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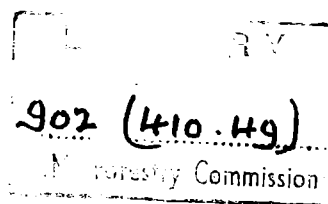
HISTORY  
OF  
**BARDNEY**

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HISTORY

of

BARDNEY

FOREST

1932 - 1951

EAST (ENGLAND) CONSERVANCY

# HISTORY OF BARDNEY FOREST

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## HISTORY OF BARDNEY FOREST

(As at November 1951)

### GENERAL DESCRIPTION OF THE FOREST

#### Situation

Bardney Forest lies in south-eastern Lindsey, North Lincolnshire. It is at present made up of eleven separate blocks spread over an area of about 15 miles, by 10 miles between the small country towns of Wragby (North) Bardney (South-west) and Woodhall (South-east).

Bardney, near which the Forester in charge has his headquarters and which gives the unit its name, is about 9 miles due east of Lincoln, on the north bank of the river Witham.

#### Area and Utilization

##### Existing Forestry Commission Property

The land comprising the present Bardney Unit was acquired under ten separate conveyances, all dating from 1932 to 1939. The total land acquired, all of it outright purchase, amounted to 2845.5 acres, of which 76.0 acres has been transferred to the Ministry of Agriculture.

At the time acquired, the land utilization was as follows:-

1. Acquired plantations	-	293.4	acs
2. Felled or derelict woodland	-	1421.3	acs
3. Bare heath and heath-scrub	-	233.1	acs
4. Agricultural and homestead	-	897.7	acs
Total		2845.5	acs

Table I (attached) gives details of the land acquired under each conveyance.

The agricultural land was mostly heavy clay soils, which could not be farmed at a profit during the "thirties".

##### Prospects of Further Acquisitions

There are prospects of considerable additional areas being added to Bardney Forest in the near future. Acquisitions proceeding in respect of three properties, totalling about 500 acres of felled and derelict woodland, are well advanced. Other derelict and scrub areas within the general limits of the Bardney area total at least another 1000 acres, and much of this land is likely to come to the Forestry Commission during the next decade.

TABLE I. STATEMENT OF ACQUISITIONS WITH ALLOCATION OF LAND

Item No.	Date Acquired	From whom Acquired	Lease (L) or Purchase (P)	Name of Land	Utilization of Land Acquired							Total at time acquired
					Allocated to Forest Use *				F.C. Land Other	Transferred away from F.C.		
					Acqd. Pltn.	Felled & Deredict Wood-land	Bare Land	Total				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
I	10.10.32	Studley Estates Co. (Ripon, Yorks)	P	Austacre, New Park, Buckwell, Southrey. Knowles Wood and Birch Woods (Bardney)	-	x 643.3	-	643.3	4.1	-	647.422	
II	19.9.37	Thomas Smithson (Southrey, Lincs.)	P	North Spring Wood (Bardney)	-	49.9	-	49.9	-	-	49.901	
III	24.9.37	Thomas Place, (Northallerton, Yorks).	P	Hatton Minting Block, and part Sotby (Bardney)	189.0	206.0	488.7	883.7	36.2	76.0	996.071	
IV	24.12.37	Thomas Cresswell (Lincoln)	P	College Wood and Great West Wood.	51.2	227.1	20.0	298.3	-	-	298.272	
V	3.2.38	John Clark Holmes (Wragby)	P	Sotby Block (Bardney)	.7	150.5	85.4	236.6	-	-	236.551	
VI	7.7.38	Hugh Mountney Lely (Godalming, Surrey)	P	Ostlers Plantation (Wood Hall Spa)	52.5	50.0	233.1	335.6	3.	-	338.636	
VII	21.9.38	Petwood Estate Ltd (London)	P	Horsington (Stirwould) Fields	-	-	107.6	107.6	-	-	107.567	
VIII	28.10.38	Thomas Godley (Worksop)	P	Halstead Wood	-	67.0	-	67.0	-	-	67.051	
IX	8. 1.39	William Fowler (Horsington, Lincs)	P	Hill Farm, Horsington	-	-	69.5	69.5	7.1	-	76.559	
X	1. 6.39	Samuel Toyne (Tattershall, Lincs)	P	Horsington Wood	-	27.5	-	27.5	-	-	27.473	
					293.4	1421.3	1004.3	2719.0	50.4	76.0	2845.503	

x i.e. included in Compartment Schedules (Part II)

\* = 1 lost in rounding figures

TABLE II

	acres	acres	acres
(a) Plantations			
Acquired <sup>‡</sup>	683.9		
Formed by F.C.	<u>1540.6</u>		2224.5
(b) In hand awaiting planting			
Blank after felling			
Blank after fire			
Tenanted pending planting	110.1	}	
Other land pending planting	<u>384.4</u>		<u>494.5</u>
TOTAL FOREST LAND +			<u>2719.0</u>
(c) Nurseries		Nil	
(d) Farmland (transferred to Ministry of Agriculture)	76.0		
(e) Forest Holdings (6 holdings etc.)		46.4	
(f) Unplantable land		-	
(g) Other land		<u>4.0<sup>‡</sup></u>	<u>126.4</u>
		<u>GRAND TOTAL</u>	<u>2845.4</u>

<sup>‡</sup>In Southrey Wood 3.0 leased to Melton R.D.C. )  
for sewage disposal. 1.0 acre site of )  
Forester's house. )

Notes: No land except that under Forest or potential forest land should be included in compartments.

+ To agree with total area of compartments.

\* Includes coppice regrowth accepted for rehabilitation:-

(1) F.Y.42 and 43 (vide App.VIII of W.P.)	112.7	ac.
(2) F.Y.50 and 51	<u>277.8</u>	ac.
Total:-	<u>390.5</u>	ac

NOTE: Above figures do not take into account minor adjustments in boundaries of area formerly under requisition by War Departments at Ostlers Plantation and Austare Wood.

### Physiography

The Forest is spread over one of the most thinly populated agricultural regions of Lincolnshire. The land is flat, except in the northern blocks where it becomes more undulating as it approaches the southern edge of the Wolds. Wide shallow valleys pass through the area, and there is a gentle slope to the south-east, with drainage to the river Witham which defines the boundary of the Fens. The countryside is exposed, with bare stretches of open agricultural land surrounding the numerous hardwood blocks. Elevation is usually between twenty-five and fifty feet above sea level with the highest point of 130 ft. at Sotby.

## Geology, Soils and Drainage

### 1. Underlying Strata

The areas are situated on the Jurassic measures and the underlying formations are Oxford and Kimeridge clays; practically the whole area is overlaid with boulder clay in which are numerous chalk fragments. Near Woodhall Spa is a region where estuarine sands and gravels occur.

### 2. Soils

The forest soil of the Bardney-Wragby area in general is an extremely heavy clay, but limited areas of clay loam occur notably at Birch Wood, Southrey Wood and at Sotby. The Woodhall Spa block, however, provides a complete contrast by being very sandy with gravel and a strong tendency to podsolization. J.M.B. Brown describes soil profiles of a number of representative pits.

### 3. Drainage

This is a problem. The flatter areas on the clay soils are often wet, and water stands on the surface for months at a time. The old woodland areas have usually been skilfully drained in the past, and it is often found that when the old drains are opened up on re-planting they are sufficient. The main drains are often deep, but shallow drains serve to draw off surface water from new planting areas.

## Vegetation

1. The natural climax vegetation of the region is broadleaved woodland, provided drainage is maintained. Oak is the predominant tree, associated species being, ash, birch, aspen and lime. The principal small trees and shrubs are hazel, field maple, whitethorn, blackthorn, willow, bramble, briar, and honeysuckle.

Characteristic plants of the profuse ground vegetation are primrose, wood anemone, dog's mercury, bluebell, with Aira caespitosa, Calamagrostis, Juncus, and meadow sweet etc., on areas of bad drainage.

A typical natural well stocked woodland on the clay soils has a fairly uniform canopy of oak with a scattering of the associated tree species, with or without a well developed understorey of shrubs, principally hazel. Between them, the trees and shrubby understorey cast a dense shade in which the ground vegetation is only weakly developed though always present.



When woods of the above type are clear felled, there is an immediate rampant development of undershrubs, herbs, and coppice regrowth from the stools of the trees and shrub species, which becomes bound into an almost impenetrable mass; in badly drained areas Aira caespitosa, Calamagrostis and Juncus becomes established in dense mats between stools of coppice regrowth.

If left to itself, such felled woodland reverts relatively rapidly to broadleaved forest with structure and floristic composition closely similar to the original.

## 2. The Gravels and Sands at Woodhall

At the time of acquisition most of the Woodhall Spa areas were open heathland with Calluna, Aira flexuosa, bracken with scattered scrub birch and oak. Molinia and bog myrtle are dominant on limited areas of impeded drainage.

## 3. Agricultural Fields - Clays

Much of the agricultural land acquired for planting was degraded grass land on heavy clay, often with invading whitethorn, bramble and briar making the initial stages of reversion to woodland.

