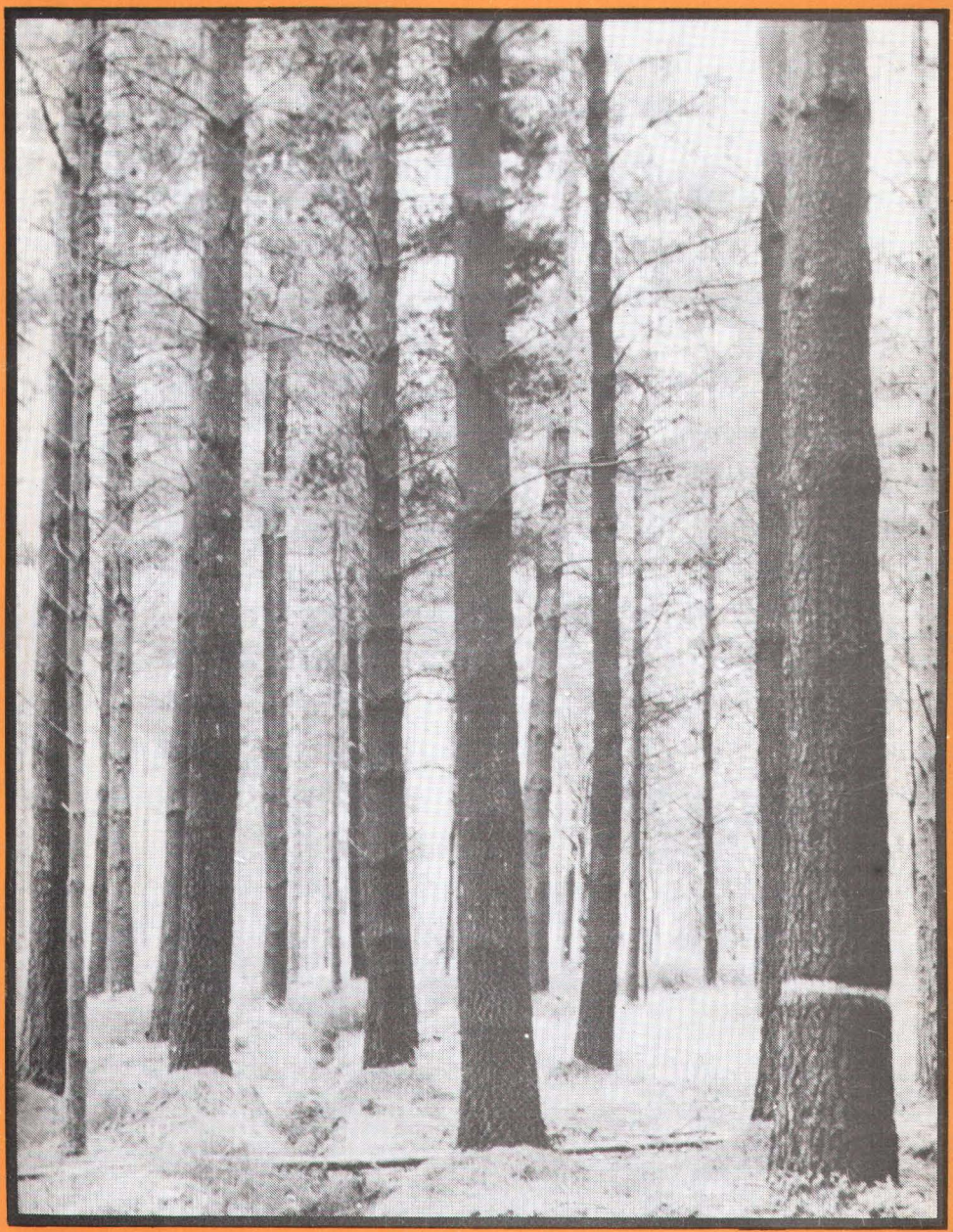

Vol. 42, No. 1, 1985

IRISH FORESTRY

JOURNAL OF THE SOCIETY OF IRISH FORESTERS

ISSN 0021 - 1192

IRISH FORESTRY

JOURNAL OF THE SOCIETY OF IRISH FORESTERS

Volume 42, No. 1, 1985

