Knockrath Woodlands:

A 20 Year Review

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Introduction

The changes in growing stock and species composition of Knockrath Woodlands have been monitored by repeated inventories over a period of 20 years as part of working plans prepared by forestry students from University College, Dublin. The summarised results of these inventories, as presented at a Seminar on Management of Woodlands in April 1976, are reproduced here to illustrate the changes which have taken place under a management plan which had as a main objective the application of the principle of sustained yield.

Location and historical background

The forest known as Knockrath Woodlands forms part of the estate of the Rt. Hon. the Earl of Meath and lies in the valley of the Avonmore river north of Rathdrum in Co. Wicklow. The area by land use is given in Table 1.

TABLE 1

AREA BY LAND USE

Type	Area
Coniferous High Forest	195.5 ha
Broadleaved High Forest	24.8 ha
Pasture	20.8 ha
Felled, unplanted	12.1 ha
Scrub	10.8 ha
Fish Farm	8.0 ha
TOTAL AREA =	272.0 ha

The property when acquired by the Estate in 1887 consisted of 139 ha of conifers, 127 ha of oak coppice and 17 ha of mixed broadleaved species. Since then the total area has varied as a result of acquisition and disposal of land.

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The older coniferous stands were planted during the period 1905 to 1935 when the woodlands were managed by a Scottish forester named Macintosh. These consist of Scots pine and European larch mixtures and stands of Douglas fir established on former grazing land. The oak woods of Knockrath are remnants of the once widespread indigenous sessile oak woods of Wicklow. These woods provided charcoal for iron smelting in the 17th century and evidence of smelting still exists in Knockrath Woodlands, at Furnace Bridge. Management practice from 1677 to 1890 was to manage the areas of oak as short rotation coppice. After 1890 this was allowed to grow into high forest.

In 1956 the woodlands came under the provisions of a working plan with the object of managing the woodlands profitably and improving the growth potential by introducing high yielding conifers while working on a sustained volumetric yield basis so as to insure sustained income. Further objectives included the conservation and enhancement of amenity in woodland areas bordering the public road.

Site Factors

Most of the forest lies between 100 to 250 m above sea level. The aspect is generally north-easterly and fairly well sheltered from the prevailing wind. Rainfall is approximately 1100 m.m. per annum. Late spring frosts occur frequently on the flat areas along the river and are sufficiently severe to cause damage to young Sitka spruce plantations.

The bedrock in the area is comprised predominantly of Ordovician shales and slates. Occasional igneous intrusions of quartz also occur. Three major soil groups have been identified in the forest (Carey 1970). Brown podsolics with good drainage account for over 90 per cent of the forest area. Soil depth varies from 25 to 75 cms, but it is usually up to 60 cms in depth. pH averages 4.8 for this soil group. Peaty gley occurs in one area. It is characterised by a surface peaty layer varying from 7 to 60 cms in depth which is extremely acid in reaction. The underlying mineral horizons have a relatively high content of silt, with poor structural properties, and are very compacted. The third group are alluvial soils which occur in close proximity to the Avonmore river. The alluvium varies from 60 to 90 cms in depth overlying ordovician shale drift. These are highly productive soils except in local conditions where drainage is impeded.

The natural climax vegetation for the area, which was sessile oak (*Quercus petraea*) with associated *vaccinium myrtillus, Luzula sylvatica* and *Pteridium aquilinum,* has now largely been replaced by

coniferous plantations, grassland, furze and bracken, but some 22 ha of indigenous woodland still remain.

The Growing Stock

The woodlands at present consist of even-aged high forest with Douglas fir, Scots pine, European larch and oak stands predominating. Species distribution by area and age-class is illustrated in Fig. 1. Although the histogram may give the impression that

