Since 1939			Planted 1920 - 39			Planted 1900 - 19			Planted 1880 - 99			Planted before 1880		Remarks		
		Bl.	Cf.	Mx.	Bl.	Cf.	Mx.	Bl.	Cf.	Mx.	Bl.	Cf.	Mx.	Bl.	Cf.		Mx.	
At 1899																		
Felled before 1914																		
1914-19																		
Planted 1900-19																		
Underplanted 1900-19																		
At 1919	2.6	197.8																
Felled 1919-39																		
Planted " "																		
At 1939	2.6																	
Felled 1939-51																		
Planted " "																		
At 1951	8.8																	

Includes 15.6 acres felling of overcrop.

Includes 4 acres New Planting.

APPENDIX V

Details of Past History of the Forest

Chopwellwoods, at one time, were much more extensive than today. The latest decrease, the ground on which Chopwell village has been built, taking place about 1907. In the 12th Century the Manor of Chopwell, of which the woods were part, belonged to Durham priory.

It was in the reign of Queen Elizabeth that the woods became crown property on the attainder for treason of a John Swinburne. The woods were granted to Henry Knaggs, Winifred Ward and George Ward for life by the Queen. Subject to this grant the woods were leased to Sir Henry Vane to whose descendants leases were granted down to 1812.

During the sixteenth and seventeenth centuries, the woods supplied large quantities of bark for tanning in Newcastle. Oak timber was taken from Chopwell to repair the Long Bridge at Berwick and to construct piers in Berwick Harbour. In 1635 Chopwell supplied much of the timber for building the battleship "The Sovereign of the Seas" (later "The Royal Sovereign"). Although the intention was to use Chopwell timber exclusively, it was found necessary eventually to supplement it with 1400 trees from Brancepeth where there was timber of better length.

Altogether at this period, great quantities of timber were removed from the forest and no attempts to replace it by systematic management were made. By 1772 the estate was mainly agricultural with only detached areas of woodland. At this date the area was divided into four farms. By 1801 there were five farms; East and West Chopwell (or Chopwellwood), East and West Carr House and Dean House (See Map No.1.) West Chopwell is now Carr House, the two originals East and West Carr House no longer existing. Dean House has completely disappeared although at one time it was an important farm of the neighbourhood. East Chopwell, now Chopwellwood, consisted of a single storey farmhouse (now Oak Lodge and Woodside Cottage) with open sheds on the east side of the yard and a cottage and a barn on the west side.

When the lease of the estate was renewed in 1812 the fear of a possible famine of navy timber led to the retention of 475 acres for planting. This consisted of 100 acres of "woodland" growing nothing but scrub, and the

remainder was arable and grassland. This area included all the principal woodland on the estate and the two main farms Dean House and East Chopwell, - the east and north of the woods as they are now. This land was planted between 1813 and 1815. In 1819 the lease of the rest of the land was surrendered and planting of the woods was completed in 1920 and 1921. This planting was presumably all of oak still in great demand for ship building. The second spell of planting was supervised by the William Billington who had planted large areas of the Forest of Dean.

These plantations do not appear to have grown well. The indiscriminate planting of oak would result in areas too dry or too wet being planted with this species. In 1839 (7th January) a severe gale uprooted at least 20,000 trees, an indication that much of the oak had no secure roothold.

In any case about 1855, on the advice of a Mr. James Brown the oak was cut and the ground replanted with larch after draining. A little Scots pine was used on higher places and spruce to a small extent in bogs. It is very likely that lack of weeding, frost and wetness in places resulted in high deaths among the larch and fifty years later the crop consisted of a poor stocking of larch with coppice shoots resulting from the early nineteenth century planting. The proportion of these varied, in the wetter places larch being almost completely absent (and the hardwoods being mere scrub) while on drier loams a reasonable crop of larch had survived. In 1893 a Scots pine plantation was laid down north of what is now the nursery.

In 1907, the Armstrong College (now the King's College, Newcastle) undertook the management of the woods, partly as a demonstration area and partly as a training ground for foresters. Two nurseries, Chopwellwood and Carr House, were laid down and new buildings erected. The timber bungalows, Chopwellwood House and Forest Lodge were built at this time, the last being a museum and lecture room. The old farmhouse was rebuilt as a two storey building and divided into two.

A working plan was prepared and put into operation recommending clearing of the worst of the scrub and inferior growth and the underplanting of certain better quality larch stands. By 1914 53 acres had been cleared and replanted. The Great War resulted in the felling of 285 acres of which 198 acres still remained unplanted in 1919. In 1919 the Forestry Commission commenced management of the woods, the College acting as local

agents, dealing with the current stock.

After the Transfer of Woods Act in 1923 a full scale replanting programme was undertaken and by 1929 the war-time fellings had been made good. Small scale felling and replanting continued until 1939 when to help satisfy the needs of a nation at war, 393 acres were felled before 1945. The felled areas have all been replanted.

C.	Present Crop		1899		1919		1939		Fellings	Area	Compt. & Remarks Areas
	Species	P.Yr	Species	P.Yr	Species	P.Yr	Species	P.Yr			
1	SS	23	EL/BL.		F		SS	23	1914-18?	13.9	
	SP/CP	17	EL/BL.		SP/CP	17	SP/CP	17	1914-18?	.8	
	JL/Be/SS	17	EL/BL.		JL/Be/SS	17	JL/Be/SS	17	1914-18?	2.5	17.2
2	CP	44	EL/BL.		Cf.	17?	Cf.	17?	(1914-18? (1939-45	4.9	
	SS/CP	17	EL/BL.		SS/CP	17	SS/CP	17	1914-18?	6.9	
	SS	40	EL/BL.		Cf.	17?	Cf.	17?	(1914-18? (1939-45	3.2	15.0
3	SS	23	EL/BL.		F.		SS	23	1914-18?	1.5	
	DF	23	EL/BL.		F.		DF	23	1914-18?	1.4	
	SP/CP	23	EL/BL.		F.		SP/CP	23	1914-18?	6.4	
	JL	47	EL/BL.		Cf.	18?	Cf.	18	(1914-18? (1939-45	1.4	
	CP	47	EL/BL.		Cf.	18?	Cf.	18	(1914-18? (1939-45	1.9	
	Be.	18	EL/BL.		Be.	18	Be.	18	1914-18?	1.0	13.6
4	CP	17	EL/BL.		CP	17	CP	17	1914-18?	.6	
	SS/NS	17	EL/BL.		SS/NS	17	SS/NS	17	1914-18?	1.1	
	SS	40	EL/BL.		Cf.	17?	Cf.	17?	(1914-18? (1939-45	12.9	
	SS	44	EL/BL.		Cf.	17?	Cf.	17?	(1914-18? (1939-45	4.9	
	JL	44	EL/BL.		Cf.	17?	Cf.	17?	(1914-18? (1939-45	.4	19.9
5	SS	40	EL/BL.		Cf.	17?	Cf.	17?	(1914-18? (1939-45	6.8	
	JL	40	EL/BL.		Cf.	17?	Cf.	17?	(1914-18? (1939-45	.5	
	CP	44	EL/BL.		Cf.	17?	Cf.	17?	(1914-18? (1939-45	1.5	8.8
6	CP	18	EL/BL.		CP	18	CP	18	1914-18?	4.7	
	SS	18	EL/BL.		SS	18	SS	18	1914-18?	9.0	
	JL	47	EL/BL.		EL/BL.		EL/BL.		1939-45	2.5	16.2
7	Be.	34	EL/BL.		EL/BL.		Be.	34	1933?	1.9	
	JL	47	EL/BL.		EL/BL.		EL/BL.		1939-45	4.5	Railside
	JL	47	EL/BL.		F.		SP	23)1914-18?	.7	
	CP	47	EL/BL.		Cf.	18	? Cf	18?)1939-45	18.6	
	CP	47	EL/BL.		F.		SP	23)	8.5	
	Be.	18	EL/BL.		Be.	18	Be.	18	1914-18?	1.0	35.2
8	JL	07	EL/BL.		JL	07	JL	07	1906?	3.2	
	CP	07	EL/BL.		CP	07	CP	07	1906?	3.1	
	SS	07	EL/BL.		SS	07	SS	07	1906?	.2	
	Be	07	EL/BL.		Be	07	Be	07	1906?	2.9	
	SS	44	EL/BL.		Cf	07	Cf.	07?	(1906? (1939-45	1.9	
	SP	14	EL/BL.		SP	14	SP	14	1906?	2.0)FO7. ?
	Be	14	EL/BL.		Be	14	Be	14	1906?	.1)Burnt 1913
	SS	34	EL/BL.		F		SS	34	1906?	.5	
	JL/Be	07	EL/BL.		JL/Be	07	JL/Be	07	1906?	.5	
	SP	07	EL/BL.		SP	07	SP	07	1906?	.3	
	EL/JL/Be	07	EL/BL.		EL/JL/Be	07	EL/JL/Be	07	1906?	1.9	16.6
9	Be.	07	EL/BL.		Be.	07	Be.	07	1906?	.5	
	JL/Be	07	EL/BL.		JL/Be	07	JL/Be.	07	1906?	2.2	
	EL/JL/Be	07	EL/BL.		EL/JL/Be	07	EL/JL/Be	07	1906?	1.8	
	SS	24	EL/BL.		F.		SS	24	1914-18?	5.4	9.9
10	SS	34	EL/BL.		EL/BL.		SS	34	1933?	1.0	
	SS	24	EL/BL.		F.		SS	24	1914-18?	9.0	10.0
11	EL/JL/Be	34	EL/BL.		EL/BL.		EL/JL/Be	34	1933?	8.2	
	EL	33	EL/BL.		EL/BL.		EL	33	1932?	2.1	
	SS	34	EL/BL.		EL/BL.		SS	34	1933?	.8	11.1