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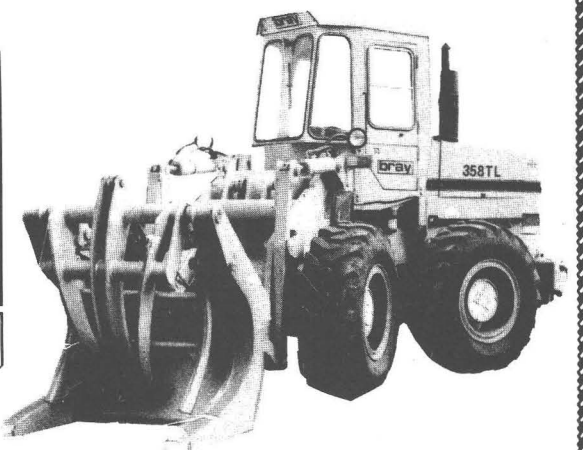

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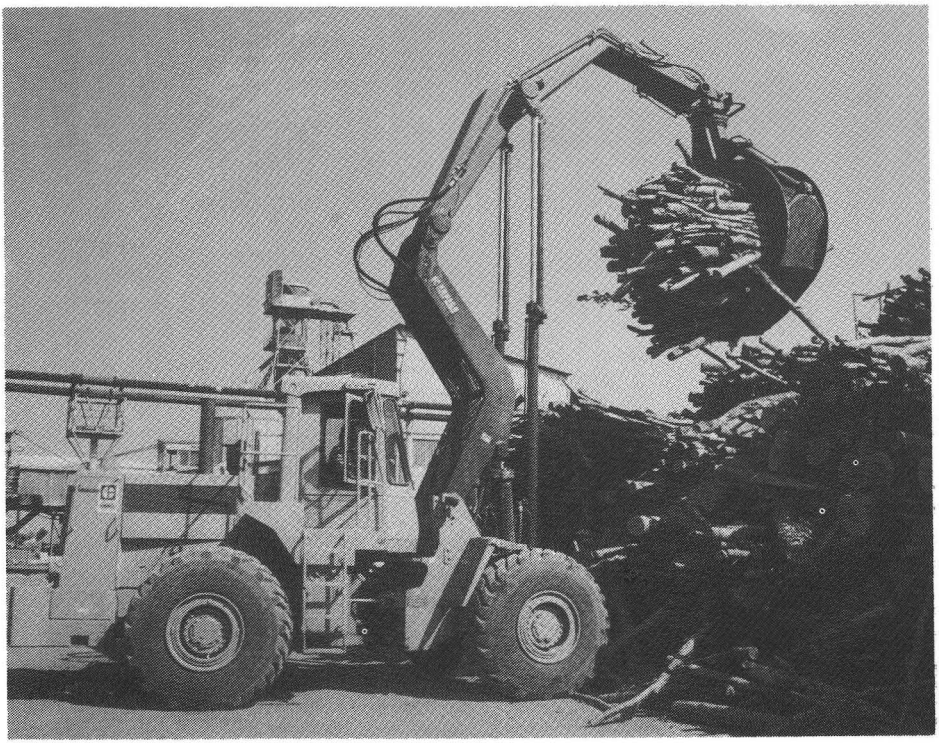

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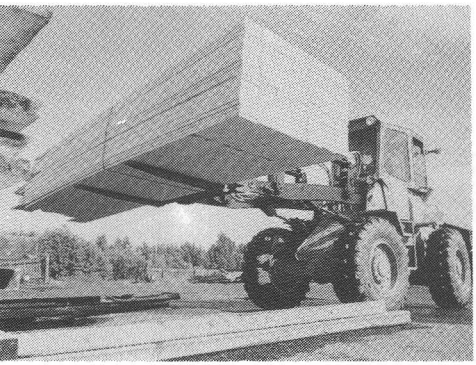