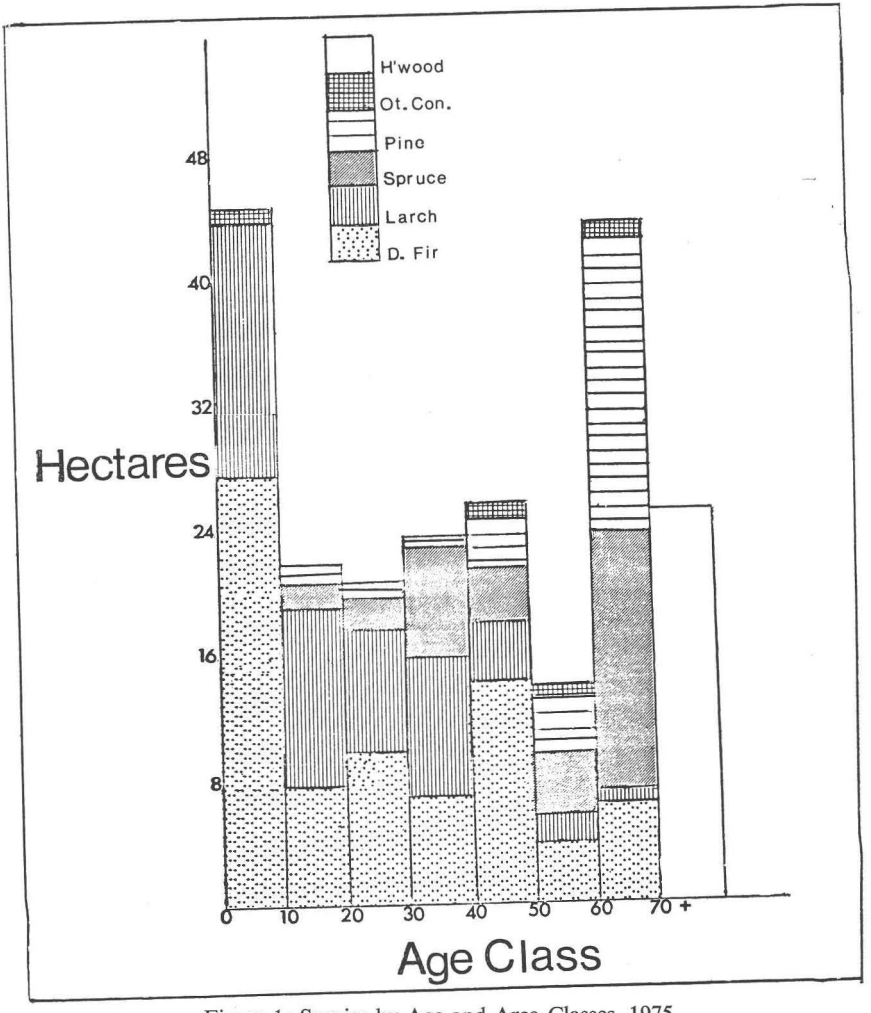


Figure 1: Species by Age and Area Classes, 1975.

all species grow in pure stands most of the older stands are of Scots pine and European larch growing in intimate mixture. In contrast Douglas fir stands are mainly pure as are the spruces. The oak occurs as pure stands of coppice origin.

Although the oak is only yield class 4, the growth potential of conifers is reasonably good. Scots pine and European larch range in yield class from 8 to 12 and Douglas fir from 12 to 18.

The growing stock as shown in Table 2 has remained at an almost constant level since 1956. This is consistent with the policy of sustained yield.

TABLE 2
GROWING STOCK AT PERIODIC INTERVALS

Year	Growing Stock (m^3)		
	Conifer	Broadleaved	Total
1956	29.511	8,633	38.244
1965	28.791	7,364	36,155
1970	32,763	8,042	40.805
1975	33,502	5,855	39,357

It will be observed that, while the total volume shows little change, there is an increase in the coniferous growing stock and a corresponding decrease in the broadleaves.

The development of the growing stock and the species composition by volume and age is shown in Figures 2 to 5. Apart from the preponderance of Scots pine and European larch in the older age classes, the main features of interest are the decrease in volume of oak during the period 1970-75 and the relative weakness in volume in the middle age group. This latter feature shows where the forest deviates from the ideal of a normal forest. This is also apparent in Table 3 which shows an area below average for the pole stages.

TABLE 3
AREA OF DEVELOPMENT CLASSES

Development Class	Area (ha)
Unplanted	51.7
Establishment and Thicket	49.3
Small pole	34.3
Large pole	24.8
Young timber	31.7
Mature timber	56.3
Mature broadleaved	23.9