C.	Present Crop		1899		1919		1939		Fellings	Area	Compt. Areas & Remarks		
	Species	P. Yr	Species	P. Yr	Species	P. Yr	Species	P. Yr					
12	JL	34	EL/Bl.		EL/Bl.		JL	34	1933?	.4	12.7		
	SS	34	EL/Bl.		EL/Bl.		SS	34	1933?	1.1			
	EL/JL/Be	34	EL/Bl.		EL/Bl.		EL/JL/Be	34	1933?	11.2			
13	EL/Bl.	58	EL/Bl.	58	EL/Bl.	58	EL/Bl.	58		10.3	25.9		
	EL/Be	34	EL/Bl.		EL/Bl.		EL/Be	34	1933?	1.2			
	CP	23	EL/Bl.		F.		CP	23	1914-18?	3.2			
	SS	23	EL/Bl.		F.		SS	23	1914-18?	5.0			
	JL/Be	23	EL/Bl.		F.		JL/Be.	23	1914-18?	6.2			
14	EL/Bl.	58	EL/Bl.	58	EL/Bl.	58	EL/Bl.	58	-	2.4	29.4		
	EL	46	EL/Bl.		EL/Bl.		EL/Bl.		1939-45	1.0			
	EL/Be.	34	EL/Bl.		EL/Bl.		EL/Be	34	1933?	1.8			
	SP/CP	23	EL/Bl.		F.		SP/CP	23	1914-18?	9.7			
	SS/Bl.	23	EL/Bl.		F.		SP/Bl	23	1914-18?	5.0			
	JL/Be	23	EL/Bl.		F.		JL/Be	23	1914-18?	3.9			
	SS	23	EL/Bl.		F.		SS	23	1914-18?	3.1			
	CP	23	EL/Bl.		F.		CP	23	1914-18?	1.4			
	NS	43	EL/Bl.		EL/Bl.		EL/Bl		1939-45	.7			
	CP	43	EL/Bl.		EL/Bl.		EL/Bl		1939-45	.4			
	15	EL/JL/Be	25	EL/Bl		F.		EL/JL/Be	25	1914-18?		2.1	30.8
		NS	43	EL/Bl		EL/Bl		EL/Bl		1939-45		.3	
		CP	43	EL/Bl		EL/Bl		EL/Bl		1939-45		.5	
JL		25	EL/Bl		F.		JL	25	1914-18?	2.1			
SP/CP		25	EL/Bl		F.		SP/CP	25	1914-18?	5.5			
SS/Ab. gr		25	EL/Bl		F.		SS/Ab/ gr	25	1914-18?	.9			
CP		44	EL/Bl		Cf.	08?	Cf.	08?	(1907?) (1939-45)	1.2			
CP		08	EL/Bl		CP	08	CP	08	1907?	1.2			
CP/P. strobilus		12	EL/Bl		CP/P. S	12	CP/PS	12	1907?	.9			
CP		44	EL/Bl		Cf.	13?	Cf.	13?	(1912?) (1939-45)	3.1			
Scrub			EL/Bl		Scrub		Scrub		1914-18?	2.6			
SP/CP		13	EL/Bl		SP/CP	13	SP/CP	13	1912?	1.0			
CP		47	EL/Bl		Cf.	13?	Cf.	13?	(1912?) (1932-45)	.5			
JL		08	EL/Bl		JL	08	JL	08	1907?	.5			
DF		08	EL/Bl		DF	08	DF	08	1907?	.9			
CP	44	EL/Bl		Cf.	08?	Cf.	08?	(1907?) (1939-45)	.8				
SP	26	EL/Bl		F.		SP	26	1914-18?	6.7				
16	EL	46	EL/Bl		EL/Bl		EL/Bl		1939-45	.4	?Fire 1940 13.4		
	EL/Be	34	EL/Bl		EL/Bl		EL/Be	34	1933?	.3			
	SP	23	EL/Bl		F.		SP	23	1914-18?	5.0			
	NS	43	EL/Bl		EL/Bl		EL/Bl		1939-45	1.4			
	EL/CP	43	EL/Bl		EL/Bl		EL/Bl		1939-45	1.3			
	EL/SP	43	EL/Bl		F.		SP	23	1914-18?	.4			
	SP	23	EL/Bl		F.		SP	23	1914-18?	1.8			
	SS	24	EL/Bl		F.		SS	24	1914-18?	2.8			
17	SS	24	EL/Bl		F		SS	24	1914-18?	8.1	28.6		
	SP/CP	25	EL/Bl		F		SP/CP	25	1914-18?	3.0			
	Be	12	EL/Bl		Be	12	Be	12	1911?	1.2			
	EL	12	EL/Bl		EL	12	EL	12	1911?	1.5			
	Be	08	EL/Bl		Be	08	Be	08	1907?	.4			
	DF	25	EL/Bl		F		DF	25	1914-18?	2.0			
	P. ash	45	EL/Bl		Cf.	13?	Cf.	13?	1912? 1939-45	.5			
	CP	47	EL/Bl		Cf.	13?	Cf.	13?	1912? 1939-45	2.6			
	SP/CP	13	EL/Bl		SP/CP	13	SP/CP	13	1912?	.4			
	JL	08	EL/Bl		JL	08	JL	08	1907?	2.9			
	SP	25	EL/Bl		F		SP	25	1914-18?	1.0			
	SP	08	EL/Bl		SP	08	SP	08	1907?	1.5			
	DF	08	EL/Bl		DF	08	DF	08	1907?	2.4			
SP	26	EL/Bl		F		SP	26	1914-18?	1.1				

G.	Present Crop		1899		1919		1939		Fellings	Area	Compt. Areas & Remarks
	Species	P. Yr	Species	P. Yr	Species	P. Yr	Species	P. Yr			
18	JL	47	SP	94	SP	94	SP	94	1939-45	4.4	19.1
	SS	47	SP	94	SP	94	SP	94	do.	6.7	
	CP	47	SP	94	SP	94	SP	94	do.	.7	
	SS	24	EL/B1	-	F	-	SS	24	1914-18?	6.7	
	EL	58	EL	58	EL	58	EL	58		.6	
19	SS	24	EL/B1		F		SS	24	1914-18?	5.8	Underplanted. Overcrop felled 1924? 24.2
	A. con	08	EL/B1		A. con	08	A. con	08	1924	.7)	
	Be	08	EL/B1		Be	08	Be	08	do.	3.4)	
	LC/Th/Be	08	EL/B1		LC/Th/Be	08	LC/Th/Be	08	do.	1.4)	
	DF	08	EL/B1		DF	08	DF	08	do.	1.7)	
	SS	08	EL/B1		SS	08	SS	08	do.	1.9)	
	DF	25	EL/B1		F		DF	25	1914-18	6.8	
	SP	25	EL/B1		F		SP	25	do.	1.7	
	SP	26	EL/B1		F		SP	26	do.	.8	
	20	R. Oak/ JL/etc.	51	EL/B1		EL/B1		EL/B1		1939/45	
EL/B1		58	EL/B1	58	EL/B1	58	EL/B1	58		2.0	
21	JL	50	EL/B1		EL/B1		EL/B1		1939/45	9.5	Underplanted. Overcrop felled 1924? 19.3
	SS	24	EL/B1		F		SS	24	1914-18?	3.3	
	LC/Th	10	EL/B1		LC/Th	10	LC/Th	10	1924?	.7)	
	Be	10	EL/B1		Be	10	Be	10	"	1.4)	
	NS/SS/DF	10	EL/B1		NS/SS/DF	10	NS/SS/DF	10	"	3.1)	
	LC/Th/Be	10	EL/B1		LC/Th/Be	10	LC/Th/Be	10	"	1.3)	
22	JL	45	do.		EL/B1		EL/B1		1939-45	1.8	15.2
	CP	46	do.		do.		do.		do.	4.6	
	JL	43	do.		do.		do.		do.	2.0	
	CP	43	do.		do.		do.		do.	6.8	
23	SS	48	do.		do.		do.		do.	6.9	22.0
	EL/BE	34	do.		do.		EL/Be	34	1933?	.6	
	R. Oak/JL/etc.	51	do.		do.		EL/B1		1939-45	13.8	
	EL	58	EL	58	EL	58	EL	58		.7	
24	JL	50	EL/B1		EL/B1		EL/B1		1939-45	12.5	12.5
25	JL	46	EL/B1		EL/B1		EL/B1		1939-45	6.4	27.3
	JL	45	do.		do.		do.		do.	5.4	
	CP	43	do.		do.		do.		do.	11.1	
	SS	45	do.		do.		do.		do.	4.4	
26	SS	30	do.		do.		SS	30	1929?	1.1	18.5
	CP	48	do.		do.		EL/B1		1939-45	7.4	
	JL	48	do.		do.		do.		do.	1.5	
	NS	49	do.		NS	07?	NS	07?	1906? 1939-45	6.4	
	JL	49	do.		do.	07?	NS	07?	1906? 1939-45	2.1	
	JL	49	do.		EL/B1	-	EL/B1		1939-45	13.4	
27	JL	49	do.		EL/B1		EL/B1		1939-45	13.4	13.4
	SS	27	do.		F		SS	27	1914-18?	13.2	21.9
	SP	27	do.		F		SP	27	do.	3.4	
SS	28	do.		F		SS	28	do.	5.3		
29	JL	48	do.		EL/B1		EL/B1		1939-45	1.5	17.3
	CP	48	do.		do.		do.		do.	4.9	
	JL	47	do.		do.		do.		do.	2.9	
	Thuya	47	do.		do.		do.		do.	8.0	
30	JL	48	do.		do.		do.		do.	4.8	13.3
	CP	48	do.		do.		do.		do.	8.5	
31	SS/EL	39	do.		do.		SS/EL	39	1938?	2.0	20.4
	JL	47	do.		do.		EL/B1		1939-45	4.0	
	CP	47	do.		do.		do.		do.	6.8	
	CP	48	do.		do.		do.		do.	2.4	
	SS	28	do.		F		SS	28	1914-18?	5.2	
32	JL	48	do.		EL/B1		EL/B1		1939-45	5.6	13.6
	CP	48	do.		do.		do.		do.	5.5	
	CP	49	do.		do.		do.		do.	2.5	

C.	Present Crop		1899		1919		1939		Fellings	Area	Compt. Areas & Remarks
	Species	P.Yr	Species	P.Yr	Species	P.Yr	Species	P.Yr			
33	JL	48	EL/B1		EL/B1		EL/B1		1939-45	5.3	10.9
	CP	48	do		do		do		do	5.6	
34	JL	47	do		do		SS/EL	39	1938?	.3	Burnt '46 do 17.6
	CP	41	do		do		SS/EL	39	do	1.7	
	SS/EL	39	do		do		SS/EL	39	do	10.6	
	JL	47	do		do		EL/B1		1939-45	5.0	
35	EL/JL/Be	26	EL/B1		F		EL/JL/Be	26	1914-18?	4.4	P. 26 Burnt '28 Agric. 28.1
	DF	29	do		F		DF	29	do	5.1	
	EL/Be	07	-		EL/Be	07	EL/Be	07		4.0	
	EL/O/Be	26	EL/B1-		F	07	EL/O/Be	26	1914-18?	.5	
	SS	30	do		EL/B1		SS	30	1929?	12.3	
	Syc	30	do		do		Syc	30	do	1.8	
36	DF	26	do		F		DF	26	1914-18?	8.3	32.1
	SS	30	do		EL/B1		SS	30	1929?	23.8	
37	SS	31	do		do		SS	31	1930?	22.0	26.8
	JL	47	do		do		EL/B1		1939-45	4.8	
38	JL	47	EL/B1		EL/B1		EL/SS	39	1938?	.9	Burnt '46 do 13.5
	CP	47	do		do		do	39	do	1.6	
	SS/EL	39	do		do		do	39	do	11.0	
39	EL/Oak	41	do		do		EL/B1		1939-45	24.1	25.4
	do	42	do		do		do		do	1.3	
40	do	42	do		do		do		do	18.4	18.4
41	JL	50	do		do		do		do	16.4	17.9
	EL/Be	39	do		do		EL/Be	39	1938?	1.5	
42	JL	49	do		do		EL/B1		1939-45	9.1	16.5
	SS	49	do		do		do		do	1.2	
	Scrub		do		do		do		do	6.2	

APPENDIX VII

Progress of the Forest

This appendix, compiled from the details in Appendix VI gives the break-down summarised in Appendix IV.

Damage by fire, where this does not affect the classification of the stand has been ignored.

The area figures used are those from the recent re-survey of the forest.

The area to the west of the forest (as shown on the map) which at one time formed part of the forest and which is now Chopwell village and a playing field, has been omitted altogether from these tables.