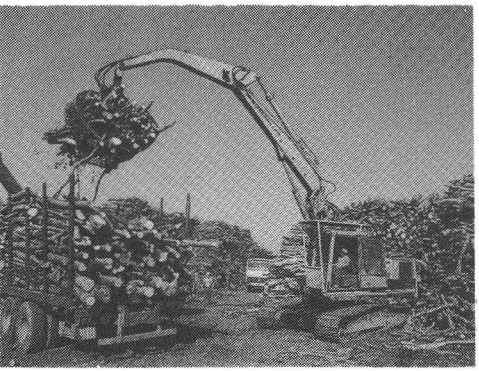

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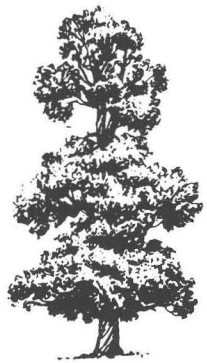

JOURNAL OF THE SOCIETY OF IRISH FORESTERS

Volume 42, No. 1, 1985

Notes for the

Assistance of Contributors

The following notes are designed to aid the speedy processing of scientific contributions to the journal. Authors should comply with them in so far as this is possible.

1. Two copies of each paper should be submitted, in typescript, with double spacing and wide margins.

2. Diagrams and illustrations should be clearly drawn in black ink on good quality paper. Captions should be written on the back of each illustration. Illustrations, wherever possible, should be drawn in an upright position (x axis narrower than y). The approximate position of diagrams and illustrations in the text should be indicated in the margin.

3. Tables should not be incorporated in the body of the text, but should be submitted separately at the end (one table per page). Their approximate position in the text should be indicated in the margin.

4. Nomenclature, symbols and abbreviations should follow convention. The metric system should be used throughout.

5. References should be in the following form:
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6. A short summary of the paper should be included. It should precede the main body of the text.

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Contents

Note: The opinions expressed in the articles are those of the contributors.

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Printed by the Elo Press Ltd., Dublin 8, Ireland.

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Errata

Apologies are due to E. Hendrick, whose name was inadvertently omitted from the list of Technical Councillors in both 1984 issues of the Journal and to Ms. L. O'Reilly who was incorrectly listed as Mr. L. O'Reilly when she was presented with her **Forester's Certificate.**

EDITORIAL

A Blessing in Disguise

It has been said, with more than a grain of truth, that Ireland is the most socialist country in Western Europe — from a forestry standpoint. There are very cogent historical reasons for this situation and it is not the intention of the State to maintain this position. Over the past four years Regulation (EEC) No. 1820/80, otherwise known as the Western Package, has attempted to redress the imbalance with only limited success. With hindsight we now know that the antipathy towards trees and the sociological constraints are more deep-rooted than we had anticipated.

The 'Package' is due to be reviewed this year, so it is opportune to suggest that the review should look forward as well as backward. It is not enough to say that some IR£19 million have been made available for private commercial tree planting and that the area planted by an applicant in any one planting season must not be less than 0.25 ha. Private woodland ownership in Europe is already fragmented. There are some 3 million woodland owners in the EEC and all but 50,000 have holdings of doubtful viability. The general standard of management is poor and the difficulties inherent in managing small units are aggravated by lack of knowledge and absence of management incentives. Fortunately for them the vast majority of such owners are not dependent on their woodland for a livelihood.

Is it the intention in Ireland, under the aegis of the Western Package, to swap an agricultural 'poverty trap' for its forestry counterpart? If the answer is in the negative, then it behoves us to take preventative action. We must spell out the objectives as we see them in terms of ownership, viable unit size and forest structure. Measures must be implemented to ensure that the policy adopted will generate the kind of stands and forest that will enrich the 'West' and the Nation. The poor response to date for the 'Western Package' may yet turn out to be a blessing in disguise.

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(c) Production of two issues annually of Society's journal "Irish Forestry"

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Submissions to the journal will be considered for publication and should be addressed to: Dr. J. J. Gardiner, Editor, Irish Forestry, Department of Forestry, University College, Belfield, Dublin 4. The attention of contributors is drawn to "Notes for the Assistance of Contributors".

Sales and advertising are handled by: Mr. E. Hendrick, Business Editor, 58 The Rise, Boden Park, Dublin 16. Tel. 945596.

Irish State Forestry: Government Policy 1948-1959

T. Rea

Forest and Wildlife Service.