### Meteorology

An average annual rainfall of about 27 in. occurs, mostly in winter. Snow falls are frequent but not usually heavy. Summer droughts occur in most years, and at these times the heavy clay soil dries hard and cracks open, often resulting in the death of newly planted trees.

Frost is a serious drawback at Bardney. The low-lying wet clay areas bordering the Fens, or beside streams, often suffer severely from frosts when they do not occur in other regions. Late spring frosts occur almost without fail in the third or fourth week of May, and in "early" seasons regularly cut back the oak until it leaves the frost layer. Lammas shoots on oak are also often killed by early autumn frosts.

The prevailing wind is south-west, with a period of cold easterly winds in spring and summer.

Young Douglas fir and pine often need firming after continuous winds, owing to the heavy compacting nature of the soil.

## Risks

Fire - With the exception of the Woodhall Spa area, the forest is one with low risk. There are no railway lines near our present property and few main roads near the various blocks, which are scattered and stocked with hardwoods. In these (the clay) areas patrols are necessary only during very dry periods, and at blackberry time. Special watch is also kept in Hatton Woods and elsewhere at the season when the Lily-of-the-Valley is an attraction to the public.

Ostler's Plantation is a highly dangerous block of conifers on heath land, and is close to Woodhall Spa, and of easy access for the public. Very careful fire precautions are necessary for this area.

Insects - The pine shoot moth (Evetria buoliana) has caused exceptionally severe damage to Scots pine in the main Ostler's Plantation Block at Woodhall. No more Scots pine should be planted there. These same pine suffer periodically from acute attacks of needle-cast, caused by the midge Cecidomyia baeri.

The larvae of the Leopard moth have occasionally caused casualties among young beech in New Park Wood.

Fungi - Scots pine, planted as a nurse to oak in clay areas, often suffers from attack by Melampsora pinitorqua, a rust fungus with aspen as the alternate host.

During the period F.Y's 1949 to 1951 Fomes annosus killed some hundreds of young Scots pine in the P.46 area of Compartment 117, Ostler's Plantation; the damage continues.

Young oak, 12-17 years old, in Southrey Wood, Birch Wood, New Park Wood and Stixwould Fields has been found (spring 1951) to be suffering from a sporadic stem canker disease. Diaporthe talerla is suspected to be the main cause. Material for further study was collected by one of the mycologists from the Alice Holt Research Station in October 1951, and further information regarding the disease is awaited.

Rodents - All regeneration areas have to be fenced against rabbits and three whole time warreners are employed to keep ground game under control. Elimination of rabbits is most difficult in the sandy soils at Ostler's Plantation, and the protection to burrows offered by anti-blast banks put up by the Defence Department around bomb dumps during the war has greatly

increased the warreners difficulties. Hares cause some damage, but are nowhere abundant.

Grey squirrels have so far (November 1951) failed to gain a footing north of the Witham. This is, however, an authentic case of one being caught at Reevesby in November 1951, and numerous others at Carrington. It may, therefore, be only a matter of time before these pests establish themselves in our Bardney Woods.

At present there are no deer in any of the Bardney Blocks.

#### Roads and Rides

The old woodlands mostly have well developed systems of rides and extraction paths, and an adequate network of rides is laid out, before planting, on agricultural land which we are afforesting. There are, however, no metalled extraction roads in any block of the unit, and when the main thinnings begin to come on, several of the key roads serving large areas of plantations, should be metalled and made all-weather extraction routes.

The horses of followers of foxhound packs cause considerable damage to rides. Some of the main rides are ridden over by several score of horses at least once each fortnight during the hunting season.

#### Labour and Local Supervision

The forest is managed by a Forester who lives in Southrey Wood. He has a Forester and a Foreman to assist him, one being stationed at Chambers Farm, in the Hatton-Minting Block and the other at Woodhall Spa.

Labour supply has been a difficult problem since 1939; from 1934 to 1939 funds were inadequate. The area is thinly populated, and since the rejuvenation of agriculture which came with the war in 1939 all available manpower is absorbed by the farming industry. The position is further aggravated by the sugar beet factory and a large canning factory at the village of Bardney, both of which concerns collect labour by bus from a wide area of the locality.

For the past four years about a dozen Polish workers have been employed. These workers are most satisfactory and are now the backbone of our Bardney labour; many of them are now married and settled in houses of their own finding in and about Woodhall Spa. Distances between the

various places of work in the unit are great, and it is necessary regularly to transport the Woodhall labour to and from their work.

The regular staff, including the poles and three warreners, totals 23 at November 1951 - a decline of 6 or 7 men over the past two years. It is essential to augment this labour if we are to maintain satisfactorily areas already planted, and tackle the large areas of derelict woodland at present in hand, and under negotiation for acquisition.

## SILVICULTURE

### General

The work done by the Forestry Commission at Bardney falls into three main types:-

- (a) Reafforestation of felled and derelict broadleaved woodland, mostly on heavy clay soils.
- (b) Afforestation of derelict and marginal agricultural land on heavy clay.
- (c) Afforestation and reafforestation on light sands and gravels (limited to the Ostler's Plantation Blocks at Woodhall).

The high cost of clearance of regrowth vegetation areas of type (a) above, and the subsequent weeding and establishment difficulties have always been and still are the outstanding problems of the Bardney Unit.

### Acquired plantations

European larch has grown fairly well on the less heavy clays, but a high proportion of the trees are pumped, and there seems little chance of this species reaching maturity. Norway spruce is fair in growth away from the frosty regions.

There are some most interesting areas of mixed hardwoods aged about sixty years. The main species are oak and lime, which are mostly from coppice stools, although a considerable number of maiden oaks occur. Lime is frequent all through Bardney forest, and must have been extensively grown at one time; it is growing extremely well with the oak and it will be interesting to see the final crop. On the report of his inspection of West Wood in 1945 Sir Roy Robinson wrote "The lime areas are very interesting and unique in my experience". Some birch and ash are scattered through the oak and lime, but in general they are very rough. There is abundant ash regeneration on the forest floor, but this seems to fade away very early, and seldom reaches the small pole stage. Birch is growing to a good form

on pockets of sandier soils, at Birchwood and Halstead.

#### Preparation of Ground

Drainage is a subject of predominant importance on the clay soils generally and on the Molinia areas at Ostler's Plantation.

Fencing against rabbits and efficient warrening are vitally necessary on all areas.

Preparation of Ground. Clearance of vegetation prior to planting on the old woodland sites on the clay soils is an extremely expensive operation. The type of vegetation involved has already been described (page 5). Ideally, planting should follow immediately on the heels of felling, the ground being completely cleared and lop and top burned as part of the felling operation and planting following immediately in the resulting clean ground. Unfortunately delay in acquiring woodland sites has, in the past invariably led to an interval of several years between the felling operations and regeneration work, and too often lop and top left on the ground greatly increased the difficulty of clearing the regrowth for regeneration. After two or three years the clearing of regrowth costs anything from £8 to £12 per acre, and after 4 or 5 years the cost may rise to over £20 per acre - an entirely uneconomic figure. An added disadvantage of delayed clearance is the build up of strength and potential coppicing vigour of the under-shrubs; bramble, grasses and rush rapidly develop between the coppice clumps from the stools of the original overwood.

The rehabilitation operations, are being developed in an endeavour to find a practical economic method of dealing with areas where the cost of clearance and replanting at the present stage cannot be effected at a reasonable cost.

#### Planting

(a) Spacing. Many different spacings have been tried for oak. The current standard spacing for this species is 4 ft. x 4 ft. and when in mixture with Norway spruce either alternate lines or alternate plants, in either case all at 4 ft. x 4 ft.

The pines have, in general, when planted pure, been put in at  $4\frac{1}{2}$  ft. x  $4\frac{1}{2}$  ft. - which is still standard spacing.



(b) Type of Plant. Most of the past planting of oak has been with 1+1 and more recently with 1+0 stock. The need for large, well balanced plants for use on old woodland sites cannot be over-emphasized. The quality of plants has, in general, been below that required by the specially difficult conditions.

(c) Methods of Planting. Notch planting has always been more or less standard practice.

(d) Annual Rate of Planting. For past annual rates of planting see Appendix IV. The future rate of planting must depend on new acquisitions coming in and labour available.

(c) Manuring. Never done.

### Ploughing

At Woodhall, parts of Ostler's Plantation were gyrotilled before planting. The operation was considered to have been worth while, but subsequent advantages have been marred by the general severity of Tortrix attack on the Scots pine. Agricultural fields which are planted with oak or oak mixtures are normally ploughed with a shallow single furrow at 4 ft. spacing, combined with subsoiling where the soils are heavy. Plants have been put in along the furrows or on the shoulder of the ridge. Results have, in general, been satisfactory.

### Beating Up

Beating up of all species is carried out as a routine measure in accordance with the policy laid down by Directorate Instructions. Initial losses caused by suppression by weeds and drought (soil cracking) on the open clay fields have tended to be heavy and beating up has in general been on a rather heavy scale hitherto. There has been no change of species, except where Scots pine has been introduced later into oak plantations.