Fig. 2 Growing Stock

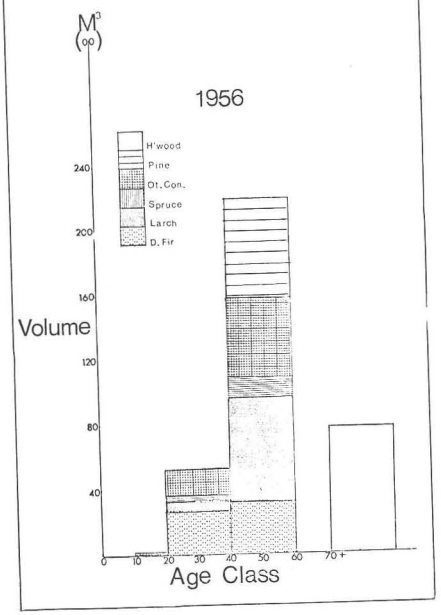


Fig. 3 Growing Stock

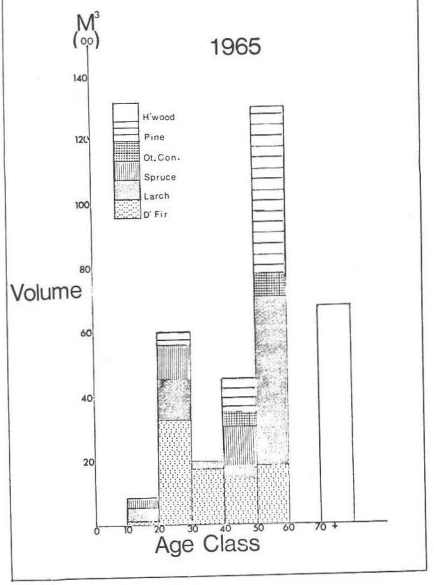


Fig. 4 Growing Stock

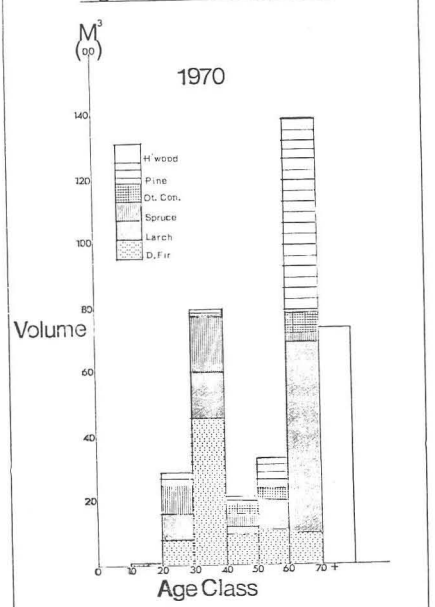
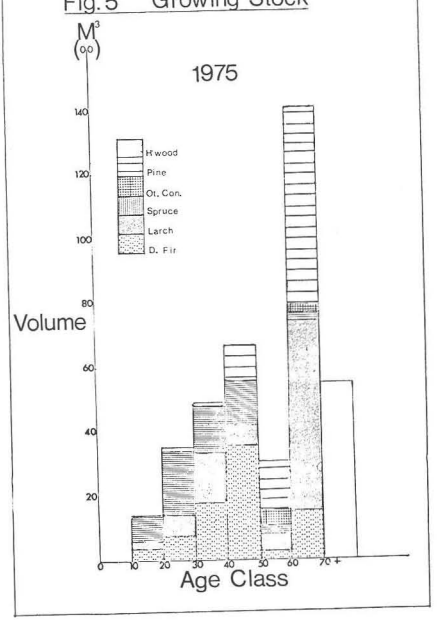


Fig. 5 Growing Stock



In the long term the differing growth rates within age classes may be used to help mould the growing stock towards normality.

Yield Regulation

The growing stock is essentially the same today as it was in 1956 (Table 2). This implies that the volume harvested is equal to the volume increment over the period. Table 4 shows the volume recorded as harvested over two time intervals for both conifers and broadleaves.

TABLE 4

VOLUME HARVESTED

Period	Conifers (m^3)	Broadleaves (m^3)	Total (m^3)
1956–1966	9,702	1,119	10,821
1967–1975	6,151	2,015	8,166
TOTAL	15,853	3,134	18,987

On the basis of the data in Table 4 the yield per year from 1956 to 1975 was approximately 1000 m^3, giving a mean annual yield per ha of 3.5 m^3. About half the annual yield was from normal clear felling of mature Douglas fir, Scots pine and European larch. One-tenth of the yield has come from the supply of some 80 transmission poles per year. Oak has contributed one-sixth of the yield on average, while the remainder consists of coniferous thinnings.

An interesting feature arising from the above data is that the mean annual production per ha would appear to be 3.5 m^3 despite the fact that the average yield class for conifers is three times this figure.

While it is generally accepted that harvested yield falls short of yield table forecasts due to various factors, including unstocked areas, sub-normal stocking and dead, dying and broken trees not listed for sale, the magnitude of the discrepancy at Knockrath requires further comment. For the period under review a large part of the area harvested had been stocked by broadleaved species of which only the commercial volume would normally be recorded and many trees would be classed as firewood. This and the possibility that the usual allowance of 15 per cent of yield table felling forecast yield had not been adequate in the case of Knockrath could explain a large portion of the volume discrepancy. As the newly planted areas reach the thinning stage and harvesting concentrates on the coniferous stands the difference in volume between harvested yield and yield table forecasts can be expected to diminish.

REFERENCE

Carey, M. L., 1970. Reconnaisance Soil Survey of Knockrath Woodland, Co. Wicklow. (Unpublished).