ABSTRACT

This article covers the period from 1948 (the year the new policy was announced) to 1959 (the year in which the 25,000 acres planting target was first achieved), and deals specifically with the sequence of events culminating in the planting of 25,000 acres per year. Dail Reports and Official Reports of the Minister for Lands were examined, as well as those (very few) departmental files that have survived the intervening thirty odd years. Several organisations were approached — e.g. Department of An Taoiseach, Department of Foreign Affairs, Stationery Office, National Library etc. — all of which contributed generously to the information contained in this article.

The principal conclusions are as follows:

1. Before the election (February, 1948) which installed the first Inter-Party Government, a policy existed of planting 10,000 acres per annum over a 50 year period. The intention was to extend the national forest area to a total of 700,000 acres, including the privately owned estate (85,000 acres).
2. The new Government did adopt, in November 1948, a policy of planting 25,000 acres per annum over a 40-year period.
3. The latter programme represented new planting, i.e. 25,000 acres per annum on top of the then existing estate (about 170,000 acres).

Much (but not all) of the evidence for these conclusions appeared in the forestry estimate debates in the Dail Reports covering the years 1948 to 1959. For the purposes of this paper contributions from Ministers and ex-Ministers only will be quoted.

INTRODUCTION

A few years ago the author served on a special working group to prepare a report to Government on the State Planting Programme. The purposes of the exercise was to review the achievement to date of the State Afforestation Enterprise and to re-appraise the case for the continuation of the planting programme. The task under-taken was to establish what had been the framework within which the Government made the 1948 decision ("to plant a million acres by annual increments of 25,000 acres") and to clarify whether the expressed target was meant to be on top of, or inclusive of, the 1948 existing estate.

IRISH FORESTRY, 1985, Vol. 42, No. 1: 7-15.

It is worth recalling that the period under review was a period of unusually frequent changes in Government. Eighteen years of continuous Government by the Fianna Fail Party was ended in February 1948 with the formation of the first Inter-Party Government. Mr. Joe Blowick (Clann na Talmhan) became Minister for Lands and Mr. Sean MacBride, Clann na Poblachta (a central figure in the new policy announcement of December 1948) Minister for External Affairs. In May 1951, Fianna Fail formed the Government, with Mr. Tom Derrig as Minister for Lands. The second Inter-Party Government took office in early 1954, again with Mr. Blowick as Minister for Lands (Mr. MacBride was not a Minister in this administration). In March 1957, another change of Government saw Mr. Erskine Childers, Fianna Fail, appointed Minister for Lands.

Given that the highest State planting achievement in any year up to 1948 was 7,000 acres, one would reasonably have expected that the annual target announced in December 1948, of 25,000 acres per year, would have been preceded by a detailed appraisal by the responsible Department (Lands) and by the Department of Finance and, the Government. There is, however, no evidence that this happened; indeed, the policy was enunciated not by the Department of Lands but by the Department of External Affairs in just two brief paragraphs of a 35 page White Paper outlining Ireland's economic development plans 1949-1953 within the post-war European Recovery Programme.

The Pre-1948 Policy

Mr. de Valera, then leader of the Opposition, in an interesting speech to the *1950-51 Forestry Estimate,* referred to the formation, in 1946, of the Fianna Fail Party's planting programme. The Party had, he said, a sub-committee sitting "to develop our programme of afforestation". The evidence presented to the sub-committee (he said) in 1946 by forestry advisors was to the effect that 600,000 acres of forest were needed "to supply not merely existing needs but foreseeable needs".

It was said, according to Mr. de Valera, that about 100,000 acres would be required, in addition, "for protective purposes", thus raising the total requirement to 700,000 acres. At that time (1946), the area under forests was 200,000 acres, comprising 115,000 acres owned by the State and 85,000 acres privately owned, so that a further 500,000 acres was required. The Party, therefore, adopted the objectives of reaching within three years a planting rate of 10,000 acres per annum and considered that "that was indicated as the figure which would, year after year, meet our requirements".

The *1948/49 Forestry Estimate* debate (8th and 9th June, 1948) pre-dated the White Paper (December 1948) referred to above and is therefore, perhaps, only of historical interest. It is clear from the debate that in the election (February 1948) campaign Clann na Talmhan had promised that 60,000 acres would be planted annually and, more incredibly, Clann na Poblachta had said they would plant one million acres in five years (an annual rate of 200,000 acres). In the debates he handled in the two Inter-Party Governments, the Minister (Mr. Blowick) received considerable "stick" from opposition speakers on foot of the 1948 election promises.