AREAS FILLED BEFORE 1919

1906 - 1919

Compt. No.	Planted since 1939 Bl. Cf. Mx.	Planted 1920-39 Bl. Cf. Mx.	Planted 1900-19 Bl. Cf. Mx.	Planted 1880-99 Bl. Cf. Mx.	Planted before 1880 Bl. Cf. Mx.	Remarks
1					17.2	
2					15.0	
3					13.6	
4					19.9	
5					8.8	
6					13.7	
7					28.8	
8					16.6	Before 1914
9					9.9	4.5 Before 1914
10					9.0	
13					14.4	
14					23.1	
15					30.0	10.1 Before 1914
16					10.0	
17					28.6	13.4 Before 1914
18					6.7	
19					15.1	
21					3.3	
26					8.5	Before 1914
28					21.9	
31					5.2	
35					10.0	
36					8.3	
					Total	
					<u>357.6</u>	53.1 Before 1914

CLASSIFICATION OF THE WOODLANDS BY TYPES AND AGE CLASSES

At 1st October, 1919

Compt. No.	Scrub	Felled	Planted since 1919		Planted 1920-19		Planted 1900-19		Planted 1880-99		Planted before 1880		Remarks
			Bl.	Cf.	Bl.	Cf.	Bl.	Cf.	Bl.	Cf.	Bl.	Cf.	
1		13.9											
2													
3		9.3											
4													
5													
6													
7													
8		9.2											
9		.5											
10		5.4											
11		9.0											
12													
13		14.4											
14		23.1											
15	2.6	17.3											
16		10.0											
17		15.2											
18		6.7											
19		15.1											
20													
21		3.3											
22													
23													
24													
25													
26													
27													
28		21.9											
29													
	2.6	174.3											

Underplanting
Underplanting

CLASSIFICATION OF THE WOODLANDS BY TYPES AND AGE CLASSES

At 1st October, 1919

Compf. No.	Scrub	Felled	Planted since 1939			Planted 1920-39			Planted 1900-19			Planted 1880-99			Planted before 1880			Remarks
			Bl.	Cf.	Mx.	Bl.	Cf.	Mx.	Bl.	Cf.	Mx.	Bl.	Cf.	Mx.	Bl.	Cf.	Mx.	
30	2.6	174.3							7.1	121.2	8.9		11.8	1.3	215.0			
31																13.3		
32																15.2		
33																13.6		
34																10.9		
35																17.6		
36																14.1		
37																23.8		
38																26.8		
39																13.5		
40																25.4		
41																18.4		
42																17.9		
	2.6	197.8							7.1	121.2	12.9		11.8	1.3	442.0			

AREAS PLANTED BETWEEN THE WARS

1919 - 1939

Compt. No.	Planted since 1939 Bl. Cf. Mx.	Planted 1920-39 Bl. Cf. Mx.	Planted 1900-19 Bl. Cf. Mx.	Planted 1880-99 Bl. Cf. Mx.	Planted before 1880 Bl. Cf. Mx.	Remarks
7					1.9	
10					1.0	
11					11.1	
12					12.7	
13					1.2	
14					1.8	
16					.3	
19					9.1	
21					6.5	
23					1.1	
26					2.0	
31					12.6	
34					14.1	
35					23.8	
36					22.0	
37					13.5	
38					1.5	
41						
Total					136.8	

CLASSIFICATION OF THE WOODLANDS BY TYPES AND AGE CLASSES

At 1st October, 1939

Compt. No.	Scrub	Felled	Planted since 1939		Planted 1920-39		Planted 1900-19		Planted 1880-99		Planted before 1880		Remarks
			Bl.	Gf. Mr.	Bl.	Gf. Mr.	Bl.	Gf. Mr.	Bl.	Gf. Mr.	Bl.	Gf. Mr.	
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16	2.6												
17													
18													
19													
20													
21													
22													
23													
24													
25													
26													
27													
28													
29													
30													
31													
32													
33													
34													
35													
36													
37													
38													
39													
40													
41													
42													
Totals	2.6												

AREAS FELLED DURING SECOND WORLD WAR

1939 - 1945

Compt. No.	Planted since 1939	Planted 1920-39		Planted 1900-19		Planted 1880-99		Planted before 1880		Remarks
		Bl.	Cf.	Bl.	Cf.	Bl.	Cf.	Bl.	Cf.	
2										
3										
4					8.1					
5					3.3					
6					18.2					
7					8.8					
8			9.2		18.6				2.5	
14					1.9				4.5	
15					5.6				2.1	
16					3.1				.8	≠ Fire
17			.4						3.1	
18										
20										
21									15.2	
22									9.5	
23									15.2	
24									20.7	
25									12.5	
26									27.3	
27									8.9	
29					8.5				13.4	
30									17.3	
31									13.3	
32									13.2	
33									13.6	
34									10.9	
37									5.0	≠ Fire
38			2.0						4.8	≠ Fire
39			2.5						25.4	≠ Fire
40									18.4	
41									16.4	
42									16.5	
Totals			14.1		76.1			11.8	290.5	

CLASSIFICATION OF THE WOODLANDS BY TYPES AND AGE CLASSES

At 31st May, 1951

Compt. No.	Scrub	Felled	Planted since 1939		Planted 1920-39		Planted 1900-19		Planted 1880-99		Planted before 1880		Remarks					
			Bl.	Mk.	Bl.	Mk.	Bl.	Mk.	Bl.	Mk.	Bl.	Mk.						
1			8.1		13.9		1.0	.8										
2			3.3		9.3		1.0	6.9										
3			18.2					1.7										
4			8.8					13.7										
5			2.5					8.8		2.4								
6			32.3					3.0		4.0								
7			1.9		1.9		.5	1.0										
8							5.4	3.0										
9							10.0	.5										
10							2.9	8.2										
11							1.5	11.2										
12							8.2	7.4										
13							14.2	10.7										
14							15.2	2.1										
15	2.6		2.1				9.6	15.2				10.3						
16			6.4				6.7	4.5				2.4						
17			3.5				15.2	4.5										
18			3.1				15.1	1.6				.6						
19			11.8				15.1	3.4				2.0						
20							3.5	4.3										
21								3.8										
22			9.5		15.2		1.4	1.4										
23			15.2		13.8		.6	1.3										
24			6.9															
25			12.5															
26			27.3															
27			17.4															
28			13.4															
29			17.3															
30			13.3															
31			13.2				1.1											
32			13.6				7.2											
33			10.9															
34			7.0															
35			4.8															
36			2.5															
37			4.8															
38			25.4															
39			18.4															
40			16.4					1.5										
41	6.2		10.3															
42																		
	8.8		313.5		72.8		1.9	256.1		46.9		11.9	53.2	15.6		1.3	14.7	



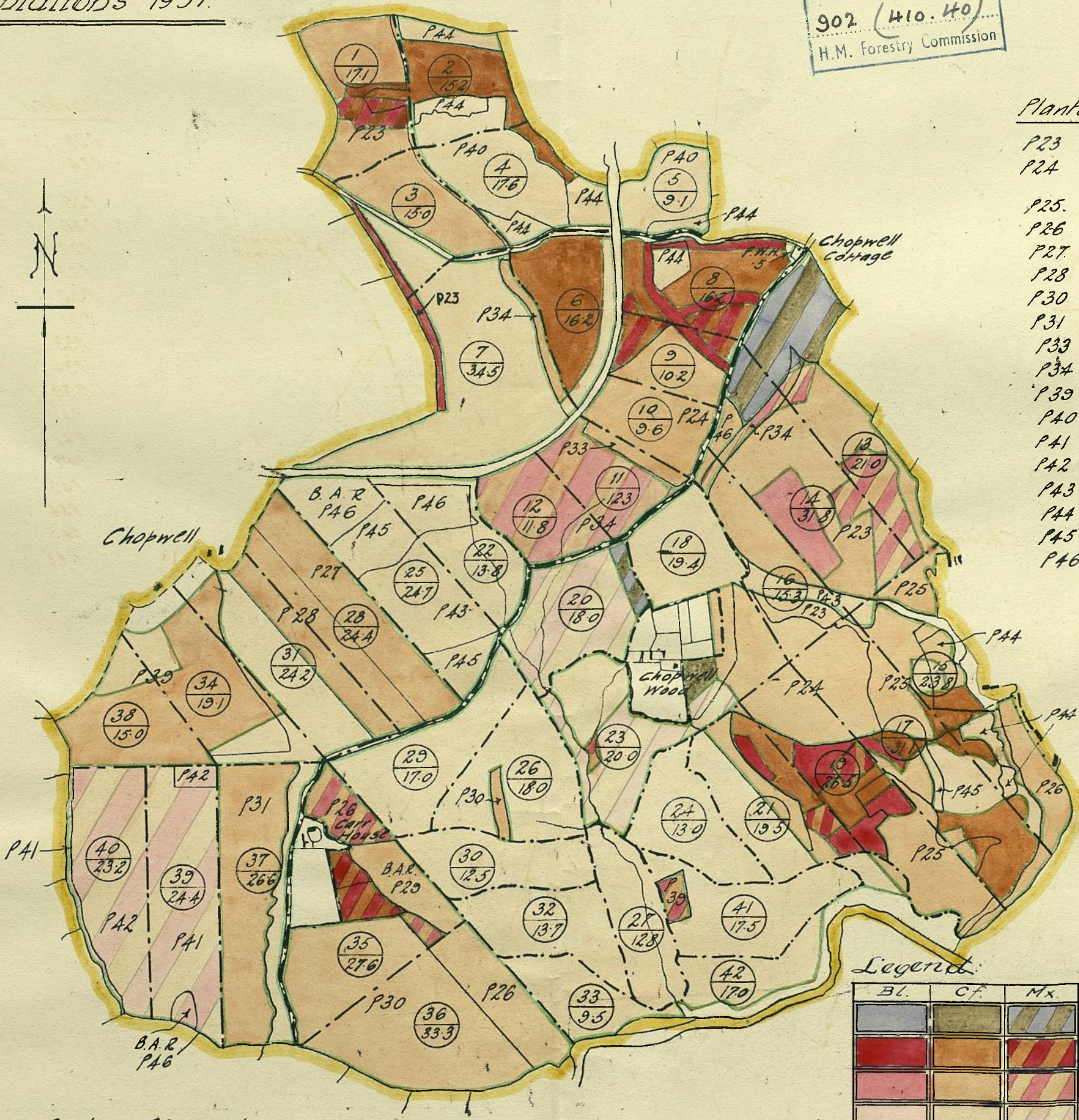
Chopwell

— CHOPWELL —

Plantations 1951.

Durham 5.

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Planted Areas.

P23	69.6 acs.	Planted prior to transfer from Crown Lands.
P24	40.3 "	
P25	27.3 "	
P26	27.4 "	5.5 acs Burnt R.P. P29.
P27	16.5 "	
P28	15.9 "	
P30	37.1 "	
P31	22.0 "	
P33	2.8 "	
P34	26.1 "	
P39	35.5 "	
P40	22.1 "	
P41	24.0 "	1.2 acs Burnt R.P. P46
P42	23.6 "	
P43	24.0 "	
P44	18.6 "	
P45	14.3 "	4.7 acs Burnt R.P. P45.
P46	9.4 "	

Legend:

	Forest boundary
	Plantations b-d

Legend:

Bl.	Cf.	Mx.	Plantations
			Before 1860
			1900-1919
			1920-1939
			1940-1951

Scale:- 6" = 1 Mile.