### Weeding

The amount of weeding required on the clay soils, especially on the old woodland sites is invariably heavy. The importance of proper weeding cannot be over-emphasized; failure to weed at the appropriate time has resulted in losses and associated heavy beating up. The weeding programme is the bottleneck in the year's work which should determine the rate at

which new planting can be contemplated vis-a-vis available summer labour.

In general, the weeding of the Bardney Plantations has been satisfactorily carried out in face of very considerable difficulties.

#### Mixture of Species

Beech, Douglas fir, Thuja and Lawson cypress have been used to a limited extent for underplanting of birch, oak and coppice. Oak in mixture with other species, however, constitutes the main mixtures and these are more fully dealt with in the section dealing with establishment of oak (page 16).

#### Rates of Growth

Available data regarding rates of growth or representative samples of the principal species is given in tabular form in Appendix IV.

#### Past Treatment of Established Plantations

None of the conifer crops established by the Forestry Commission have as yet reached the brashing stage. Some of the most successful of the original Forestry Commission planted oak in Southrey and Birch Woods is getting very near the stage when thinnings will begin, and small scale exploratory work has been done in accordance with the Chairman's directions (vide Appendix I - Report of Chairman's inspection 8.4.50). Thinnings of acquired old mixed hardwood crops have been carried out in Hatton Wood and in Great West Wood, the latter on the express instructions of the Chairman in 1945 (Appendix I - report dated 24.5.45).

Cleaning. The timely removal of side shade encroaching on oak planted in strips and groups among coppice or in mixture with "nurse" species has proved an extremely costly, tedious and drawn out operation the disadvantages of which outweigh the "hoped for" advantages of those special systems. More information is required regarding the economic and silvicultural factors governing removal of overwood from underplanted beech and Douglas fir.

#### Notes on Individual Species

Oak. Oak is the obvious choice of species for the clay areas, and has been planted on a larger scale than any other. It grows reasonably well at Bardney, but in the frostier areas and patches of dense grass it is slow to start, sometimes making very little growth for the first ten years. On less frosty sites, with lighter vegetation, growth is clean, rapid and good.

A detailed account of the many systems of raising oak which have been tried at Bardney is given on page 16.

Ash. Ash is unsuited to Bardney; in practically every plantation failure is now apparent. The cold, wet heavy soil and frosty conditions are against it. It forks badly and though growing to a small pole, it then begins to fall off. Copious natural regeneration of ash on these sites is no indication of suitability of this species for re-afforestation of the heavy clay areas.

Oak and Ash. Oak and ash have been planted together in many places. Alternate groups of the two species amongst coppice, with a total of 100 groups to the acre have been planted in New Park and Halstead Woods. Rows of oak groups, five trees to the group, the groups nine feet from centre to centre, have been planted alternately with rows of single ash on more open coppice areas in Southrey Wood. In most cases the ash has failed. Occasionally, however, the rules are reversed, and the ash (usually branchy and coarse) has gone far ahead of the oak and threatens to take possession of the crop if the oak is not favoured drastically in thinnings. Examples of this may be seen in Southrey Wood (P.34 Compartment 4 north-east corner and P.35 Compartments 5 and 7, strip on old agricultural land along southern boundary of the wood).

Oaks in groups of five to twenty four trees, at the rate of 100 groups to the acre, have been planted in coppice, or in a matrix of Scots pine or Norway spruce where the coppice cover was poor or absent. On old agricultural land oak has been planted in more intimate mixture with Scots pine.

Beech Beech promises well in the early years. The possibilities of this species are of special interest in that it may be possible to convert natural coppice regrowth on our "Rehabilitation Areas" by underplanting with beech. Beech is entirely absent from all old woodland on clays throughout the district. P.38 in Birch Wood is the best beech we have on this forest. The soil here is a well drained loam, with a bracken/bramble vegetation, not at all characteristic of the bulk of the woodlands, with their heavy clay soils and impeded drainage. There is, however, more P.38 beech in New Park Wood on a more typical clay soil, and growth here is distinctly promising. There is no beech on the worst clays. Details of some beech stands are given below.

(a) Birch Wood Compartments 10 and 11. Beech P.38.

This is a much visited area, repeatedly mentioned in visiting officers' reports. The area planted was originally a dense crop of natural birch poles, which was thinned out and underplanted with beech at 6 ft. x 6 ft. In 1940, Mr. A.P. Long remarked that the shade was excessive. Subsequently the birch was removed in a series of cleaning operations, until the beeches are now practically in the open. In the opinion of the Chairman more birch should have been left for a beech crop planted as widely as this. There is now (1951) vigorous growth and much forking.

(b) Southrey Wood Compartment 3. Beech P.45.

Beech was planted between oak groups when coppice, birch, aspen, etc. was felled. Very large plants were used and growth is satisfactory. Lord Robinson considers that the beech has been introduced too early, and that it may compete too vigorously with the oak.

(c) New Park Wood Compartments 21 and 25. Beech P.38 under birch poles.

After thinning birch poles, acorns were sown in Compartment 21 in 1937 - but this failed and the following winter beech plants 2+0 were planted at about 5 ft. x 5 ft. and at the same time a portion of Compartment 25 was similarly planted with beech. Since 1945 the birch overwood has been thinned at regular intervals. The result has been fairly good. The beech are vigorous, but of poor form and not so tall as similarly aged plants in Birch Wood; the reasons for this are less favourable soil, and frost incidence. Mr. Brown observed frosted shoots in 1951 at a height of 10 ft. above the ground, but he considers the trees are growing out of the frost level and may now be expected to increase rapidly in height.

(d) New Park Wood Compartment 27

Beech was planted between oak/ash groups in F.Y.44, the beech in groups of four large transplants.

Lime - This species is a feature of the old oak woodlands of the Bardney District. The tree grows well in mixture with oak, or as an understorey, sometimes coppiced periodically. Fine clean stems develop in close canopy and after felling, the stools send up a mass of vigorous coppice shoots, which if thinned are capable of producing good sized timber stems.

The Chairman said that the lime in "Great West Wood" was "unique in his experience", of great interest and deserving of special study. Lime is often one of the most promising components of areas accepted for rehabilitation. A small block of lime has been planted on a heavy clay field at Hatton Sykes P.51.

Black Italian Poplar - This tree has been planted on a very small scale in odd corners - e.g. on the southern boundaries of Birch Wood and Southrey Wood and also a block acquired at Hatton. With the exception of occasional trees growth is indifferent, and on the evidence to date there appears to be little future for poplar especially on the felled and devastated areas where intense competition from coppice and weed growth is an adverse factor.

Scots pine - Scots pine was chosen as the chief species for afforesting the sandy heath at Ostler's Plantation. The severe damage caused to the species by Tortrix, and the now generally accepted view that Corsican pine is the more economic crop wherever conditions suit it (and the Woodhall conditions undoubtedly do suit it) lead us to the conclusion that Corsican pine would have been much more suitable than Scots pine at Ostler's Plantation. Scots pine has also been used extensively as a "nurse" crop with oak on the heavy soils. It has given vigorous growth on even the worst Aira sites, but has not achieved what was intended. Corsican pine should have been planted in lieu of Scots pine at Ostler's Plantation. Small blocks were planted there, and are doing well. It has also been planted on light clay loams at Sotby in P.50 and P.51.

Douglas fir - The main use of this species has been for underplanting, and good results have been obtained on the lighter type of soils, e.g. under birch at Woodhall Spa (P.46) and at Hatton (P.41) under an open crop of young oak; growth has been satisfactory to date. The use of Douglas fir for underplanting or for pure planting on the heavy clay sites is not recommended especially where coppice regrowth is vigorous.

Norway spruce - This species grows exceedingly well on the better drained areas, but on areas of restricted drainage subject to frost, growth has been severely checked. Main use of Norway spruce is as a nurse to



oak, and in this respect it is far superior to other conifers; even when retained to a comparatively late stage of development of the crop, the spruce does not interfere unduly with the development of the oak.

### The Larches

European larch and Japanese larch - These grow moderately well where drainage is adequate, but on the whole these species have produced unsatisfactory crops. As a nurse to oak both larches have proved most unsatisfactory.

Thuja and Lawson cypress have been tried on a small scale in 1951 for the underplanting of coppice.

### Notes on Establishment of Oak Crops at Bardney

Oak is the tree of predominant importance in Bardney Forest.

A wide variety of silvicultural methods have been used there in the attempt to find economic methods of raising an oak crop on heavy clay soils - either in old felled woodland areas or on agricultural fields, no longer economic for farming. The areas in question (together with similar areas in Kesteven Forest) are in the opinion of the Chairman (Lord Robinson) "some of the most difficult silviculturally in Forestry Commission possession", and though a great deal has been learned since planting commenced in 1934, many problems remain to be solved.

### Methods practised to date

#### A. Group Systems

##### (1) Oak groups in coppice

Location: Compartments 5-13, 19-23, 25.

Method: Groups of 5, 16 and 24 oak, scattered unevenly through coppice, 100 groups to the acre. Groups usually closer in lighter coppice areas. Areas accepted as  $\frac{3}{4}$  planted except in Compartments 10-13 which are fully planted.

Result: When properly tended growth can be excellent but the method must be considered unsatisfactory in general, owing to difficulties and high cost of maintenance. Coppice round groups, often dense, needs cutting back at frequent intervals; oak tends to suffer from crowding and too much shade.