The 1948 Policy Decision

The important document is a White Paper entitled "The European Recovery Programme: Ireland's Long Term Programme (1949-1953)". This incidentally, proved to be elusive and attempts to trace it in the Department of Fisheries and Forestry and in the Department of An Taoiseach as well as in Government Publications and the Stationery Office were unsuccessful. After establishing its existence in the library of Trinity College, Dublin, a copy of the White Paper was finally obtained in the Department of Foreign Affairs.

The European Programme (ERP) was a complicated post-war European recovery procedure which originated in 1947 with a speech made by the United States Secretary of State (Marshall). The procedure agreed, under what was called the "Convention for European Economic Co-Operation", in Paris in April 1948, and debated in the Dail in June 1948, had two aspects, viz. aid to European countries by the USA and a form of what was termed "self-help" by the participating countries. The foreword to the White Paper sets out the background to, and the elements of, the programme prepared by the Irish Government. Paragraphs 48 and 49 (Page 22) of the 35 page programme deal with "reafforestation" and are as follows:

> 48. During the war years Ireland's stock of soft woods was depleted by 60 per cent; this depletion, taken in conjunction with the country's requirements of timber, renders it imperative to engage in large-scale reafforestation. While this will not bring any immediate results (save in so far as it provides employment) it forms part of Ireland's long-term planning.
>
> 49. So far, reafforestation has been carried out only on a very small scale; in recent years, the rate of planting in the State Forests has been approximately 6,000 acres per year. It is

> proposed to step this up to 25,000 acres per year. The aim will be to plant a million acres by annual increments of 25,000 acres. At maturity, and assuming an average yield of 3,500 cubic feet of timber per acre on a 50 year rotation, the annual return on a 25,000 acres felling will be of the order of 87.5 million cubic feet or approximately 350,000 standards of sawn timber.

The paper was "Presented to both Houses of the Oireachtas by the Minister for External Affairs" (Mr. Sean MacBride).

No specific debate took place in the Dail on this White Paper (dated 20th December 1948). The first Dail reference to a 25,000 acre annual programme took place on March 10th, 1949 when Mr. McEntee (Fianna Fail), in a crisp comment on the Minister's reply to a question on the area acquired for State forestry in the year ended 28th February 1949, said "We are a long way from the 25,000".

In the following month (April 27th, 1949), when introducing the *1949/50 Forestry Estimate* the Minister (Mr. Blowick) referred to "the increased programme of 25,000 acres a year recently announced". Mr. Moylan (Fianna Fail) — Mr. Blowick's predecessor as Minister for Lands — said "I fully approve that policy, and anything this Party can do to help will be done, and we wish the idea every luck in the world". During that debate the Minister referred to the new policy decision on at least five occasions. At one point he said "since the Government finally decided upon embarking on the 25,000 acres programme, and since other steps were taken, the acreage coming in is very satisfying to me".

In the *1950/51 Forestry Estimate* debate (23rd May, 1950) the Minister refers to the position "when we decided to increase the planting programme from in the neighbourhood of 5,000 or 6,000 acres per year to 25,000 acres". Later he said "until we have 1,000,000 to 1,250,000 acres of forestry we cannot say that we have the land working to its maximum output".

The Land Survey

There is a need, if only for historical accuracy, to dispel the idea that the eventual estate size target derives from a land survey carried out by the Department of Lands. This is a misconception which surprisingly — in the light of the evidence — appears to have become pretty widespread in the 1950s. It is clearly on official records that in 1956 the Minister for Lands understood that the figure of 25,000 acres was not related to any assessment of the future timber requirements of this country but flowed mathematically from a fixation of an ultimate forest acreage target of 1¼ million

acres by reference to the fact that a cursory survey of potential forest land carried out by his Department indicated the availability of some 1,200,000 acres of such land.

In the Official Report of the Minister for Lands covering the four years 1st April 1953 to 31st March 1957 it is stated "in 1948, following a national survey of potential forest land, it was decided that the rate of afforestation should be expanded as rapidly as possible and that the target should be a planting rate of 25,000 acres per annum".