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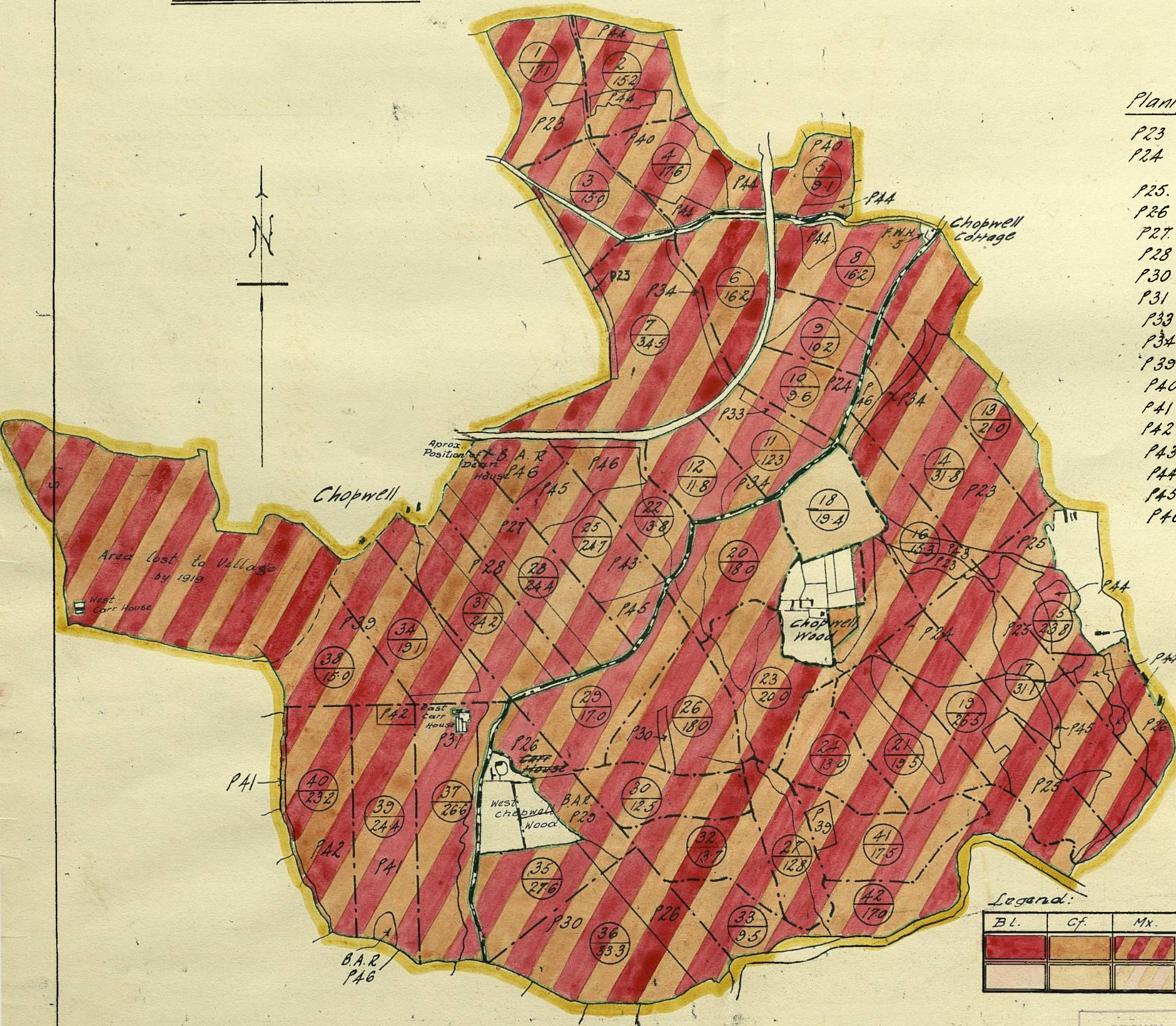
DATE: 26.7.1951.

INITIALS: T. Kerlyk

CHOPWELL.

Plantations 1899.

Durham 5.



Planted Areas.

P23	69.6 acs.	} Planted prior to Transfer from Crown Lands.
P24	40.3 "	
P25	27.3 "	
P26	27.4 "	} 5.5 acs Burnt R.P. P29.
P27	16.5 "	
P28	15.9 "	
P30	37.1 "	
P31	22.0 "	
P33	2.8 "	
P34	26.1 "	
P39	35.5 "	
P40	22.1 "	
P41	24.0 "	} 1.2 acs Burnt R.P. P46
P42	23.6 "	
P43	24.0 "	
P44	18.6 "	
P45	14.3 "	} 4.7 acs Burnt R.P. P46.
P46	9.4 "	

Legend:

	Forest boundary
	Plantations b-dy

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Legend:

Bl.	Cf.	Mx.	Plantations
			41-60 years (before 1860)
			1-20 years (1880-1899)

Scale: 6" = 1 Mile.

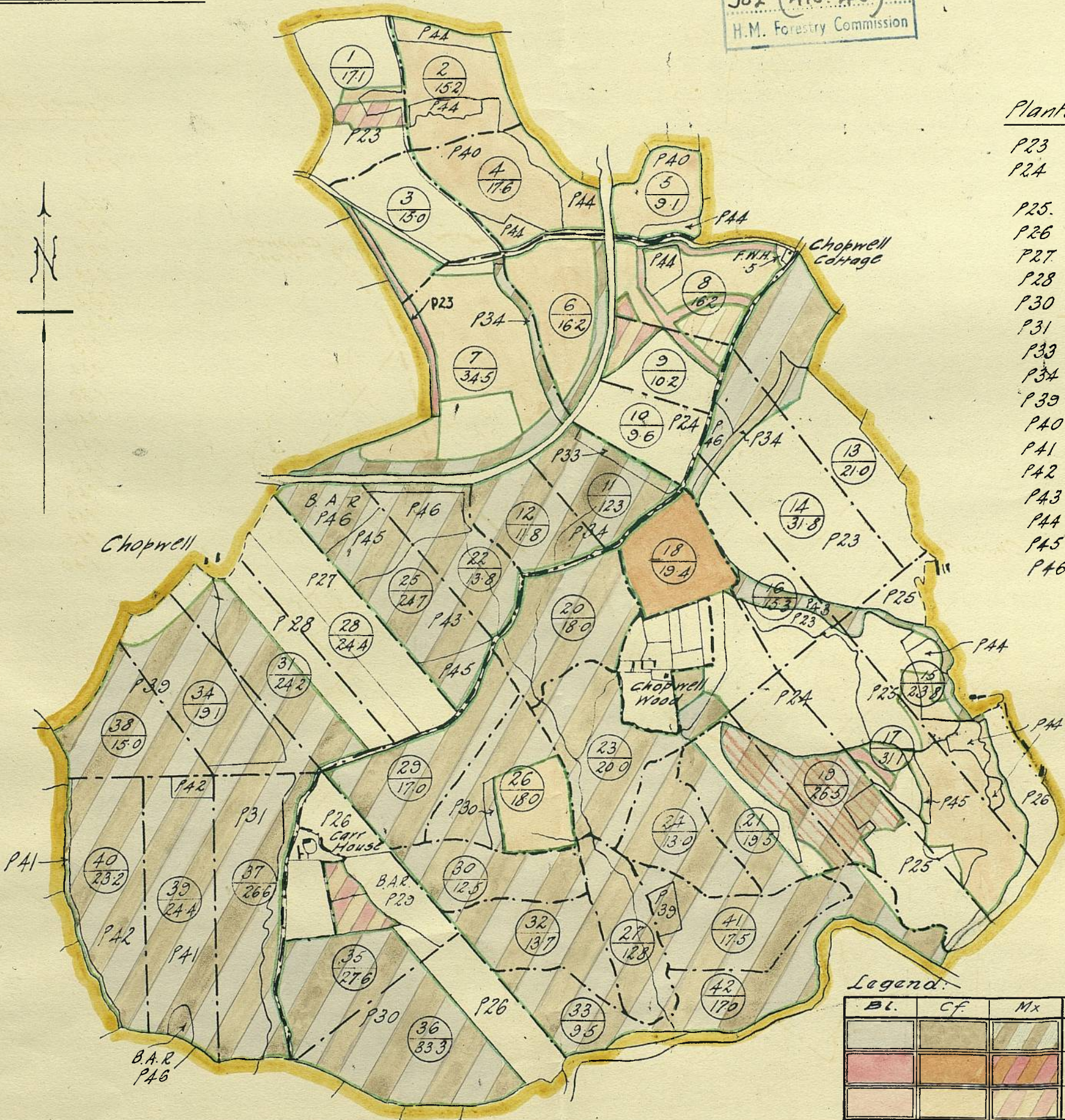
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INITIALS: T. Kudlyk
12.4.47.

CHOPWELL.

Plantations 1919.

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Durham 5.



Planted Areas.

P23	69.6 acs.	} Planted prior to transfer from Crown Lands
P24	40.3	
P25	27.3 "	
P26	27.4 "	5.5 acs Burnt R.P. P29
P27	16.5 "	
P28	15.9 "	
P30	37.1 "	
P31	22.0 "	
P33	2.8 "	
P34	26.1 "	
P39	35.5 "	
P40	22.1 "	
P41	24.0 "	12 acs Burnt R.P. P46
P42	23.6 "	
P43	24.0 "	
P44	18.6 "	
P45	14.3 "	4 acs Burnt R.P. P46
P46	9.4 "	

Legend:

	Forest boundary
	Plantations bdy
	Underplanted area

Legend:

Bl.	Cf.	Mx	Plantations
			Before 1880.
			1880-1899
			1900-1919

Scale: 6" = 1 Mile.

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N.E.E. CONSERVANCY.

DATE: 26.7.51

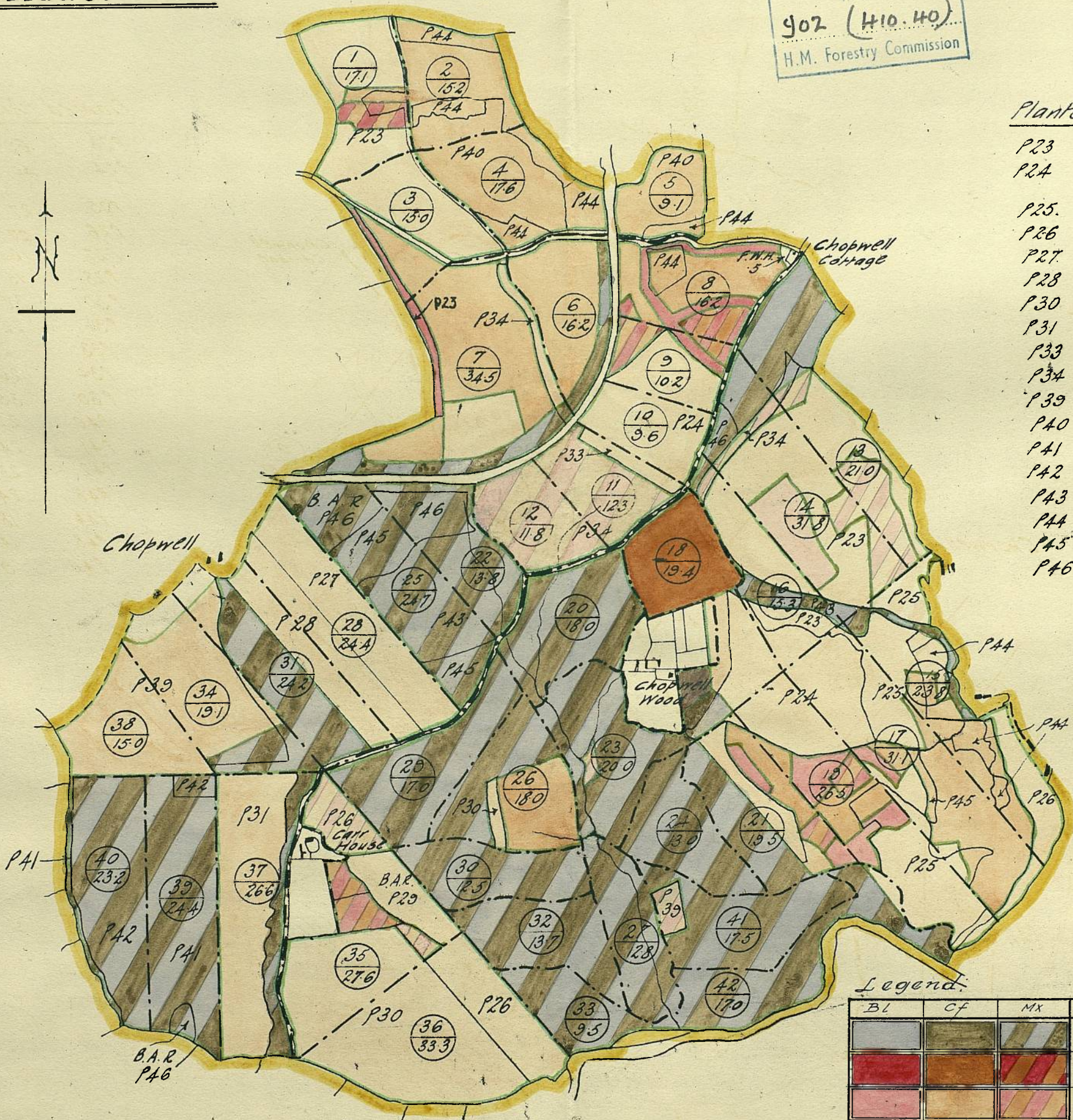
12.4.47.