(2) Oak and ash groups in coppice

Location: Compartments 14, 15, 18, 26, 27.

Method: Alternate groups of 16 ash and 16 oak scattered irregularly through coppice, 100 groups per acre in all. Areas accepted as fully planted.

Result: As in (1) above, but less satisfactory as the ash have proved a failure in general. Ash is not suited to these areas.

(3) Oak groups with rows of ash in light coppice

Location: Compartments 1-4

Method: Oak groups closely planted in rows, 5 plants per group, single rows of ash between rows of oak groups. Ash rows 9 ft. apart.

Result: Oak groups grown well in general, as there is only light coppice; ash very poor. Areas fully stocked.

(4) Oak and Scots pine groups on open land

Location: Compartments 16, 17, 35, 36, 37, 38, 40, 62.

Method: Groups of 12 oak alternating with groups of 9 Scots pine.

Result: As yet too early to judge. On Aira caespitosa areas oak needs careful maintenance. Scots pine groups already tending to crowd oak groups. Will need careful attention shortly. Areas fully stocked; but crop may be patchy as selection of oaks for final crop will be limited.

(5) Oak and Norway spruce groups on open land

Location: Compartments 74 and 75

Method: 13 rows of oak, 4 ft. apart, 13 plants per row 3 ft. apart. These rectangular oak groups are surrounded by 3 rows of Norway spruce.

Result: Oak has grown well, but Norway spruce tend to crowd them in. It is too soon to comment on this mixture, but selection of oak for final crop may be limited as in (4) above.

(6) Oak and Japanese larch groups on open land

Location: Compartment 94

Method: As in (4) above, using Japanese larch instead of Scots pine.

Result: Oak fair; Japanese larch a failure, since replaced by Scots pine. Oak requires careful weeding.

B. Oak and Conifer in intimate mixture

(1) Oak and Scots pine on open land

Location: Compartments 122, 124, 125 and 126.

Method: 3 Oak plants and 1 Scots pine alternating along each row. Species in rows staggered so that rows of Scots pine and oaks run diagonally through area. Rows 4 ft. apart; plants 2 ft. apart in rows.

Result: Area fully stocked with intimate mixture of oak and Scots pine. Oak grown very well in general, but the problem of dealing with the Scots pine nurses arises after about 8 years. Scots pine is being removed as required to allow free growth to oak.

(2) Oak and Japanese larch

Location: Compartments 10, 11, 12.

Method: 3 oaks alternating with Japanese larch along the rows.

Result: Areas fully stocked with oak. Owing to the rapid growth of Japanese larch this system is not advised. The oak have grown well in general but the Japanese larch have had to be removed after only 8 years, leaving the smaller oaks still in danger from smothering by bracken etc. Where Japanese larch have not been thinned in time the oaks have been suppressed.

(3) Oak and Norway spruce.

With effect from P.50 the standard method of raising oak at Bardney is an intimate 50/50 mixture of oak and Norway spruce - normally oak 1+0 and Norway spruce 2+1. The Norway spruce will be taken out progressively as Xmas trees, giving a large interim return to offset the initial high cost of establishment, and the unremunerative nature of early oak thinnings.

C. Pure Oak Planting

Location: Compartments 12, 34.

Result: Fairly good - at least as good as in B (2) above, which some of it adjoins. Needs careful weeding on the worst areas where there is heavy growth of bracken and grasses.

#### D. Strip Planting

##### (1) In Coppice

Location: Compartment 5.

Method: An oak group area was converted to strips in F.Y.47 by clearing coppice  $\frac{3}{4}$  ch. strips;  $\frac{1}{4}$  ch. strips of coppice being left between oak, and coppice.

Result: Too early to say, but should simplify maintenance and give better selection for final crop. Needs careful weeding.

#### E. Direct sowing of Acorns

Location: Compartment 21 (P.37)

A complete failure.

#### Acceptance of Coppice crops for Rehabilitation

The very high cost of preparation of ground and subsequent weeding of plantations made on felled woodland which has been left for some years before treatment, coupled with the promise of a relatively quick yield of low quality timber from the best of the coppice regrowth areas has led to the development of the "Acceptance for Rehabilitation" programme. 634.9 acres have been provisionally ear-marked for management in this manner, of which 390.5 acres have already been accepted as a crop (vide Appendix III).

Areas so accepted must have an adequate stocking of coppice, and must have essential drains and rides cleared and be fenced against rabbits. In due course, as the crop grows on into a stage where forest conditions of canopy and soil vegetation have been re-established each area will have to be treated on its merits, and a decision taken either:-

(a) To accept as a crop to be grown on into poles or timber

or

(b) To convert to a new crop either by opening up and underplanting or by clear felling and straight planting.

For conversion operations, beech promises to be the most useful species for underplanting - though the possibilities of shade bearing conifers - Thuja, Lawson cypress, Abies grandis, Douglas fir and Tsuga, will be investigated.

The whole conception of Rehabilitation is new and needs vigorous and intelligent development. Interesting notes on the Chairman's views on this subject are given in the Report of his visit in 1950 (Appendix I).

### Conclusions

(1) The heavy clay soil on which a high percentage of the Bardney Forest is situated is primarily suited to oak production, and successful crops of this species can be obtained provided proper technique is employed.

(2) The Woodhall Spa section of the forest is situated on sandy type of soil suitable for the growth of Corsican pine.

(3) Ground stagnation on felled hardwood areas is mainly due to faulty drainage which in turn leads to a high water table and site deterioration.

(4) Competition from strong weed growth and coppice regrowth is a factor which mitigates against tree growth, and intense weeding in the initial stages of development of the crop is essential in order to achieve success in replanting of felled and devastated areas or afforestation of derelict agricultural land.

(5) Failure to weed in the initial stages of development of the crop has greatly prolonged the establishment period and resulted in heavy failures.

(6) Oak once it is established can compete successfully with thorns, briars and coppice regrowth, and cleanings in this stage of development of the crop can be overdone.

(7) Ash and ash/conifer mixtures are unsuited to the heavy clay soils, except in very limited areas of better drainage; the presence of ash (coppice or maidens) on felled and devastated areas is no indication of the suitability of the sites for the growth of this species for timber production.

(8) Poplar has given only moderate results and growth is generally poor; on the evidence to date, the planting of poplar on areas where competition from coppice is strong, is not to be recommended.

(9) Beech is showing exceptional growth in the initial stages of development and may prove to be extremely useful for underplanting unprofitable coppice.

(10) A feature of a high percentage of the woodlands comprising the Bardney forest is the presence of lime; this species grows well in mixture with oak, or as an understorey. Lime is often one of the most promising components of areas accepted for rehabilitation.



(11) All the early silvicultural methods employed in raising oak, namely, groups, strips and mixtures with ash, Scots pine and Japanese larch have definite disadvantages which are now considered to outweigh the expected advantages for which the methods were planned.

(12) The best method to date of regenerating oak on cleared woodland areas and old agricultural ground is the alternate row mixture of oak and Norway spruce.

(13) The intimate mixture of oak and Norway spruce has the following advantages, provided timely removal of the Norway spruce is undertaken:-

- (a) Maximum benefit is received by the oak from clean weeding which is also essential in the production of fully furnished Christmas trees.
- (b) Initial weedings of the oak are facilitated especially where Norway spruce are used as markers in the oak rows.
- (c) Clean floor conditions are produced relatively more quickly and uniformly.
- (d) 50% of the spruce can be removed at the more profitable Christmas tree size (3 ft.) and the remainder at a later stage thereby yielding a high financial return to offset the initial high costs of establishment.
- (e) The Norway spruce have a decided nursing effect on the oak.

(14) Scots pine on account of its rapid coarse growth on the heavy clays is wholly unsuited as a nurse to oak; early removal of the nurse is necessary in order to prevent suppression of the oak, and this results in a low return, since the pine has to be cut at an unprofitable stage in development.

(15) As a nurse to oak and ash, larch (European larch and Japanese larch) has proved unsatisfactory.

(16) The planting of pure conifer on the heavy clay soils as a means of reducing the annual weeding programme, is now considered to be avoiding the main issue, since the areas in question are primarily oak sites, and should be used for oak production.

(17) Good strong oak 1 yr. and 2 yr. seedlings, are better than direct sowings; well balanced sturdy plants are essential in order to compete successfully with the intense weed growth, and also to facilitate weeding.

(18) Evidence has shown that close planting of oak, i.e. 4 ft. x 2 ft. and 3 ft. x 3 ft. is unnecessary and indeed wasteful; the planting spacings now recommended in mixture with Norway spruce are  $4\frac{1}{2}$  ft. x  $4\frac{1}{2}$  ft. or 4 ft. x 4 ft.

(19) The tendency for the heavy clay soils to crack during spring and summer droughts makes early planting essential.

(20) 635 acres of coppice, have been earmarked for rehabilitation and of this area 390 acres have been accepted for either:-

- (a) Conversion to high forest, (cases where useful species exist).
- (b) Storage and subsequent underplanting.
- (c) Storage followed by future clear felling and subsequent replanting.