These statements are not correct. The Minister, (Mr. Blowick), speaking in the Dail on 28th April, 1949, said "shortly after I came into office I asked the Forestry Department to set about making a survey of land suitable and available for forestry all over the country". The Department's relevant file (one of the few files traced from that period) clearly shows that the survey did not begin until January 1949 and was not completed until January 1950. The result of the survey was announced by the Minister for Lands in an estimate (1950/51) speech on May 2nd 1950 when he said that the area (1,200,000 acres) is not "to be taken as the limit of plantable land but should be regarded as the minimum". The point is that the survey post-dated the White Paper of 20th December 1948 and, therefore, could not, of course, have contributed to the decision. The sequence was: first the decision to plant 25,000 acres per annum, then the land survey, then the request for FAO advice (culminating in the "Cameron Report") on the conclusions of the survey.

The Cameron Report

The Cameron Report (the FAO Report on Forestry Mission to Ireland", 15th February, 1951) is referred to on several occasions in the Dail Reports 1951-1959. For reference purposes the important paragraphs relevant to the subject of this article appear in the Foreword (first paragraph) and at Page 14 (paragraph 20) of that report. In the Foreword it is stated "In February 1950 the Government of Ireland notified the Director General of the Food and Agriculture Organisation that as a part of its long-term programme of economic development a policy decision had been taken involving the establishment of 25,000 acres of new forestry plantation annually over a period of 40 years". Paragraph 20 of the Report notes that "there is no overall definition of forestry policy embodied in the legislation in Ireland, such as might be expected in the Forestry Act 1946", and goes on to quote the relevant paragraphs from the White Paper (although Cameron does not call it that) of 1948.

Regretably, all efforts to trace the letter sent in February, 1950 by the Irish Government to the FAO ended in failure. The FWS Secretariat file dealing with the Cameron Report cannot be traced and the Departments of An Taoiseach and of Foreign Affairs have no record of any relevant papers.

Subsequent Forestry Estimate Debates

In May 1951 there was a change of Government and the new Minister for Lands (Mr. Derrig) had an easy passage with the *1951/52 Forestry Estimate.*

In introducing the *1952/53 Forestry Estimate,* on July 1st 1952, Mr. Derrig referred to "insistent and unremitting pressure on my Department to increase the planting rate at all costs". Mr. MacBride spoke in this debate — the first time he did so on forestry in the Dail in the period researched. He said "the Inter-Party Government agreed on a plantation target of 25,000 acres a year".

The Minister's reply to the debate is interesting in that he refers to "the document issued by the Minister for External Affairs as a White Paper to the ERP on December 20th 1948" as being the first public pronouncement regarding the 25,000 acre programme and "for which I cannot find any authority at all from the technical officers responsible to me". He went on: "The Department of Lands know nothing officially about it. No official authorisation had been given by that Department to that programme and it was only during the following year that the then Minister, now sitting at the other side of the House, stated to the Forestry Division that the Government had adopted a planting programme of not less than 25,000 acres".

On 29th March 1955, Mr. MacBride spoke to the 1954/55 Supplementary Estimate on Forestry. By this time the Inter-Party Government was back in office, again with Mr. Blowick as Minister for Lands. (Mr. MacBride was not a Minister in this Government). He (Mr. MacBride) said "In 1948 I was instrumental in getting the then Government to come to a firm decision that a minimum plantation rate of 25,000 acres per annum should be embarked upon. That decision was not merely a Government decision; it was a decision which received the approval of this House and one which was embodied in the long-term programme prepared in connection with the spending of Marshall Aid. That policy was published in one of the White Papers approved by this House at that time". He went on to quote Paragraph 49 of the 1948 White Paper.

In the context of planting policy the 1956 Dail Reports are interesting because of (a) the Minister's contribution to the *1956/57 Forestry Estimate* debate and (b) a motion of Afforestation moved

in November of that year by Mr. MacBride. In introducing the Estimate on July 11th 1956 the Minister for Lands (Mr. Blowick) made a lengthy speech in the course of which he reviewed the progress of State afforestation in four main periods viz. 1904-1922, 1922-1934, 1934-1950 and 1950-1956. It is notable that the Minister described the beginning of the third period, i.e. 1934, as being "marked by the settlement of an annual planting target of 10,000 acres", whereas Mr. de Valera's speech of May 17th 1956 (see Pre-1948 Policy above) seemed to imply that this policy was formed in 1946.