INITIALS: T. Rudlyk

CHOPWELL.
Plantations 1939.

Durham 5.

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Planted Areas.

P23	69.6 acs.	} Planted prior to transfer from Crown Lands.
P24	40.3 "	
P25	27.3 "	
P26	27.4 "	5.5 acs. Burnt R.P. P29.
P27	16.5 "	
P28	15.9 "	
P30	37.1 "	
P31	22.0 "	
P33	2.8 "	
P34	26.1 "	
P39	35.5 "	
P40	22.1 "	
P41	24.0 "	1.2 acs. Burnt R.P. P46
P42	23.6 "	
P43	24.0 "	
P44	18.6 "	
P45	14.3 "	4.7 acs. Burnt R.P. P46.
P46	9.4 "	

Legend:

	Forest boundary
	Plantations b.d.

Legend:

Bl	Cf	Mx	Plantations
			Before 1860
			1880-99
			1900-19
			1920-39

Scale: 6" = 1 Mile.

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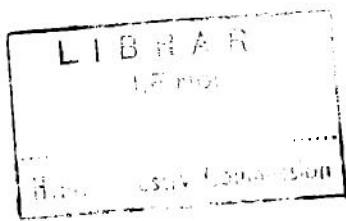
FORESTRY COMMISSION
N. E. E. CONSERVANCY 12.4.47.

DATE: 26.7.1951.

INITIALS: T. Hudlyb.

CHOPWELL FOREST

1908. Plantations.



JL Compt. 17.



*Ab. gr. Compt. 19.
Originally planted under larch.*

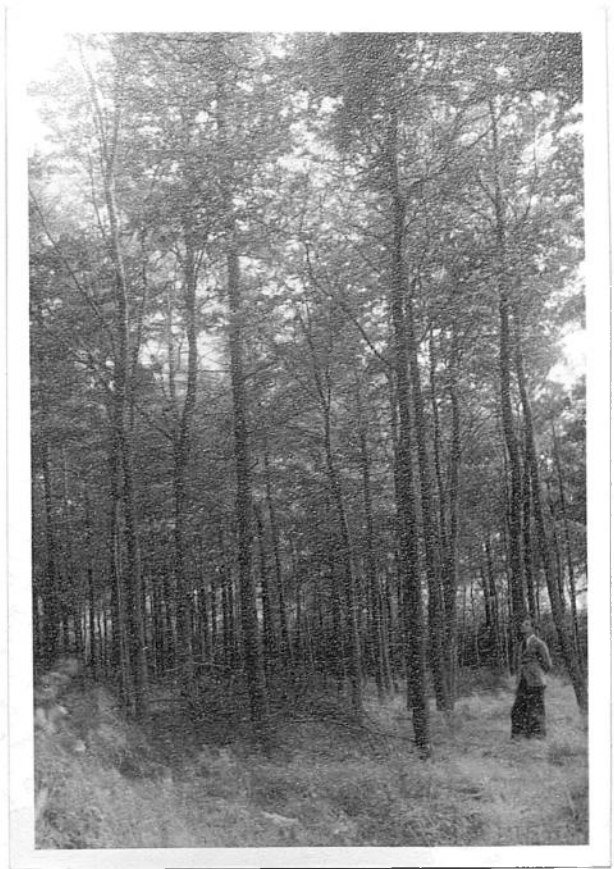


*DF Compt. 15.
In a sheltered valley*

October 1951.

CHOPWELL FOREST

1908, Plantations (cont'd).



*EL/Be P07, Compt. 35.
A new mixture recently
thinned.*

*Be P08, Compt. 17.
A small good patch.*



*SS P08 Compt. 19.
The oldest & best sitka.*

October 1951.

CHOPWELL FOREST

1912/13 Plantations



*CP Compt. 15.
Pruned about 1938/39.*



*SP Compt. 15.
A sandy ridge.*

October 1951

CHOPWELL FOREST

The middle twenties.



U. S. G. A. I.
S. P. 27
CHOPWELL FOREST

*SP P27. Compt. 28.
An exposed site.*



*SP P23. Compt. 16.
Behind the nursery.*



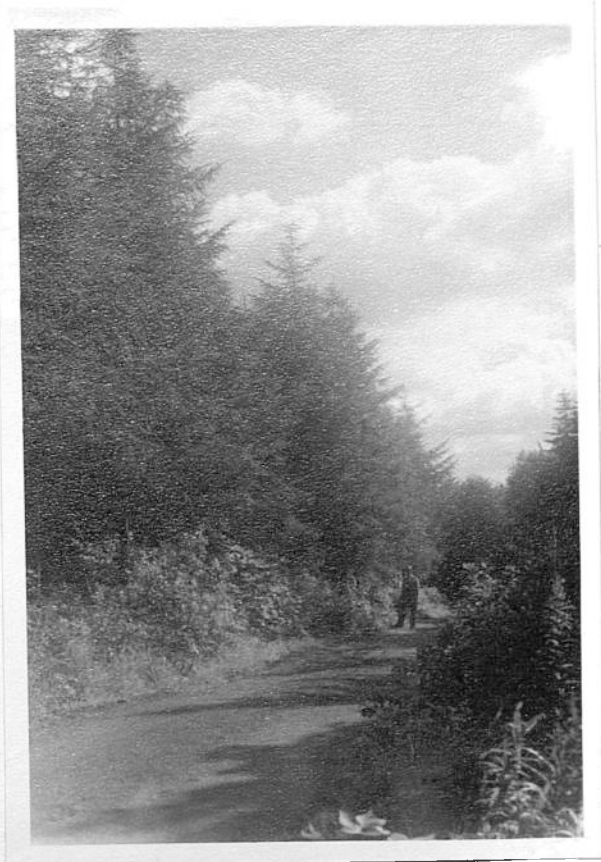
*SS. P27. Compt. 28.
A similar but less exposed site.*

October 1951.

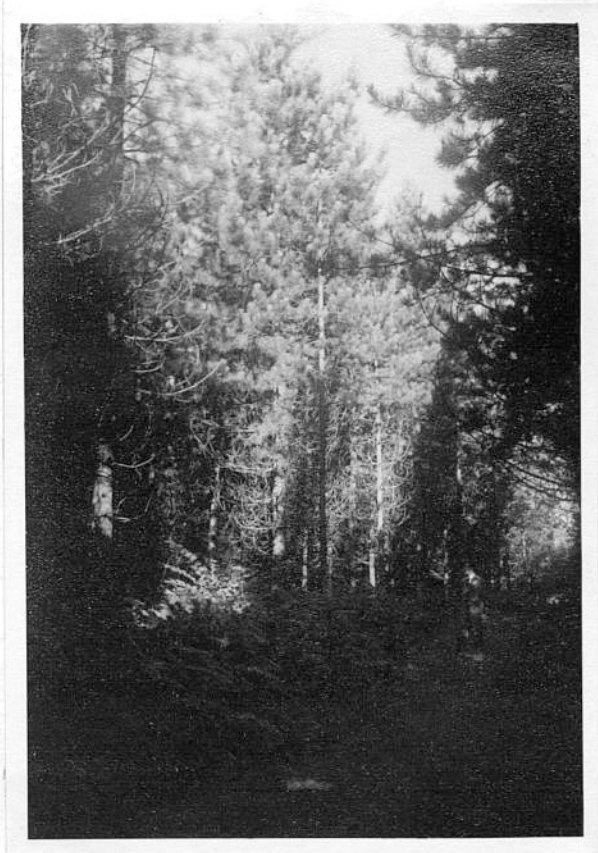
CHOPWELL FOREST

The middle twenties (cont'd).

LIB Y
LEJ
H.H. Forestry Commission



*SS P24. Compt. 19.
A fair average.*



*CP P23. Compt. 14.
A variable stand.*

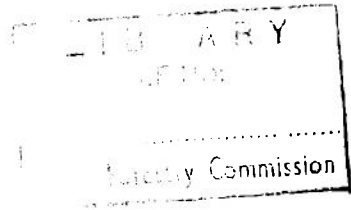


*JL P25. Compt. 15.
Replanting of a fire burning a CP plantat.*

October 1951.

CHOPWELL FOREST

Young Crops



*SS P45. Compt. 25.
Growing fast & clear of weeds.*



*JL P47. Compt. 16.
Large plants, a quick start
& fast growth.*



*JL P43. Compt. 22.
Still growing very fast.*



*CP P43. Compt. 25.
A slow start but steady growth.*

CHOPWELL FOREST

..... R Y
.....
.....
K. Forestry Commission



The nursery.



*EL/Be/Syc. etc. P58. Compt. 20.
The old crop.*

October 1951.

CHOPWELL FOREST
October 1951

1
1908 Plantations

- JL Compt. 17.
- Ab. Gr. Compt. 19.
- Originally planted under larch.
- DF Compt. 15.
- In a sheltered valley

2
1908 Plantations (cont'd)

- EL/Be P07. Compt. 35.
- A new mixture recently thinned.
- Be P08. Compt. 17
- A small good patch.
- SS P08 Compt. 19
- The oldest and best sitba.

3
1912/13 Plantations

- CP Compt. 15.
- Pruned about 1938/39.
- SP Compt. 15.
- A sandy ridge.

4
The middle twenties

- SP P27. Compt. 28.
- An exposed site.
- SP P23. Compt. 16.
- Behind the nursery.
- SS. P27. Compt. 28
- A similar but less exposed site.

5
The middle twenties (cont'd)

- SS P24. Compt. 19
- A fair average
- CP P23. Compt. 14.
- A variable stand.
- JL P25. Compt. 15.
- Replanting of a fire burning a CP plant.

6
Young crops

- SS P45. Compt. 25.
- Growing Fast & clear of weeds.
- JL P47. Compt. 16.
- Large plants a quick start & fast growth.
- JL p43. Compt. 22.
- Still growing very fast
- CP P43. Compt. 25.
- A slow start but steady growth.

7
The Nursery

- EL/Be/Syc. Etc. P58. Compt. 20.
- The old crop.

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WORKING PLAN

FOR

CHOPWELL WOODS

(WITH MAP.)

BY

J. F. ANNAND,

LECTURER IN FORESTRY.



LONDON AND NEWCASTLE-UPON-TYNE:
ANDREW REID & COMPANY, Limited, PRINTERS AND PUBLISHERS.

1908.

ARMSTRONG COLLEGE,
NEWCASTLE-UPON-TYNE.
(IN THE UNIVERSITY OF DURHAM.)

WORKING PLAN

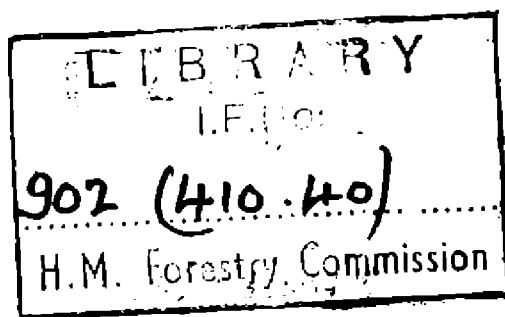
FOR

CHOPWELL WOODS.
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1908.

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Working Plan for Chopwell Woods.

SITUATION OF THE WOODS.