## History of Bardney Forest

### APPENDIX I

#### Notes from Inspection Reports

##### 19.1.38. Sir Roy Robinson (Chairman)

###### Southrey Wood

The area of oak groups in birch and aspen was then traversed and growth considered remarkably good. The Chairman indicated that treatment of the surrounding growth according to the light requirements of the oak must be kept in view.

Compartments 3 and 4 were then crossed and the poor growth of oak in the open contrasted with the group-planting. The invasion of birch and aspen in certain areas is exerting a beneficial effect and is being preserved during weeding operations.

The unplanted area on which natural ash has come up fairly uniformly was then inspected in Compartment 7. Examination of an aspen/ash thicket revealed the presence of considerable numbers of the latter species, many of which are well grown stems in danger of suppression or mechanical injury. Cleaning is to be put in hand at an early date on this area and lines of treatment were considered.

The Chairman indicated that he would lighten the present canopy by about half, to that end removing overbearing aspen and rough ash. Selection of the best ash stems remaining would follow and the work directed to giving them sufficient room to prevent mechanical injury and avoid whippiness. No hard and fast rule could be laid down beyond that the best stems must be favoured. Later on, beech could be introduced.

###### Birch Wood. Compartments 12 and 10.

In Compartment 10 the Chairman considered the use of larch as nurses for oak unnecessary in view of the shelter of birch surrounding the open ground.

Isolated scrub birch and oak standing over the oak/larch area should have been removed.

The cleaned birch was then visited. The Chairman gave instructions

that the birch is to be thinned, the best stems being preserved with a view to getting plywood size, and underplanted with beech this season.

Bucknall Wood.    Compartments 13 and 14.

The method of mixing oak and ash in alternate groups was considered bad silviculture. The question of coppicing of frost damaged ash was discussed. It was decided that such treatment should not be undertaken at present.

Commenting on the whippiness of the leaders and the small size of the buds of the oak, the Chairman said that these features indicated too much shade. This excessive shading, it was thought was probably due to strong grass growth rather than to the surrounding coppice. In order to check this weeding is to be carried out in June.

College Wood.    (New acquisition)

From the planting point of view, beech is to be kept in mind for underplanting but it was appreciated that this species was seldom found on such sites in the surrounding district.

Hatton Estate

The planting of certain fields was discussed and oak with Norway spruce nurses was considered worthy of trial, the spruce to be planted at double the usual rate and later half their number cut out as Christmas trees.

24.5.45.    Chairman's Visit

Southrey Wood.    Compartment 3 Oak, P. 34.

The area of oak groups opposite the forester's house was inspected in some detail.

Normal weeding and siding-up of the coppice was carried out regularly until 1940 and growth was rather better than normal. From 1940 onwards the coppice has been gradually removed until at the present time 75 per cent of the shelter has gone and the intention has been to remove the balance during the next two years. The Chairman considered that the shelter is being removed too slowly and instructed that a sample of the remaining coppice be ringed during the ensuing weeks and the result of this compared with the normal opening-out work.

Over part of the area from which all the coppice between the groups had been removed, beech were planted during P.45. These were seen to have made a satisfactory start. The Chairman considered that they had been introduced too early and might very well cause trouble by outstripping the oak. The general conclusion was that this technique of producing oak is outmoded and shews no advantages over the strip methods such as practised at Alice Holt, while it is more costly and finicking in working. The very close spacing of these early days is now considered quite unnecessary and wasteful and the Chairman is not at all certain that even four by two is not too close and that four by four might well give a satisfactory degree of cleanliness to a pure oak crop.

Birch Wood - P.38.    Compartments 9 and 10.

The Japanese larch/oak mixture was first inspected. The Japanese larch were planted nine feet apart and the rows staggered; three oak eighteen inches apart were planted between each two larch. All the Japanese larch have been brashed and some high-brashed, and an appreciable proportion removed altogether, all in order to give sufficient light and freedom to the rapidly-developing oak. Many more of the larch will have to be cut out during this early summer. The Chairman commented that he did not like oak/Japanese larch mixture at all and considered the inclusion of Japanese larch quite unnecessary. He agreed that a heavy removal of the remaining Japanese larch is necessary to maintain the rate of development of the oak.

Next were seen a number of blocks of beech planted under birch high forest cover. The beech have developed quite well but for the greater part shewed signs of requiring more light. Various methods of development were discussed and the Chairman said that he desired a few of the straightest and best birch kept on for inclusion in the final crop and for ultimate use as peeler logs.

New Park Wood.    Compartment 19, P.36.

An area of beech under birch was also seen; these are being split up into one part having the birch only 15/20 ft. high, the other part having birch 30 ft. and upwards. In the latter the beech were growing much better, obviously due to the extra amount of light they could get.



Ringing and removal of part of the smaller birch will have to be done to enable the beech to develop at the maximum rate. The taller birch area is not in such urgent need of attention and this will be treated along the same lines as the same mixture in Birch Wood mentioned above.

#### Great West Wood - P.41

An area of the wood was then inspected which holds an appreciable stocking of lime, these trees being 50 ft. - 60 ft. high, clean-stemmed and of good form. Ash and oak form the other components. The Chairman was very interested in this mixture from an ecological point of view and said it was the first he had seen. A specimen of the leaves and twigs was taken away to ascertain exactly which lime it is. It was explained that a small series of local experiments has been carried out on the subject of propagation of lime both from seed, suckers and cuttings. This woodland area has still to be thinned for the development of the lime.

#### 8.4.50. Sir Roy Robinson (Chairman)

##### Southrey Wood. Compartment 3, P.34 Oak groups, 100 groups per acre.

24 trees per group in coppice. Filled up with beech in P.45. The Chairman considered that it is now obvious that too many trees per group were planted. He was of the opinion that the beech had been introduced too soon, and would overtake the oak, necessitating premature removal. The Chairman instructed that a few oak groups near the forester's house should be reduced to 3 or 4 of the best trees per group, as an experiment to note the response of the oak to such treatment.

##### Birch Wood. Compartments 10-13.

(1) Oak groups in coppice, P.38, 100 groups per acre 16 trees per group. The Chairman was of the opinion that if these areas are carefully maintained, the result would be as good as could be expected for this system. Advantage is to be taken of all natural oaks coming up between the groups.

(2) Oak/Japanese larch areas, P.38. The Japanese larch has virtually, all been removed owing to its very rapid growth and consequent damaging effect on the oak. The Chairman considered that the growth of the oak is very good, but that it could have been safely grown without a nurse. Mixtures of oak and Japanese larch are seldom satisfactory.

(3) Beech areas, under natural birch, P.38, birch approximately 30 years. Most of the birch overwood has been removed leaving a few of the best stems to go on to veneer size. The Chairman considered that the overwood had been removed too rapidly in the last year. He was of the opinion that shade is not too harmful over beech as it will recover, but with too much light in the early years may increase any inherent tendency to forking. A more gradual removal of birch should be done in future. The wide spacing of the beech indicates that it was originally intended to keep some shade to a later age. There was insufficient beech trees per acre to justify total clearance of birch at 10 years of age.

A discussion followed at this point concerning the best age or height of the birch for such underplanting. It was agreed that height is a better criterion than age since growth of the birch would vary with the site. The birch on these areas was estimated to have been 18-20 years old and 15 ft.- 20 ft. in height when the beech was underplanted. Judging by results this condition would be near the optimum.

The Chairman instructed that any coppice growth from the recently felled birch stools was to be allowed to come up with the beech.

#### Southrey Wood

##### Compartment 6. Natural Ash Areas.

The Chairman considered that the ash here was slightly more vigorous than that seen at Bourne on the previous day. He was of the opinion that an assessment of the whole problem of ash silviculture on these heavy clays should be made by the Research Branch. It was noted that there was copious natural regeneration on some areas but that the ash later failed, possibly through overcrowding or lack of good drainage conditions.

The Chairman considered that these areas of Bardney and Bourne are some of the most difficult silviculturally in Forestry Commission possession.

#### Great Scrubbs Wood

##### Compartment 69. Young mixed coppice

The Chairman instructed that when the time comes for treatment, the following should be put into effect.

- (1) The best birch and lime coppice areas to be left for later underplanting with beech.

- (2) Some of the best natural birch areas to be treated as a birch crop.
- (3) The more open areas to be filled in with beech.
- (4) If birch crop areas fail, then underplant with beech.