Mr. Derrig, former Minister, in his speech to the same debate said "The White Paper the Minister referred to was presented in connection with the American aid programme". He went on "The White Paper on ERP, issued by the Minister for External Affairs on 20th December 1948, contained the first public pronouncement about a 25,000 acres per annum programme. It was in that setting that it was announced. As far as I know, and I made enquiries about the matter when I held office as Minister for Lands, no firm directive was given to the Department in regard to the implementation of that programme for a considerable time afterwards".

Later on in his speech the Minister (Mr. Blowick) said "I am . . . in a position to tell the House that not merely is it the intention to increase the planting rate this year by 2,500 acres to 17,500 acres, but that each succeeding year will be marked by a similar big increase until the 1948 target of 25,000 acres is reached".

Mr. MacBride's motion (November, 1956) sought to commit Dail Eireann "to plant a minimum of 1,000,000 acres at a rate of not less than 25,000 acres per year". He reviewed again the 1948 White Paper and stated "in the light of the lack of progress it is desirable, I think, to try to remove doubts as to what our target is". Mr. Blowick, Minister, however, moved an amendment to the motion which said "Dail Eireann . . . agrees that hereafter there should be an annual increase of 2,500 acres in the rate of planting until an annual planting rate of 25,000 acres shall have been attained, whereupon consideration shall be given to the future rate of planting to be pursued, in the light of our forest and general economic requirements". The motion as thus amended was agreed to by the Dail on 5th December 1956. The effect of the amendment was to remove the explicit obligation to continue to plant 25,000 acres each year until 1,000,000 acres had been planted.

In April 1957 following another change of Government, the *1957/58 Forestry Estimate* was introduced by a new Minister, Mr. Childers, Fianna Fail, (Mr. Derrig had died the previous November). In a cautionery note he said "it is questionable whether this small

country, with limited capital resources, with problems of a considerable excess of imports over exports and a plethora of other economic difficulties can really justify a steadily increasing annual capital investment in afforestation which is already close to the level of £2,000,000 a year".

Mr. Childers made a significant speech in June 1958, in introducing the *1958/59 Forestry Estimate,* when he promised that the 25,000 acre planting target would be reached the following year. His speech draws heavily on a 1956 study by Mr. Henry Gray, Assistant Secretary of the Forestry Division of the Department of Lands ("the memorandum prepared is I think unique — being possibly the first overall projection of income and costs prepared for an entire country's forestry operations"). Mr. Gray's study represented State forestry's input to a comprehensive set of proposals ("Economic Development") formulated by Mr. T. K. Whitaker, Secretary of the Department of Finance, as a basis for the Government's 1958 Programme for Economic Expansion. Mr. Childers stated "total employment on State forestry work will rise slowly to 6,000 by about 1968 and then more rapidly to 7,000 in 1974 and to 9,000 in 1978".

Commenting on policy ("a planting programme of 25,000 acres from 1959 onwards") he said "we have 246,885 acres of land planted at the moment" and "present policy provides for the planting of 1,000,000 acres, one-seventeenth of our total land area. At current rates of timber consumption we would need to plant 7,000 acres a year — at Danish rates 17,500 acres. In either event we will have a large export surplus".

(The speech abounds with items of interest to students of Irish forestry — the expectation of financial breakeven in 1974, the return of 5¼% on capital invested, forestry employment "rising eventually to 20,000 persons", the introduction of the bonus incentive scheme for forest workers, etc.)

Conclusions on Government Policy 1948-1959

(a) Annual Planting Rate

There is no doubt that the Government decided in December 1948 on a planting programme of 25,000 acres per annum until 1 million acres of *new plantations* had been established. It is at least uncertain that this decision was preceded by any systematic analysis of the implications (expenditure, revenue, employment, self-sufficiency in wood, availability of suitable land). The Department of Lands did not contribute to the decision — the Land

Survey undertaken by the Department post-dated the policy announcement. The annual planting policy of 25,000 acres was not countermanded by any of the four Governments in office during the period 1948 to 1959.