The Crown Woods of Chopwell are situated in the County of Durham. They lie within eight miles of the city of Newcastle-upon-Tyne and are about $2\frac{1}{2}$ miles distant from Rowlands Gill station on the Blackhill branch of the North Eastern Railway. The woods extend in a northerly direction from the banks of the River Derwent between Lintzford and the village of Blackhall Mill.

CONFIGURATION OF THE GROUND.

The range of altitude above sea level is from 180 feet at the south-east corner, near the River Derwent, to 720 feet at the extreme north-west boundary. There is very little steep ground, and not much of it flat, the woods generally occupying gently sloping ground. Except on a small portion at the edge of the river the ground is nowhere so steep as to occasion difficulties in connection with silvicultural operations.

* NOTE ON THE PAST HISTORY AND PRESENT CONDITION OF THE WOODS.

The Chopwell Woods, apparently more extensive in former times than now, formed part of the Manor of Chopwell, which in the twelfth century belonged to Durham Priory. After many vicissitudes they appear to have become vested in the Crown in the reign of Queen Elizabeth, on the attainder for treason of one John Swinburne. They were granted in that Queen's

* The Note on the Past History of Chopwell Woods is compiled chiefly from information supplied by H.M. Office of Woods and from an article contributed by W. H. Tomlinson, to Vol. 19 of the *Archaeologia Aeliana*, 1898 (A. Reid & Co., Ltd., Newcastle-upon-Tyne).

reign to Henry Knaggs, Winifreth Ward and Geo. Ward for the term of their natural lives, and subject to this grant were leased in Charles I.'s reign to Sir Henry Vane, to whom and his descendants renewed leases were granted down to 1812. The woods are of considerable antiquarian interest on account of their association with many of the Northern English strongholds and towns, and also with the British navy at an important period of its history.

During the sixteenth and seventeenth centuries, the woods supplied tanners in Newcastle with large quantities of bark for use in their business. Oak timber, used in repairing the "long" bridge at Berwick, in constructing piers for Berwick harbour, and in making gun carriages for the town walls, was also obtained from Chopwell; and ash timber for various purposes was also taken from the woods to Berwick, Chopwell being, according to the authorities, *the nearest place convenient!*

During the year 1635, Chopwell provided the greater part of the oak timber required for the building of the then famous battleship "The Sovereign of the Seas" (afterwards "The Royal Sovereign"). At first it was intended that the whole of the timber necessary should be drawn from this source, but when Phineas Pett, the great naval architect of the time, arrived, he found that the woods did not come up to his expectation, and accordingly made arrangements for supplementing the Chopwell supplies by getting 1,400 special trees from Brancepeth Wood where there was "excellent provision of long timber." Altogether, during the reign of the first King Charles and later, great quantities of timber appear to have been removed for various purposes and no evidence exists of any systematic attempts to make good the wastage by planting or otherwise. On the contrary, it appears that in or before the 18th century large areas were grubbed up and the land converted into agricultural estate. In 1801 the estate appears to have been divided into five farms with detached areas of woodland.

At about the last mentioned date, while oak timber was still the chief building material for the navy, one of the periodic scares as to a probable famine in navy timber spread over the country and some attention was again given to Chopwell Woods. On the renewal in 1812 of a lease of the estate, about 475 acres partly wood and partly arable or grass land were reserved for planting and this area was planted or re-planted between 1813 and 1815, presumably with oak. Of the area thus planted at this time, 100 acres consisted of "woodland and wet bog growing Alder, Birch and other wood peculiar to such land." About 1819 other portions of the estate were surrendered to the Crown and planted between 1820 and 1821, under the superintendence of one William Billington, who had previously had charge of the enclosing and planting of large areas of land in the Forest of Dean. It is not possible now to ascertain with any degree of accuracy what proportion of species other than oak was planted, but the presumption is that as the great demand was still for oak timber for the navy, little else was considered worth planting, and the importance of having a mixture with lightly-foliaged trees of some soil-improving species such as the beech would not then have been taken into account. Much of the land planted was probably too wet and sour for the successful growing of oaks. Evidence for this view is found in an account* given of the effects of a gale which occurred on what is traditionally known in the locality as "Windy Monday" (7th Jan., 1839), when it is stated upwards of 20,000 trees were uprooted in the woods. Deep-rooted wind-firm species like the oak are not likely to have been affected by the severest of gales, if the roots had found suitable soil conditions, especially in the leafless winter condition, and at the comparatively early age of 20 to 30 years as they must then have been. In any case, about 50 years ago, on the advice of Mr. James Brown, the cutting and clearing of the oak timber was commenced, and in the

* See Mr. Tomlinson's article in *Archaeologia Aeliana*.

course of five years or so, the greater part of it was cut over and removed. The ground was drained and the greater part replanted. It would appear from local reports, that the cutting of so large a quantity of oak timber—much of it young, if not inferior—had had the effect of glutting the market and a good deal of inferior timber, it is said, could not be disposed of. Probably on account of the high price which larch timber was then bringing in the market, practically the whole of the cleared ground was—also on the advice of Mr. Brown—replanted with larch. A little Scots pine had been used on the high-lying exposed parts and spruce to a very small extent in the bogs. If the poor, marshy, clayey portions of the woodlands were unsuitable for oaks, they unfortunately proved more so for the larches. A great many of them, especially in the frosty hollows, soon died off, leaving great portions of the ground unstocked except for the stool shoots of the oak and of the few other broadleaved species, such as ash, alder, birch and sycamore occurring naturally on the ground. Those shoots reduced to a single stem on each stool, and the surviving 50 years old larch, now constitute the crop on the greater part of the ground. The Scots pines, where they occur in little patches, are standing much too thinly on the ground, having suffered from the attacks of squirrels and probably also to some extent from gales and snow-break. A few small patches of the originally planted seedling oaks still survive. Both varieties of common oak, *Quercus pedunculata* and *Q. sessiliflora*, occur in the woods. With the exception of the larch, most of the trees now forming the crop, arising as they do from the stool shoots of the oak, etc., and standing widely apart, are rough, short-stemmed, low-crowned, and branchy, and the bulk of them certainly will not produce valuable timber.

In the stiff wet soils where very few of the larches have survived, large portions of the crop are mere scrub, having practically no market value, and they will scarcely pay the cost of clearing. A much better state of things, however, exists in the drier portions:

with fairly good loamy soils where a much larger proportion of the larches have succeeded. Here also the resultant trees from the old stools have done much better although they are not likely to form so valuable timber as hardwoods of seedling growth, but there can be no doubt whatever that the results would have been infinitely more satisfactory, if the larches had been mixed with some soil-improving, soil-protecting species. In exceptional small spots the crop for 50 years old larch is all that could be desired, but in these cases the larches are mixed with leafy trees such as beech and sycamore.

There is only one young plantation within the woods at present. It lies immediately to the north of the fields selected for nursery ground, and consists of Scots pine with a little larch. The extent is 9 acres or thereabouts, and the age of the plantation is 13 years. The plantation seems to have been set out with intervals of a little over 4 feet between the plants, on the "square" system; and on a part where the soil is pure sand, a good many larches have died out. Consequently the plantation is rather thin, but otherwise it is in very healthy condition, and gives promise of producing a useful timber crop. A few old stunted branchy hardwoods, the remnant of a former crop, are still on the ground, and will be removed, as they are injuring the young crop.

To summarise, it will be seen from the foregoing statement, that a great part of the area is at present covered with a comparatively young, but very irregular, and generally too thin crop, a large proportion of which consists of inferior timber. For several decades the fellings have only been of a casual nature, and hitherto there has been no attempt at a grading of age classes by means of clearing and restocking in fixed areas.

GEOLOGICAL FORMATION AND SOIL.

The underlying rocks consist chiefly of sandstones and shales of the coal measures, but only on exceptional spots do the rocks exercise any direct influence on the

surface soils. Those are for the most part lying on glacial deposits, and the consequence is, that they are extremely variable over the whole of the woods. Long ridges of deep sands or pebbly gravels are intermingled with stiff clay soils, clay loams, and sandy loams. Shallow deposits of peat over stiff clay are also met with in various localities in the woods.

CLIMATE.

The climate is that of the north-east of England. The woods are situated about 20 miles from the eastern seaboard but they do not suffer from east winds. The prevailing winds are from the west, north-west, and south-west, the most prevalent being south-west.

The rainfall averages probably about 29 or 30 inches. During winter the cold is often severe and snow lies for a considerable length of time on the colder stiff soils at the higher altitudes. Tree growth is somewhat slower than in other parts of the country where there is greater atmospheric humidity. Owing to the direction of the prevailing winds the smoke from the industrial centres on the Tyne does not materially affect tree-growth and the atmospheric conditions at present are sufficiently pure for the growth both of broad-leaved trees and of conifers.

Coal-mining operations under the woods interfere with the drainage of the land to a considerable extent, and in some cases the moisture is drained off to an injurious degree.

OBJECTS OF MANAGEMENT.

The main object in view is to make the most of the woods financially, without having any special regard to immediate, in preference to future, returns.

In a district where coal has been plentiful for centuries and where it has every appearance of continuing plentiful for many years to come, timber fit only for fuel has at the present time no market value. Consequently, no matter what the kind or species of timber grown, it must be straight, clean, free from knots, of

fairly even growth, comparatively cylindrical and generally of good quality in order to command a ready sale. Those requirements as to quality will apply whether the produce to be disposed of is in the form of small-sized pit timber or matured logs of larger growth. There is every likelihood that in this district, there will be an increasing demand in the future for high class timber, and it appears just as certain that as in the past, so in the immediate future at any rate, there will practically be no demand at all for rough timber of low technical value.

The objects of management therefore should be:—

- (1) To bring the wooded area into such a condition as to produce the largest possible out-turn of clean, straight, well-grown timber of the highest technical value, such as will be likely to command the best and readiest market;
- (2) At the same time to introduce such conditions as will not only protect the soil from further deterioration, but will also improve its fertility;
- (3) Incidentally, and in consequence of the first two objects being attained, to provide for students of forestry a demonstration area to show how forestry may be practised to the best advantage on economic lines.

AREA OF THE WOODS, AND SCHEME PROPOSED FOR WORK IN THE IMMEDIATE FUTURE.

The total area of the woods, within the boundaries as at present defined, is 930 acres or thereabouts, per ordnance survey measure. From this area there fall to be deducted, public roads, colliery railways, sites for colliery cottages and buildings belonging to the woods; grass paddocks, tree nursery ground, and certain steep and inaccessible parts on the banks of the River Derwent; and the area which would fall to be treated under the Scheme of Management, would be 872 acres or thereabouts. Later on, when the working of the coal

from underneath the woods is completed, certain portions now used for colliery purposes may again become available as forestry ground.

The public road, running in a south-westerly direction from Hookergate by Carr House to Blackhall Mill, divides the woods naturally into two main divisions, namely:—

- (1) North or North-West Division containing (after deductions made as above) 456 acres or thereabouts;
- (2) South or South-East Division containing (after deductions made as above) 416 acres or thereabouts.

It is proposed to deal with the woods by commencing at once the clearing and replanting of the worst portions of the area. The North-West Division contains the largest proportion of inferior timber (chiefly stunted oak, sycamore, and birch); and 197 acres of this will be cleared and restocked during the next 20 years. During the same period it is proposed to deal in a similar manner with 125 acres of the South-East Division. This gives an average annual cut of 9·85 acres in the North Division and 6·25 acres in the South; but as it is likely to be the most profitable way of dealing with the present crop to endeavour to market it in moderately large quantities at one centre each year the fellings (see Appendix A, page 28) will be arranged accordingly. This will be the most economical method of dealing with the restocking also, should it unhappily be found necessary to fence against rabbits. The series of fellings shown on the accompanying map are arranged so that the work will proceed in a westerly direction against the prevailing winds. An exception has had to be made in certain cases, where there are blank or practically blank portions in the interior of the woods. These, of course, must be stocked immediately. Wind-firm species will also be planted on the exposed margins of these portions, and other precautionary measures will

have to be taken if large clearings have to be made in the vicinity later on. By 1927, 322 acres of the wooded area (197 acres in the North Division, 125 in the South) it is proposed will be covered with young plantings, ranging from 20 years old to 1 year old.

