

Object of Management. To create and maintain in perpetuity a forest of irregular structure which will function primarily in a protective capacity:

Principles of Management.

1. The stand to be created should be of a composition and structure best adapted to the natural conditions and such as to maintain and increase soil fertility to the greatest possible extent.
2. The object will be to achieve the highest value production by an increase of the growing stock and of the production to the extent necessary to supply the highest possible increment in respect of volume and quality.
3. To determine the optimum amount and composition of the growing stock for the provision in perpetuity of a sustained yield while maintaining the soil permanently overshaded, i.e. by avoiding the use of clear-felling operations.
4. To obtain experience and information that may prove valuable in the treatment of protective belts at high elevations either in isolation or in forest areas.
5. To improve access to the forest as may be necessary to ensure satisfactory exploitation of the available material.

Situation. The experimental area is situated mostly on the upper and middle slopes of two diverging spurs, running NE to S and N to S from the main mass of the Dunslair Heights, which form the southern and highest part of the Moorfoot Hills. The area is an irregular horse shoe in shape. The spurs meet at Caresman Hill, 1831 ft. Glentress Valley lies between the spurs, with Glentress Burn at the foot. The lowest part of the area is 800 ft., and most of it is above 1,250 feet.

The experimental area forms part of Glentress State Forest, and is about 2 miles ENE of Peebles.

Area. 302 acres. The Forestry Commission compartments are grouped into 6 Blocks, ranging from 43 to 54 acres each.

History. It is not known if the whole area was covered with forest in prehistoric times. If so, it is likely to have been mainly birch-oak-rowan-hazel, with possibly some ash and alder in the wetter and lower pockets. It was probably cleared for grazing. The forest was acquired by the F.C. from the Hay Estate in 1920, with a small area of old plantations on the upper slopes. These were mixed Scots pine and European larch established between 1903-06. There are scattered remains of these in Blocks C and D. Rectilinear strips were cut through the pine and larch by the F.C. and planted with Sitka spruce. Pure blocks of conifers were planted in other parts. In more recent years, some of the young larch areas have been opened out and an understorey of spruce introduced.

Climate. 37½" rain p.a. 206 rainy days (0.2" or more). 60 days of snow and sleet. Snow lies on the average 20 days a year. The locality is not subject normally to long droughts. The daily mean sunshine is 3.39 hours. R.H. 75% - 80%. Mean Annual Temperature 45°F. Ground frost on over 100 nights per annum on the average. The area is exposed to the S.W. and W. winds. The valley of the Glentress Burn acts as a sort of funnel and concentrates wind strongly on blocks C and D. There are probably better moisture conditions on the lower and more sheltered slopes of Blocks A, B, C, D than on the higher ground with a S.E. exposure in Blocks B, D, E, F.

Geology. There are hard greywacke outcrops on the tops of the upper slopes of the ridges. These rocks are usually shattered and so allow a certain amount of root penetration. The lower slopes are masked by a varying depth of heavy glacial till, often of a fertile nature. In places the clay is overlaid by a layer of scree or colluvial soil, giving good forest soil conditions. Springs occur along the middle slopes in Blocks A, B, C.

Soil. Mostly a brown earth, slightly leached at the higher elevations and in parts along the highest ground in Blocks C and D where heather and heath plants are present. Except for heavy boulder clay at the foot of Block A, the subsoil texture is fairly loose.

Vegetation. The ground vegetation is mostly a grass-heath with fine grasses and mosses. In recently thinned plantations there is some Holcus mollis.

There is apparently only one leaf-tree in the experimental area - an elm in Compt. 3/14.

The existing stands have been artificially created. They include Scots pine of a promising type, Corsican pine which has not done well on the Silurian soils and is diseased and dying off, European larch of an apparently inferior strain which has done badly. Japanese larch is growing satisfactorily but is rather coarse on the heavy pockets of soil. Norway spruce is mainly in the moist hollows where it is doing well. It has also been planted under larch and is developing normally. Sitka spruce was planted in strips cleared through the larch some 30 years ago and is growing vigorously although some leaders show sign of wind damage. Also some Sitka has been planted in more recent years in opened out larch and is healthy. It is not likely to form permanent forest on the drier high-lying parts. Douglas fir occurs as a pure belt along the bottom of the slopes in blocks A & B and is about 30 years old and growing vigorously. Silver fir (A. grandis) has been underplanted in Block F. There is an unhappy patch of Pinus monticola in Block C.

This is in effect an application of the block method.