# History of Bardney Forest

## APPENDIX II

### Supervisory Staff in charge of Bardney Forest

(From Inception of Unit 1932, to  
November, 1951)

✱

Year	Forester	Dist. Officer	Divl. Officer (or S.F.O.)	Conservator
	Always:- <u>Bardney Forest</u>	1. East Midlands District 2. From 1.1.46 No.1. E (E)	1. Division 5 up to ..... 2. East (England) Div. to 31.12.45 3. S.F.O. from 1.1.46	EAST (England) Conservancy from commence- ment 1.1.46
1932 1933	From opening of Unit. G.H. Button	From opening of Unit. C.A. Connell	From opening of Unit. H.M. Steven E. Wynne-Jones ( 1933)	
1934 1935		J.M. Ross (Oct.1st, 1935)		
1936			J. Macdonald ( 1936)	
1937	D.J. Davies (Feb. 1937)			
1938				
1939		W.V. Jackson (Sept.4th 1939)	C.A. Connell (Sept.4th 1939)	
1940				
1941				
1942	G. Jones ( 1942)			
1943				
1944				
1945			Division ends on 31.12.45	
1946		R. Carnell (Sept.25th 1946)		(C.A. Connell (1.1.46) (A.D. Hopkinson (March 1946)
1947		S.R. Payne (Feb. 1947)	G.W. Backhouse ( 1947)	
1948				
1949			G.F. Ballance (August 1949) A. Paterson (Sept. 1950)	G.W. Backhouse (August 1949)
1950				
1951		T.V. Dent (Jan.17th, 1951)		
1952				
1953				
1954				
1955				

✱ NOTE: Conservancies took the place of territorial Divisions from  
1.1.46, when the Forestry Commission was reorganised.

# History of Bardney Forest

## APPENDIX III

### Classification of areas by Silvicultural System and age class of crop

The following statement classifies by age classes and species type (conifer or broadleaved) area of plantation acquired and area formed by the Forestry Commission. It also shows areas of coppice regrowth which have been or probably will be "accepted for rehabilitation."

#### Details of P.years of Plantations and Accepted Crops

Plantations				Rehabilitation		
<u>No. I Working Circle</u> (Crops formed principally by planting).				<u>No. II Working Circle</u> (Formed mainly by regrowth acceptable)		
Origin and year of formation	Conifers (acres)	Broad-leaved (acres)	Total (acres)	Year Accepted	Area (acres)	Approx. Year(s) of origin.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
<u>Acquired</u>				Some of the old acquired hardwood crops - e.g. Hatton Wood and parts of College Wood, may have originated largely from Accepted Natural Growth.		
1880-1890	-	134.7	134.7			
1891-1900?	-	68.8	68.8			
1901-1917?	-	-	Nil			
1918-1927	39.4	43.1	82.5			
1928-1937	7.4	-	7.4			
Total Acqd	46.8	246.6	293.4			
<u>Planted by F. C.</u>				<u>Areas accepted for Rehabilitation</u>		
1934	2.0	71.0	73.0			
1935		65.8	65.8			
1936		67.5	67.5			
1937	6.1	58.3	64.4			
1938		78.1	78.1			
1939	120.9	90.7	211.6			
1940	52.8	91.0	143.8			
1941	18.0	137.9	155.9			
1942	5.0	34.2	39.2	1942	50.3	P. 25-34
1943	15.5	44.4	59.9	1943	62.4	P. 28
1944	-	-	Nil			
1945	-	3.0	3.0			
1946	14.0	-	14.0			
1947	20.2	-	20.2			
1948	-	137.5	137.5			
1949	7.4	189.9	197.3			
1950	79.2	23.1	102.3	1950	151.0	P. 10-P. 35
1951	46.8	60.3	107.1	1951	126.8	P. 31-P. 41
Total F. C.	387.4	1152.7	1540.6	Total	390.5	

Summarised the figures from Table III above, and including areas not yet planted or accepted but provisionally allocated for planting or rehabilitation in the Working Plan, the overall position is as follows:-

Distribution of Total Forest Land to Working Circles  
Areas in Acres  
(At November 1951)

Method of Silvicultural System (1)	Plantation W. C. (2)	Rehabilitation W. C. (3)
1. Acquired Plantations P.1880-1937	293.4	
2. Plantations formed by F.C. P.1934-1951	1540.6	
3. Coppice areas accepted for) Estimated rehabilitation during F.Y.) age at 42, 43 and 50, 51 ) origin P.10 to P.41		390.5
4. (a) Unplanted Forest Areas	250.1	
(b) Coppice regrowth not yet accepted as a crop.		244.4
Total of W.C.'s	2084.1	634.9
<u>Total land allocated to Forest use</u> (Total of Columns (2) and (3))		2719.0

APPENDIX IV

Height Records of Plantations, (Nov.1951)

Item No.	Species	Cpt. No.	P. Year	Age (When measured) (Years)	Planting System	Site Factors				General Condition of crop (at time of report)	Height Growth			Remark
						Soil	Drainage	Vegetation	Frost		Top Ht. of Dominants	Av. annual Ht. increase	Av. annual Ht. increase over last 2 years	
1	Oak	13 (north end)	38	14	100 Groups per acre of 16 plants among copp.	Clay Loam	Good	Copp. and Bramble	Slight	Patchy. Good where not suppressed by copp.	12'-16'	12"	18"	Well developed nat. oak in copp. between groups up to 30'
2	Oak	13 (south end)	38	14	Strips 9' wide 3 lines of plants at 4 1/2'	Heavy Clay	Water level very high gleying at 3" from top.	Aira and Rush	Considerable	Very patchy coming out of check slowly.	Gps. from 3'-5' sometimes to 10' - 12'	4" 9"	Nil to 6" 12"	
3	B.I.P.	12 and 13 (south end)	38	14	15'x 15' among clumps of blackthorn and grass.	Heavy Clay	Impeded Flat	Aira Sedge & Twitch	Considerable	Very irregular	8' to 28'	6" 24"	Nil 12"	
4	(J.L.) ( ( ( (Oak)	12	38	14	('Nurse' to ) oak Lines ) 4 1/2' x 4 1/2' ) J.L. 9' in ) lines with ) above J.L. ) 3 oak between each J.L. )	Loam	Good	Bracken	Moderate	Good	24'	21"	12"	J.L. Grows too fast for the oak. Not suitable as a nurse.
5	Oak	12	38	14	Pure 5'x5'	Loam	Good	Bracken	Moderate	Good	14'-16'	13"	18"	
6	(S.P.) ( (south half) (Oak)	5	41 41	11 11	Gps. with oak ) groups. ) Gps with above SP checker- ) board )	Heavy Clay	Poor	Aira and thorn.	Severe	Good irregular Very slow coming out of check	10'-16' 3'-5'	16" 4"	18"-24" Nil to 6"	(Melampsora causing damage. Little Tortrix.)
7	Oak	5 (north edge)	41	11	Gps in coppice later turned to strips	Clay Loam	Good	Coppice thorn etc. turning to Aira and grass through weedings in strips.		Slow coming out of check	5'-8'	7"	8"	
	Oak		47	5	Lines in strips 3/4 ch. copp belt.					Promising catching up groups. Poor Very patchy.	3'-5' 8'-12'	10" 7"	Nil to 6" 10"	Plants were 2x3+1 18"-24" when planted.

Item No.	Species	Opt. No.	P. Year	Age (When measured) (Years)	Planting System	Site Factors				General Condition of crop (at time of report)	Height Growth			Remark
						Soil	Drainage	Vegetation	Frost		Top Ht. of Dominants	Av. annual Ht. increase	Av. annual Ht. increase over last 2 years	
8	(Oak) (Ash)	5	35	17	(Oak and Ash) (Ash 9' x 9', 5 between each square of ash)	Heavy Loam	Good	Probably grass and bushes Now thorn clumps & light grass & bramble	Mod-ate	Fair but coarse grown	18'	13"	10"	
9	S.P.	9	46	6	Pure	Heavy Loam	Fair	Aira and thorn.	Mod-ate	Good	6'	12"	20"	
10	Oak (pedunculata) Oak (sessile)	3 3	34 34	18 18	100 Gps. per acre in copp. 24 plants per groups. Oak and Ash 5 Oak between ash at 9'x9'	Good Loam Light Loam	Good Good	Mx. copp. Bramble below Bracken (anemone)	Slight Slight	Very Good Good	23' 18'	15" 12"	18" 15"	Av. of 22 trees in temporary sample plot Rather rough grown. Ash has disappeared.
11	N.S.	2	34	18	1 acre plot planted pure on turves in cleared copp.	Loamy Clay	Good	Coppice	Severe	Only a few survivals	12'-15'	10"	15"	
12	Oak N.S.	74	39	13	Squares of Oak 4'x3' with 3 rows of N.S. Clay every 1/2 ch.	Heavy Loam with Clay below	Good	Grass	Severe	Very irregular	3'-12' 3'-15'	6" 7"	6"-12" 18"	Rather patchy in places with the oak starting to come away.
13	S.P.	109	P.39	13	Gyro tilled 4 1/2' x 4 1/2'	Sand	Good	Heather	Slight	Fair	7'-17'	11"	15"	
14	S.P.	108	P.39	13	Gyro tilled 4 1/2' x 4 1/2'	Sand	Good	Heather	Slight	Fair	7'-17'	11"	15"	Badly attacked by Tortrix
15	S.P. N.S.	107	P.39 P.39	13 13	Gyro tilled 4 1/2' x 4 1/2' Turfed 6'x6'	Sand Sand	Good Mod.	Heather Heather Molinia Bog myrtle	Slight Heavy	Fair Mod. to Good	7'-20' 7'-22'	12 1/2" 13 1/4"	15" 16 1/2"	now improving too wide spacing owing to gullies.
16	S.P.	105	P.39	13	Gyro tilled 4 1/2' x 4 1/2'	Sand	Fair	Heather	Slight	Fair	7'-15'	10"	12"	as Item 13
17	S.P. N.S.	106 106	P.40 P.40	12 12	Gyro tilled 4 1/2' x 4 1/2' Turfs inverted 4' x 5' staggered	Sand Sand	Good Fair	Heather Heather	Slight Heavy	Fair Good	7'-16' 5'-20'	10 1/2" 12 1/2"	13 1/2" 16 1/2"	as Item 13 Retarded by frost in early stages.
18	S.P. C.P.	101 101	P.40 P.40	12 12	Gyro tilled 4 1/2' x 4 1/2' Gyro tilled 4 1/2' x 4 1/2'	Sand Sand	Fair Good	Heather Heather	Slight Slight	Poor Fair	5'-14' 5'-16'	9 1/2" 10 1/2"	12" 13 1/2"	as Item 13 Very small percent-age of true C.P.
19	S.P.	104	P.39	13	Gyro tilled 4 1/2' x 4 1/2'	Sand	Mod. to Fair	Heather	Slight	Patchy	4'-17'	9 1/2"	12"	as Item 13