The foregoing proposals have been made with a steady view to the immediate needs of the woods, and it is hoped that they will come within the present financial arrangements. At the end of 10 years, when the worst portions of the woods will probably have been overtaken, this scheme may have to be revised, and some modification may be necessary in the direction of a somewhat more rapid clearing and restocking, in which case the present financial arrangements may also have to be modified.

For present purposes, no detailed records of former income and expenditure for any defined portions of the woods are available.

It will be gathered from the details of the present condition of the crops that no good purpose would meantime be served by making detailed measurements of the volume of timber on the ground, nor would the measurement of any sample areas, which could be selected, give any reliable data on which to base an estimate of a likely future yield from areas fully stocked with suitable species of seedling growth. As a matter of fact, the series of fellings suggested for the next decade will be confined to the clearing either of areas in most cases almost entirely covered with poor, scrubby, ill-conditioned, over-grown coppice (oak and other species) of extremely little market value, or, at the best, of areas only partially covered with normally-grown timber trees. The present proposals for a felling series for the immediate future are based, therefore, on considerations of *area only*, and not on what, under ordinary circumstances, would be the proper method, namely, *area plus growing stock*. It may be of interest to mention, however, that sample areas of larch, Scots pine, and Corsican pine, measured in private woods in the locality on similar soils, have given the following results per

acre (quarter-girth measurement), exclusive of thinnings for which there are no records:—

Species.	Age in Years.	Volume in cubic feet.	Annual Production (cubic feet).
Larch	80	5,520	= 69
Scots pine	30	1,680	= 56
Do.	45	2,610	= 58
Corsican pine	47	3,196	= 68
Scots pine	95	7,220	= 76

No local measurements for broad-leaved species (ash, sycamore, oak, etc.) are at present available. In Chopwell, two measured plots of larch mixed with stool-shoot hardwoods in some of the better-stocked ground outside the proposed felling areas gave the following results per acre:—

No. 1	Volume.		Annual Production.
	1,950 cubic feet	=	39 cubic feet.
No. 2	2,300 cubic feet	=	42 cubic feet.

The age of these two stands is 50 years. Neither is fully stocked, but they are typical of some of the best parts of the woods where the larch has succeeded fairly well.

There appears to be no reason therefore why, with more fully stocked areas, paying crops, largely of coniferous timber, should not be produced on the ground. On the table (Appendix A), accompanying coloured map showing the woods, there is indicated the felling and restocking series proposed for next ten years. If practicable, the felling on the various areas will proceed one full season in advance of the restocking. As pines are practically non-existent in these areas there will not be much fear of severe attacks from weevils or beetles on the newly planted trees, although in arranging the fellings possible future danger from insect attacks has been kept in view.

SPECIES TO BE USED FOR RESTOCKING THE WOODS.

The new crops will largely be made up of coniferous species. Under existing conditions it does not seem likely that a paying crop of oak could be produced on the ground, and except in certain better soils near Carr House, it is not proposed to use oak. It could be profitably used there to a small extent, and it is proposed also to use oak and ash with beech in the small field to be planted up near Carr House. This field may have been somewhat heavily manured, and conifers, especially pines, might in consequence rather have a predisposition to disease if set out there, but larch will be used in the temporary mixture to protect the beech.

Where beeches occur in the woods they have done well and it is proposed to use them to a considerable extent if only for the purpose of assisting to bring the soil into more fertile condition, but in any case they grow more freely than spruce and they would produce in Chopwell a larger volume per acre than spruce. Per unit of bulk, even the rough branchy beech has at present, in this locality, as high a market value as spruce. The most readily-marketable timber is the larch, but it would only be courting failure to attempt to grow this species where neither soil nor situation are congenial, and a full crop of well-grown Corsican or Scots pines would no doubt give much better returns than less than half a crop of poorly-developed, diseased larch. It is proposed, therefore, to use larch only on the best naturally-drained loamy soils, and nowhere in the woods is it proposed to plant it as a pure crop. Very good individual larch trees occur in the woods and also good pure clumps. Along with beech in carefully-selected sites it can no doubt be used quite profitably. A small proportion of larch may also be used in mixture with Corsican pine.

Scots pine will be the most suitable species to use in the poorest soils in the woods, and in particular for the pure sands and gravels this species will be used along with a small proportion of black pines.

Corsican pine will be used to a fairly large extent on the Northern Division of the woods.

Spruce does not succeed particularly well, and it usually attains its maximum development here by the time it reaches 50 years. Spruces therefore will be used only to a very limited extent, in moist, peaty hollows, and such like places. Mining operations underneath sometimes dry up what would otherwise be a moist or even wet soil, and in cases like these the spruce often fails. A little of the Weymouth-pine or Scots pine might be useful to mix with the spruce in such exceptional cases. Sitka spruce is likely to give better results than common spruce, and will be used along with the latter species.

Douglas fir in the good loamy soils in shelter will probably give as large monetary returns as anything else that could be planted, but its use should be confined entirely to sheltered hollows.

Ash and sycamore of seedling growth both attain to useful dimensions in the woods.

Since the rabbits have to a large extent been put down, natural seedling growth is beginning to show to a certain extent in places where the surface soil conditions provide a suitable seed bed. Ash seedlings are springing up to a moderate extent, and sycamore in greater quantity. In the good soils ash seedlings especially should be encouraged, and it should be possible to reduce expenditure somewhat by utilizing well-grown clumps of natural ash seedlings in the course of restocking the woods. To a less extent the sycamore also might be used in a similar way, but this will not apply in the case of most of the clearings to be made in the immediate future, because in these there are generally no suitable parent trees, nor are the soil conditions such as would permit of seedling growth, owing to the very rank growth of coarse grasses and weeds.

Birch comes up naturally everywhere where there is any bare soil. It occurs in some instances to the extent of being almost a weed, and in newly-formed plantations it no doubt will give a certain amount of

trouble before it can be suppressed by the planted crop. Natural birch will be useful for the temporary stocking of small bare patches which cannot immediately be dealt with along with the ordinary clearings. This tree, however, does not attain to large dimensions in the woods. The sweet chestnut grows very freely in the woods but it is so liable to "ring shakes" in the north of England that it could not be relied upon for general planting.

Regarding the extent to which the various species should be used in the crop, as large pure groups as the variable nature of the soil will admit of should be formed. An exception to this rule will be made in cases where larch can with safety be planted, as it would not be desirable to have any considerable breadth of pure larch.

SIZE OF PLANTS TO BE USED AND PLANTING DISTANCES.

Over a considerable proportion of the ground to be restocked in the immediate future, there is (owing to the thinness and general nature of the crop) a rank growth of coarse grasses and other weeds, and it will be impossible to avoid using fairly large transplants, in some cases 3 years old, but in most cases 4 years old, for the plantings. There is no local demand for very small thinnings, and as wages in the locality are high, it does not seem desirable to have too close planting. Larch and beech set out at 4 feet by 4 feet on a system of squares or about 2,720 per acre, should on the whole give the best results. Corsican pine could be set out at 3 feet 6 inches to 4 feet apart. Scots pine and spruce might be set out at 3 feet 6 inches apart, and Douglas fir at 4 feet apart if large transplantings have to be used, and 3 feet 6 inches apart if seedlings or small transplants are used. Ash will be set out in groups in some of the best soils, but, as has already been stated, good natural growth of ash and sycamore will be encouraged and taken advantage of, thus often obviating the necessity of planting these species. If premature thinning of the

young crops is avoided, the above stocking should be quite ample, having in view sufficiently early formation of canopy, the proper protection of the soil, early suppression of branches and the production of good quality of timber.

As regards methods of planting, the same reasons which preclude the use of seedlings or quite small transplants also prevent the simplest and most expeditious methods of planting, such as by dibbling or notching with hand iron or pointed planting spade, being in general adopted. In the looser soils with less rank surface growth the hand-planting iron has, however, been quite successfully used this season. In every case the cheapest methods consistent with efficiency will be adopted.

TREATMENT OF THE BETTER PORTIONS OUTSIDE THE PROPOSED FELLING AREAS FOR THE NEXT TWENTY YEARS.

These sections are somewhat more fully stocked, carry more larch, and are generally in better condition. It is doubtful, however, whether their present condition would warrant expenditure in attempts to improve them by underplanting except in certain restricted areas. To have been really useful and profitable, the work of under-planting the larches should have been commenced perhaps 20 years earlier, and judging from the general average appearance of the crops at present it is to be feared that before the undercrop could have much market value the larches would have begun to suffer from the various heart rots by which they are liable to be attacked. In certain small restricted areas of the best portions, however, in particular towards the southern and western boundaries, where the position of the ground is such that the trees would not be isolated and exposed to gales in the course of the working of the general felling scheme later on, underplanting would be advantageous. Inferior, or branchy, or faulty trees would be freely thinned out from the sections to be thus treated. The species most useful for

this work, and most suitable for the soil, would probably be found to be such as beech, or Douglas fir, or some of the silver firs.

Some of the best boles of oak and other broad-leaved species would benefit by pruning, especially of the dead branches. The best of the larches might also have their dead branches removed. This work on the larches could be done at very little cost as their brittle branches could be knocked off to a considerable height by means of a fairly heavy pole. A woodman accustomed to the work could trim a large number of trees in this way in the course of a day, and where the trees are in a healthy growing condition, this work would no doubt pay quite well. Under the more dense system of culture in the new crops, practically no pruning will be required.

In the present open condition of the woods no large returns can be expected from thinnings to be made outside the area to be cleared and felled, as these would not only be at the expense of the final yield of timber, but would further tend to deterioration of the soil, and the overhead leafy covering should be preserved as far as practicable. The thinnings for the next decade, except where under-planting is to be done, should therefore be confined to the felling of dead or moribund trees, and to the removal of an occasional rough branchy tree or a "whipper" interfering unduly with the crown of a specially good larch. For the purpose of regulating even those light thinnings, the woods within the above areas should be divided into about equal portions so as to overtake the thinnings twice during a decade.

TREE NURSERY.

A tree nursery, for raising young stock for re-planting, has been established in a central position in the woods adjoining the new buildings. It occupies an open, fully-exposed site at about 450 feet altitude, and should produce healthy robust stock.

MARKET FOR THE TIMBER IN THE DISTRICT.

As the woods are situated in the middle of a coal district, the timber has no market value as fuel. Fairly large-sized really good oak can still be sold at good prices, but inferior oak is difficult to dispose of. Good ash is scarce, and always commands a ready sale. Oak bark does not bring a price sufficient to do more than cover expenses. Beech, if of good quality, commands a fair price, and at present even fairly rough beech can be sold at any rate at as high a price as spruce. Amongst conifers larch is the leading tree as regards price per unit of volume, but properly-grown pine timber should approach much nearer to larch prices than the material at present turned out. The prices of pit timber are keenly cut, owing to the cheap rate at which Scandinavian timber can be brought to the Tyne. The pitmen in any case prefer the light, easily-handled, clean-grown, imported material to the rough, clumsy, tapering stuff produced at home, but with the market near at hand there is no apparent reason why *properly-grown* coniferous timber produced under a system of more dense culture, should not successfully compete with imported timber. Besides, with gradually-diminishing supplies all over the world it is not at all likely that the present abundant supplies from abroad, even of small pit timber, can be continued indefinitely. Sound, clean-grown, full-wooded, lengthy boles (especially in the case of conifers), are fairly certain to meet a ready sale at enhanced prices in the near future, but there seems to be no place in the market in this locality for rough, inferior timber.