Growing Stock. The enumerations and volume calculations will provide the means of assessing the effect of the treatment proposed and the progress towards the desired objective. The enumeration will consist of 100% callipering by compartments and blocks of all stems greater than 3 $\frac{3}{4}$ " BHQG. The trees will be grouped into 1 $\frac{1}{2}$ " QG classes ranging upwards from a mid group of 4 $\frac{1}{2}$ " QG. Each year one block will be enumerated and thereafter on a 6 year cycle. Standing volumes will be calculated on the basis of the enumeration data by means of a Conventional Volume Table in Hoppus feet. The data will be used to obtain information on stem numbers and volume, i.e. numbers of stems and volume per acre. These will show the distribution of stems by classes per acre and so information will be recorded of the relationship of the size classes to one another by stem numbers and by volume. Thus the data will be used towards achieving normality for this type of forest.

all living trees grouped into blocks < 5' not included in vol

Volume. As fellings take place and are recorded, conversion factors will be obtained in order to convert management volumes into production volumes. This will be done for each species and probably for each compartment and block. A reduction coefficient has been worked out for Block A. In 1952 the measured volume of the trees marked for felling amounted to 11,819 hopsils. From this, 8,567 H.ft. were obtained after felling. This represents 72.5% of the management volume, or in other words, the present reduction coefficient is 0.725. This ~~reduction~~ coefficient is liable to increase as the stand approaches nearer normality.

*8
7840 H.ft
9565 hopsils
0.725*

Costs. Unit costs for 1954 based on a production of 7840 H.ft. are as follows:

Thinning	6 $\frac{1}{4}$ d.	Crosscutting	3d.	Pitwood loading	1d.
Extraction	3 $\frac{1}{4}$ d.	Sawmilling	10d.	Under-sized poles	1 $\frac{1}{2}$ d./stob
Measuring	2 $\frac{1}{2}$ d.	(Millwood)		for stobs.	

Receipts amounted to the following:

Millwood	9/- per cu.ft.	Under-sized poles - firewood	35/- per ton
Firewood	30/- " ton	stobs	5/- " "
Pitwood	90/- " "	stakes	5/- " "

During the year there was a net profit of £644-3-9 on these operations.

Planting costs, including transport and weeding came to £73.12.10 for the year.

Increment and Prescribed Cut. It is too early to fix a prescribed cut as increment determination cannot be made as yet with any accuracy.

Stand Structure. The regular structure of the existing stands is being broken up to develop irregularity. Briefly, this is being done by creating gaps of 1/20 acre or 1/40 acre, and to introduce climax species into these.

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In Block A the conversion period is being taken as approximately 60 years. Therefore on a 6 year cycle, 1/10 of the block will be opened out and planted each year. At the end of the conversion period the block should then consist of groups of various ages ranging at 6 year intervals from 1 - 60 years, and possibly with remains of some of the original crop aged 90 years then. At the moment the block contains trees of only the lower size classes and with only one series of groups of climax species, i.e. those planted in 1952-53.

Future Working. The essence of the silvicultural treatment is to train up all the existing stands to furnish the highest value production in perpetuity, and to make use of them for the training up of stands of new species to be introduced. Treatment and regeneration of the stands will not follow any rigid pattern, but will be haphazard. Treatment will be flexible, and it will be modified from time to time on the basis of the results obtained. It will be based on experience and evidence which accumulate. It must be kept in mind that the objective is the ultimate establishment of a main crop of climax species of irregular ~~structure~~ structure and composition, in particular Norway spruce, Silver fir and beech.

Procedure.

1. The introduction of main crop species in varying proportions in conditions deemed to be suitable to them.
2. The retention of existing pioneer species.
3. The introduction of pioneer species where they are required to prepare the locality for the introduction of main crop species.
4. The introduction of other climax species on a small scale only.
5. The thickening of all exposed margins with wind-firm, relatively slow growing species, e.g. sessile oak, ash and sycamore.
6. A thinning treatment to enable the main crop species to take over gradually.
7. New species to be introduced by some form of group planting with groups of variable age, and the planting distance within the groups to be not greater than 3ft. x 3 ft.
8. All existing bare land to be planted up not too quickly so that passages are left for extraction until such time as groups of older trees have a high canopy to permit extraction in them without damage to the stand.
9. Regeneration and extraction methods will not be rigidly prescribed. Each case will be dealt with on its merits.
10. Except during the year of treatment, no cultural operations will be carried out in any block apart from the removal of blown or dead trees, but if thought necessary, and exceptionally, certain treatments may be applied on a 3 year cycle.

Work Done. Work began with the treatment of Block A in '52-53, and Blocks B and C were dealt with in the next two years. Block D will be enumerated in September/October of this year by the students, and fellings marked and groups selected for planting by the F.C. next year.