Item No.	Species	Cpt. No.	P. Year	Age (When measured) (Years)	Planting System	Site Factors				General Condition of crop (at time of report)	Height Growth			Remark
						Soil	Drainage	Vegetation	Frost		Top Ht. of Dominants	Av. annual Ht. increase	Av. annual Ht. increase over last 2 years	
20	C.P.	103	P.40	12	Gyro tilled 4 1/2' x 4 1/2'	Sand	Good	Heather	Slight	Mod. to Good.	7' - 17'	12 1/2"	15"	as Item 18
21	{ Oak { D.F.	61	?	?	No Record (Acq crop)	Heavy Loam	Good	Bramble Briars	Moderate	Good	30' - 40'	?	9"	
		61	P.41	11	5x6 planted under oak	Heavy Loam	Good	Bramble Briars	Moderate	Good	6' - 16'	12"	24"	
22	{ Oak { D.F.	62	?	?	No Record (Acq crop)	Heavy Loam	Good	Bramble Briars & Gorse	Moderate	Good	30' - 40'	?	9"	
		62	P.41	11	5x6 planted under oak	Heavy Loam	Good	Bramble Briars & Gorse	Moderate	Good	6' - 16'	12"	24"	
23	{ Oak { Lime { Birch { Ash	97	?	?	No report (Acq)	Heavy Loam	Moderate	Bramble	Moderate	Good	35' - 45'	?	6"	Converting to High Forest
		97	?	?	" "	Heavy Loam	Moderate	Bramble	Moderate	Good	40' - 50'	?	9"	
		97	?	?	" "	Heavy Loam	Moderate	Bramble	Moderate	Good	40' - 50'	?	9"	
		97	?	?	" "	Heavy Loam	Moderate	Bramble	Moderate	Mod.	30' - 40'	?	6"	
24	{ Oak { Lime { Birch { Ash	98	?	?	" "	Heavy Loam	Moderate	Bramble	Moderate	Good	35' - 45'	?	6"	Converting to High Forest
		98	?	?	" "	Heavy Loam	Moderate	Bramble	Moderate	Good	40' - 50'	?	9"	
		98	?	?	" "	Heavy Loam	Moderate	Bramble	Moderate	Good	40' - 50'	?	9"	
		98	?	?	" "	Heavy Loam	Moderate	Bramble	Moderate	Mod.	30' - 40'	?	6"	
25	{ Ash { J.L.	99	P.41	11	Groups with J.L. groups	Heavy Loam	Poor	Grass Bramble Thorn & Briar	Heavy	Poor	8' - 12'	11"	24"	Retarded by frost in early stages. B.U. with S.P. some J.L. dying back.
		99	P.41	11	Groups with Ash groups	Heavy Loam	Poor	Grass Bramble Thorn & Briar	Heavy	Mod.	15'	15"	27"	
26	{ Oak { J.L. { S.P.	94	P.41	11	Groups with J.L. & S.P.	Heavy Loam	Poor	Grass & Bramble	Heavy	Mod.	3' - 8'	6"	12"	Retarded by frost in early stages B.U. with S.P. some dying back.
		94	P.41	11	Groups with oak groups	Heavy Loam	Poor	Grass & Bramble	Heavy	Mod.	12' - 15'	13"	24"	
		94	P.41	11	Groups with oak groups.	Heavy Loam	Poor	Grass & Bramble	Heavy	Good	8' - 12'	11"	30"	
27	D.F.	93	P.41	11	5x6 under Pole Crop H.W.	Heavy Loam	Good	Grass & Bramble	Moderate	Good	8' - 15'	11"	30"	Pole crop completely removed in F.Y. 50.
28	{ Oak { Lime { Ash { Birch	42	?	?	No report (Acq)	Heavy Clay	Poor	Bramble	Slight	Good	40' - 50'	?	4"	Converting to High Forest.
		42	?	?	" "	Heavy Clay	Poor	Bramble	Slight	Good	45' - 55'	?	6"	
		42	?	?	" "	Heavy Clay	Poor	Bramble	Slight	Poor	30' - 45'	?	6"	
		42	?	?	" "	Heavy Clay	Poor	Bramble	Slight	Fair	45' - 55'	?	9"	

Item No.	Species	Opt. No.	P. Year	Age (When measured) (Years)	Planting System	Site Factors				General Condition of crop (at time of report)	Height Growth			Remark
						Soil	Drainage	Vegetation	Frost		Top Ht. of Dominants	Av. annual Ht. increase	Av. annual Ht. increase over last 2 years	
29	(E.L. (N.S. (S.P.	41 41 41	P.24 P.24 P.24	28 28 28	4 x 5	Loam Loam Loam	Good Good Good	Grass and Bramble Grass and Bramble Grass and Bramble	Slight Slight Slight	Fair Fair Fair	30' - 35' 25' - 40' 30' - 45'	14" 14" 16"	12" 13" 11"	A few NS and SP with a few Nat. Oak coming in.
30	B.I.P. S.S.	37 37	P.24 P.24	28 28	9 x 9 5 x 5	Heavy Clay Heavy Clay	Poor Poor	Thorn and Bramble Thorn and Bramble	Heavy Heavy	Very Poor " "	6' - 40' 6' - 30'	10" 7½"	10" 20"	Now coming away
31	(B.I.P. (N.S.	52 52	P.24 P.24	28 28	10 x 10 9 x 9	Heavy Loam Heavy Loam	Moderate Good	Grass aira meadow sweet Bramble and Thorn Grass and Thorn.	Slight Slight	Fair Fair	20' - 42' 15' - 35'	13½" 10"	14" 15"	Too wide spacing for good crop.
32	(Oak (Oak	25 25	P.38 P.38	14 14	4 x 3 Groups	Loam Loam	Good Good	Aira and Bramble Aira and Bramble	Moderate Moderate	Fair Fair	4' - 13' 6' - 12'	7" 8"	15" 12"	
33	(Ash (Oak	26 26	P.36 P.36	16 16	50 groups per acre 50 groups per acre	Heavy Loam Heavy Loam	Good Good	Grass Bramble & coppice. Grass Bramble & coppice.	Heavy Heavy	V. Poor Fair	3' - 22' 4' - 20'	9½" 9"	15" 15"	
34	(Ash (Oak	27 27	P.36 P.36	16 16	50 groups per acre 50 groups per acre	Heavy Loam Heavy Loam	Good Good	Aira and thorn Aira and thorn	Heavy Heavy	V. Poor Fair	3' - 23' 5' - 20'	9¾" 9½"	13" 15"	
35	Oak	20	P.37	15	100 groups per acre	Heavy Loam	Good	Aira and coppice	Heavy	Fair	5' - 16'	8½"	12"	
36	(S.P. ( ( ( ( (Oak	124 124	P.40 P.40	12 12	Nurse to Oak, lines 4½' x 4½' S.P. 9' in lines with above S.P. 3 oak between each SP	Clay Clay	Good Good	Grass Grass	Heavy Heavy	Good Good	6' - 20' 3' - 19'	13" 11"	20" 18"	
37	D.F. S.P. D.F.	112 112 112	P.40 P.43 P.43	13 9 9	6 x 6 4 x 4½' 4 x 7	Sand Sand Sand	Good Good Good	Bracken & Heather Heather Heather	Slight Slight Slight	Good Good Fair	5' - 26' 3' - 15' 2' - 13'	14" 12" 19"	18" 18" 14"	Planted number Oak Burnt in 1942 " " "
38	(S.P. (S.P.	111 111	P.43 P.39	9 13	Not Gyro-tilled 4½' x 4½' Gyrotilled 4½' x 4½'	Sand Sand	Good Good	Heather Heather	Slight Slight	Good Good	3' - 16' 5' - 16'	12" 9"	15" 13½"	Burnt in 1942 recovering from Tortrix