ROTATION PERIOD.

The new crops will be largely conifers and although it may perhaps be considered premature to prescribe arbitrarily the period of rotation in the meantime, it may be stated that the crops in the North Division, which contains the largest proportion of poor soils, will probably reach their financial maturity at 60 years,

whilst those on the South Division with better soils could probably be carried more profitably to 80 years. In exceptionally good parts the rotation might be still further prolonged. Assuming, therefore, the various grades of soils over the whole of the Northern Division are likely to be about equally productive, the annual fall in the North Division with a rotation of 60 years would extend over an area of about 7·60 acres, and on a similar assumption regarding the soils of the Southern Division, the fall there, with a rotation of 80 years, would extend over 5·20 acres, but it will readily be understood that, with a comparatively young block of woodland and with the crop in the condition in which it now is, a normal series of age classes could not be got at during the course of one rotation. This object should, however, be kept steadily in view, as it must tend to the attainment to the fullest extent of the objects of management. The underplanting of certain selected parts towards the southern and western boundaries, where the larches are likely to continue sound and in healthy growing condition, would, by assisting to extend profitably the life of parts of the present crop, be a further step in this direction.

INCOME AND EXPENDITURE.

Owing to the earlier of the proposed clearings being on practically unproductive ground, and owing also to the necessity of very much restricting the thinnings on the better portions of the woods, the revenue from the sales of timber will be small for some years, but it will gradually increase as the clearings are advanced to where there is better and more saleable material, and at the same time the growing stock must be rapidly increasing in value.

Ten acres of the scrub cleared during the past season only realised about £7 10s. an acre.

Any income from other sources (for cottage rents, sand, etc.) is not taken note of here.

The annual amount at present to be expended on the upkeep of the woods had already been fixed before the foregoing proposals were drawn out.

It is estimated the cost per acre for replanting will vary from £3 10s. to £5 10s. according to the size of plants and the amount of surface soil preparation necessary. Any estimate of the final and complete yield from the new crops would have to be based very largely on assumption and would be valued accordingly, but this much can be stated. The production of full crops of timber will be aimed at. These crops should *at least equal* the best of the measured sample plots of the somewhat incomplete crops in the neighbourhood, of which the particulars are given at page 14. In other words, the yield should at least be equivalent to an annual production of from 60 to 80 cubic feet. This would yield a good profit, even at present prices, if reasonable economy is practised in the production of the crop. With the enhanced prices which may reasonably be anticipated, the financial results would, of course, be better.

ROADS.

Two public roads maintained by the local authorities are carried through the woods. One of these roads is at present in a bad state of repair, and it is to be hoped the authorities will do something to improve it. All the other roads leading through various parts of the woods are kept in repair by the staff of the woods. Unfortunately, none of these latter roads are macadamized, and during wet weather they are difficult to keep in condition, if any considerable amount of traffic takes place. Any large expenditure on road making would not be advisable in the present state of the woods. Much can be done, however, to keep them passable and dry on the surface by regular periodic clearings of the water courses alongside.

CONTROL BOOKS.

The keeping of records and statistics for future reference in connection with the working of the woods will at once be commenced.

An accurate account of all the operations should be kept so as to accumulate information for the preparation of future working plans. The amount realized for thinnings and for the material on each annual cut should be recorded, and after the first three or four seasons' fellings, when the worst of the scrub has been removed, and the ground at present bare is planted, record should be kept also of the price realized for the timber per unit of measurement (lineal or solid). Such record would have a certain value, even although the timber to be dealt with at present is not of first rate quality.

In particular, details of the area planted each year, and the cost of all the operations connected with the planting, should be carefully kept. All unnecessary expenditure should be strictly avoided and with the help of careful records of each year's costs, economies may often be effected in the future.

FENCES.

All the fences alongside the public roads running through the woods have to be kept in repair by the woodmen. A share of the upkeep of boundary fences also falls to be charged against the woods. The fences consist partly of thorn hedges, partly of posts and rails, and partly of posts and wire. The thorn hedges generally are not in good condition. They are chiefly planted on raised banks, and they have suffered a good deal from the attacks of *aphides* and species of *psyllidae*. Where fences have to be renewed or new ones formed, wooden posts and wire will be chiefly used. It is hoped that it will soon be unnecessary to use wire netting for the new plantings, but it is not considered safe meanwhile to entirely cease using it. Rabbits come in from the neighbouring properties and there is no remedy for this except to fence against them.

WIND MANTLES.

Wind mantles or shelter strips, largely of wind-firm trees, like sycamore and beech, should be maintained

permanently on the extreme margins, and on all specially prominent or exposed parts in the woods. With this object in view certain outside strips and clumps at present thinly stocked with lightly-foliaged species would be under-planted with beech.

INJURIES TO WHICH THE CROPS ARE LIABLE.

Fires.—Danger from fires is chiefly to be apprehended in the neighbourhood of the colliery railway which runs through the North Division of the woods. Some small fires have occurred alongside this railway and precautionary measures will have to be taken to prevent a recurrence.

Snow.—In some years the snowfall has been heavy, and the Scots pines have suffered to a certain extent from snow-break.

Wind.—There has been a certain amount of windfall where spruce is growing and precautionary measures already indicated (wind mantles and shelter belts, etc.) will have to be taken against future damage.

Frost.—Spring frosts do a considerable amount of damage in the low-lying hollows, and the killing off of the larch in such places has no doubt largely been due to this cause.

FUNGOUS DISEASES.

Canker on the stems of oak (caused by *Nectria ditissima* and also by a species of *Stereum*) is common, especially where the environment is unsuitable, but the ash is wonderfully free from disease.

The larch canker (*Dasyscypha calycina*) is prevalent in most parts of the woods, but it is not quite clear that the wholesale killing off of the young larch trees, less than half a century ago, was due to the attacks of this fungus. The rot in spruce and larch caused by *Trametes radiciperda* also occurs, especially in the larch

stems on the dry sandy ridges. It is possible that the honey fungus (*Agaricus melleus*) may give some trouble in the coniferous crops following hardwoods.

A species of *Stereum* is parasitic on the wych elms.

INJURIOUS INSECTS, MAMMALS AND BIRDS.

The caterpillars of the Oak Tortrix (*Tortrix viridana*) frequently strip the oaks (*Quercus sessiliflora* excepted) of their entire foliage.

The pine beetle (*Hylesinus* (*Hylurgus*) *piniperda*) is also present in the woods, and a more prompt clearing than hitherto should take place of dying or newly-cut stems of Scots pine, in order to prevent this pest from establishing itself to any injurious extent. *Polydrusus micans*, a beetle often found feeding on the foliage of birch and beech, does a certain amount of damage by feeding on the buds of newly planted out larch, Douglas fir, pine and beech.

Cockchafer grubs and wireworms have done a small amount of damage in the tree nursery, and steps have now been taken to have them exterminated.

Aphides (*Chermes abietis* and *Chermes laricis*) are prevalent in the woods wherever spruce and larch occur, and for this, amongst other reasons, in future crops, beech and larch will be planted together in preference to spruce and larch. The Larch Mining Moth (*Coleophora laricella*) is another insect enemy which the larch has to contend with here. The large larch sawfly (*Nematus Ericksoni*) has also been found in the woods, but it is not common. The Beech Felted Coccus (*Cryptococcus fagi*) occurs occasionally on beeches, especially on those which have been damaged by rabbits.

Rabbits have in the past done a great deal of damage to the broad-leaved species, and they have contributed in no small degree to a reduction in value of the crop of timber. Ash, sycamore and beech have suffered most. Some have been killed outright, and others much crippled. Where the beech have been much damaged by rabbits, an attack of the felted coccus on the stem has

occurred. The rabbits are now so far reduced in numbers that natural seedling growth of pine, ash, sycamore, and other trees are beginning to show themselves wherever the surface soil conditions admit of the germination of seeds. Even after the rabbits are entirely cleared out there will be a danger of their getting in again from the surrounding estates.

Squirrels have also caused damage in the woods both to pine and larch and they formerly devoured practically all the tree seeds. Their numbers are now much reduced, however, and they should not be permitted to increase.

Woodpeckers are fairly plentiful in the woods and they cannot quite be classed as harmless birds. They may do good by destroying various insects (which may, however, not be very injurious forest insects), but there seems to be no doubt that they tear off the bark and hollow out holes in really sound parts of tree stems and thereby cause rot and deterioration of the timber. The trees they prefer in Chopwell are the sweet chestnut, the oak, and the Scots pine. At the same time unless their numbers increase very much, it does not seem necessary to adopt any special measures against them.

ARBORETUM.

The small field to the north of the new buildings and adjoining the tree nursery (No. 232 on the 25-inch Ordnance Map) is now a good deal cut up with roads, etc. It could not very well be entirely planted up without closing in the houses too much, and it will be best utilized by partly planting it up in small groups of various genera and species of trees arranged as far as practicable according to natural orders and sub-orders, etc. This will be very useful for teaching purposes.

EXPERIMENTAL PLOTS.

A few acres will be set aside for experimental tree-planting. The plots will be selected at various points in the woods but will be arranged so as not to interfere at

all with the working scheme for the production of commercial timber, etc., as set forth under *Objects of Management*.

They will be used for such purposes as the following, namely:—

- (1) To test untried species likely to prove useful as timber trees in this neighbourhood when treated under ordinary forest conditions;
- (2) To test the relative advantages and disadvantages of various silvicultural mixtures;
- (3) To test the effects of various degrees of density in planting;
- (4) To test the effects of various methods of thinning.

Certain of those experiments, as for example No. 4, could not, of course, be fully carried out for a good many years.

It should be clearly understood that the experimental work, although going on alongside the ordinary forestry operations, will be work quite apart and will not be allowed to interfere at all with the main objects of management.

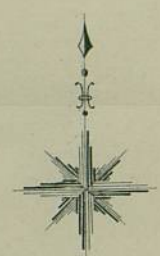
APPENDIX A.—TABLE I.




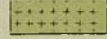
FELLING SERIES SUGGESTED FOR TEN YEARS.

Year.	Number on Map.	Division or Working Circle.	Areas (North) in Acres.	Areas (South) in Acres.	Total Areas in Acres.
1907-08	{ I. <i>a</i>	South		3·846	} 14·346
	{ I. <i>b</i>	do.	...	10·500	
1908-09	{ II. <i>a</i>	North	9·016		} 14·416
	{ II. <i>b</i>	do.	5·400		
1909-10	III.	do.	15·450	...	15·450
1910-11	{ IV. <i>a</i>	South		11·990	} 15·240
	{ IV. <i>b</i>	do.	...	3·250	
1911-12	V.	North	17·380	...	17·380
1912-13	VI.	South	...	17·160	17·160
1913-14	VII.	North	16·250		16·250
1914-15	VIII.	do.	18·000		18·000
1915-16	IX.	South		15·600	15·600
1916-17	X.	North	18·130		18·130
Total fellings during 10 years			99·626	62·346	161·972

NOTE.—The above statement of areas was prepared from measurements made on the 25-inch ordnance sheets (corrected by planimeter tracings) and the areas may not be absolutely correct.

MAP OF CHOPWELL WOODS (COLOURED GREEN).



-  GROUND, N.W. DIVISION, TO BE REPLANTED DURING 20 YEARS.
-  Do. S.E. " " " " " "
-  Do. N.W. OUTSIDE, 20 YEARS FELLING SERIES.
-  Do. S.E. " " " " " "

I., II., &c. INDICATE ORDER OF PROPOSED CLEARINGS.

FOR STATEMENT OF AREAS, SEE PAGES 11 & 28.



SCALE. SIX INCHES TO ONE MILE.

FEET 1000 500 0 1000 2000 3000 4000 5000 5280 FEET