Item No.	Species	Opt. No.	P. Year	Age (When measured) (Years)	Planting System	Site Factors				General Condition of crop (at time of report)	Height Growth			Remark
						Soil	Drainage	Vegetation	Frost		Top Ht. of Dominants	Av. annual Ht. increase	Av. annual Ht. increase over last 2 years	
39	(D.F.)	116	46	6	5½' x 5½'	Sand	Good	Heather Fern Grass & Heather	Mod.	Good	2' - 12'	14"	15"	Planted under Birch
	(D.F.)	116	47	5	5½' x 5½'	Sand	Good		Mod.	Fair	2' - 11'	15"	14"	" " "
40	S.P.	117	46	6	4½' x 4½'	Sand	Good	Heather	Slight	Good	3' - 10'	13"	18"	Badly attacked by Fomes
	S.P.	117	47	5	4½' x 4½'	Sand	Fair	Grass Heather	Slight	Fair	2' - 7½'	11"	15"	
41	(Ash)	14	35	17	50 groups per acre (16)	Loam	Good	Aira grass	Heavy	V. poor	3' - 23'	9"	13"	A fair percentage of Nat. Oak coming away.
	(Oak)	14	35	17	50 groups per acre (24)	Loam	Good	Bramble Cop. Lily of the Valley	Heavy	Fair	5' - 23'	10"	12"	
	(Bee)	14	35	17	5' x 5'	Loam	Good		Heavy	Fair	3' - 16'	6½"	15"	Planted under Birch
42	(Ash)	15	35	17	50 groups acre (16)	Loam on Clay	Good	Aira, Grass	Heavy	V. poor	3' - 21'	8½"	13½"	A fair percentage of Nat. Oak coming away.
	(Oak)	15	35	17	50 groups acre (24)	Loam on Clay	Good	Bramble & Thorn	Heavy	Fair	5' - 22'	9½"	13½"	" " "

# History of Bardney Forest

## APPENDIX V

### Compartment Area Statement

(With cross reference, New to Old, Compt.Nos.)

Name of Block	Old Cpt. No.	New Cpt.		Name of Block	Old Cpt. No.	New Cpt.	
		No.	Gross Area			No.	Gross Area
	1	1	12.0		44	41	28.2
	2	2	25.0		45	42	18.0
	3	3	26.0		46	43	18.0
	4	4	22.0		46	44	17.8
	5	5	27.0		47	45	13.0
	6	6	19.6		47	46	15.4
	6	7	19.7		48,49	47	28.4
	7	8	29.5		-	48	15.6
	8	9	19.0		-	49	22.7
	9	10	10.5		50	50	11.4
	10	11	11.5		33a	51	16.0
	11	12	15.0		34	52	13.2
	12	13	15.0		-	53	20.0
	13	14	20.0		-	54	16.3
	14	15	22.8		-	55	20.4
	-	16	30.4		-	56	22.7
	-	17	19.5		-	57	26.8
	19	18	10.8		-	58	22.0
	19	19	21.7		-	59	17.0
	18	20	20.3		-	60	17.0
	17	21	17.4		-	61	18.2
	17	22	17.5		-	62	21.4
	16	23	15.5		-	63	20.2
	15	24	25.0		-	64	22.8
	16	25	17.0		-	65	20.2
	21	26	30.7		-	66	20.4
	20	27	26.0		-	67	20.0
	22	28	24.3		28,29	68	22.0
	29	29	23.0		29,30	69	21.5
	-	30	34.4		29,30		
	-	31	32.2		33	70	28.4
	-	32	33.3		-	71	23.0
	39	33	23.3		31,32	72	25.0
	38	34	14.4		31,32	73	20.0
	37	35	24.6		66	74	32.2
	36	36	15.0		67	75	31.5
	35	37	19.8		68	76	32.0
	41	38	20.2		69	77	30.0
	40	39	27.2		73	78	19.2
	42,43	40	25.4		74	79	27.0
					75	80	26.2

APPENDIX V (Continued)

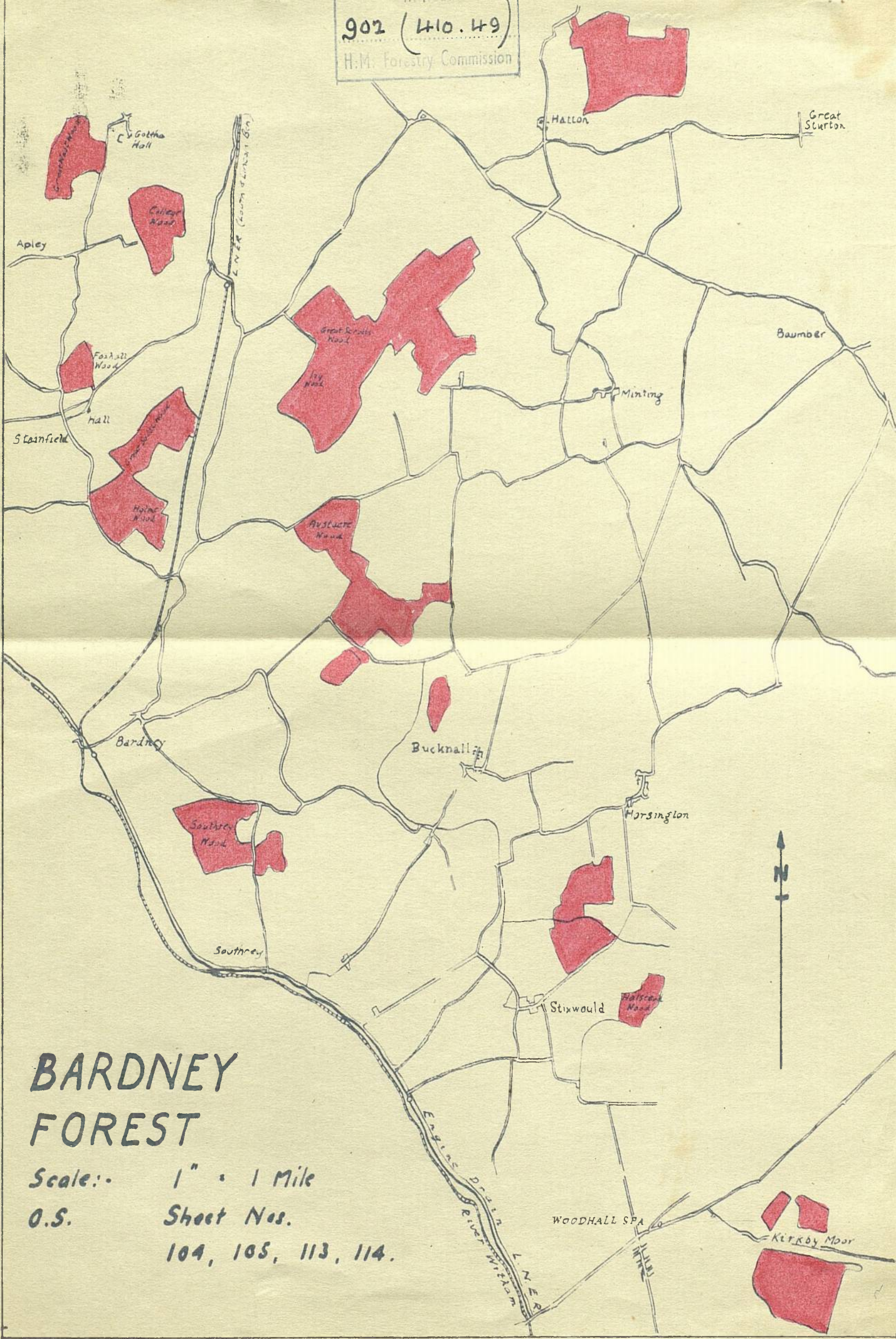
Name of Block	Old Cpt. No.	New Cpt.		Name of Block	Old Cpt. No.	New Cpt.	
		No.	Gross Area			No.	Gross Area
	76	81	16.3		-	121	12.2
	77	82	22.0		-	122	25.1
	78	83	20.3		-	123	13.0
	79	84	31.1		-	124	15.1
	58	85	17.6		-	125	20.2
	59	86	24.0		-	126	22.0
	60	87	22.9		-	127	7.6
	61	88	15.2		-	128	24.9
	62	89	15.0		-	129	19.0
	63	90	27.0		-	130	27.5
	64	91	15.1		-	131	17.8
	65	92	21.8			132	
	51	93	12.0			133	
	52	94	20.0			134	
	53	95	23.2			135	
	54	96	20.2			136	
	55	97	21.2			137	
	56	98	30.0			138	
	57	99	11.0			139	
	3	100	18.6			140	
	2	101	18.4			141	
	1	102	23.6			142	
	7	103	19.2			143	
	6	104	22.0			144	
	5	105	23.5			145	
	4	106	23.7			146	
	11	107	13.1			147	
	11	108	16.0			148	
	10	109	19.5			149	
	10	110	10.7			150	
	9	111	24.0			151	
	8	112	20.0			152	
	-	113	17.9			153	
	-	114	16.4			154	
	-	115	18.2			155	
	-	116	15.0			156	
	-	117	15.7			157	
	-	118	19.0			158	
	-	119	28.4			159	
	-	120	19.6			160	







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H.M. Forestry Commission



# BARDNEY FOREST

Scale: 1" = 1 Mile

O.S. Sheet Nos.

104, 105, 113, 114.