(b) *The Eventual Target Area*
The 1948 Government decision was to plant 1 million acres. This was clearly new planting (made explicit, according to Cameron, in the Government's letter to FAO in February 1950), i.e. on top of the then (1948) estate (about 170,000 acres). This perhaps is the first source of the 1.2 million acres, i.e. 1,170,000 acres —or nearer to 1.25 million acres if the 85,000 acres of private plantations are included.

Coincidently, the Land Survey by the Department of Lands, completed in January 1950 came up with 1.2 million acres (precisely 1,201,915 acres) of suitable forestry land.

While the research covered in this paper failed to establish either the source of the basis of the ultimate estate size target envisaged by the Government in 1948 — whether it was, 1, 1.2 or 1.25 million acres — it cannot, of course, be concluded that no basis existed. Indeed, as far back as 1908 the Report of the Departmental Committee on Irish Forestry "Presented to Parliament by Command of His Majesty" concluded that "a total possible forest area of 1,000,000 acres was available in this country".

This ultimate target was effectively countermanded by the amended motion passed by the Dail, as described above, on December 5th 1956, although the Minister for Lands (Mr. Childers) said eighteen months later (June 1958) "present policy provides for the planting of 1,000,000 acres".

Postscript

The research (such as it was) described above was, of course, only peripheral to the Report on the Planting Programme presented to Government in 1982. The Government responded to the report on 18th August, 1982 by confirming as an overall policy objective the maintenance of an annual planting target of 10,000 hectares (but now including reforestation and the planting of privately-owned land).

A Management Oriented Study of the Birch-Rowan-Hazel woodland at Murlough Bay, Co. Antrim, Northern Ireland

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SUMMARY

A management oriented study of the Birch-Rowan-Hazel woodland at Murlough Bay, Co. Antrim, Northern Ireland was conducted in order to establish the balance of tree species composition, population age structure and regeneration of the tree species, grazing pressure and the status of Sycamore (*Acer pseudoplatanus* L.) and Ash (*Fraxinus excelsior* L.) which are invading the woodland. The woodland forms part of the National Trust Nature Reserve.

Results indicated that:

1. the most common trees were Birch (*Betula pubescens* Ehrh.) 1016 trees/ha, Rowan (*Sorbus aucuparia* L.) 244 trees/ha and Hazel (*Corylus avellana* L.) 236 trees/ha whilst Sycamore and Ash accounted for 21.4 and 14.8 trees/ha respectively;

2. the main tree species were, by and large, segregated within the woodland with Hazel just below the cliff, Birch in the lower, damper areas and Rowan between;

3. plots of Log. Tree Number against Log. Tree Age indicated that populations of all the above five tree species were declining;

4. regeneration appeared to be sparse despite the very large numbers of seedlings produced whilst there was extensive evidence of grazing pressures from goats and sheep;

5. assuming no regeneration or mortality of the Sycamore, its canopy cover is likely to increase from 4.0% to 11.4% of the total in the next 50 years; that of Ash will increase from 2.0% to 6.7% over the same period.

A management plan, directed towards restricting grazing and Sycamore eradication by tree-barking is suggested.

IRISH FORESTRY, 1985, Vol. 42, No. 1: 16-32

INTRODUCTION

After the extensive and systematic clearance of the forests by Scottish and English settlers very few natural or semi-natural woodlands have survived in Ulster and, today, plantations of exotic conifers constitute almost exclusively the Ulster forested landscape. Tomlinson (1982) in his review of woodlands in the north of Ireland described oakwoods, ashwoods, and mixed woods dominated by oak and ash but did not mention the existence of birch woodland. In the Scottish Highlands, birchwoods are the commonest semi-natural woodland (McVean 1964) but they are usually small and isolated and, like so many natural and semi-natural woodlands, they are under threat. Chard (1953), for example, estimated that since 1900 some 50,000 ha of birchwoods have disappeared from the Scottish Highlands due to suppression of regeneration. Throughout Britain, numerous woodlands are also being invaded by the non-native species, Sycamore (*Acer pseudoplatanus* L.) and, because of the mild climate of Ireland, Irish woods are particularly susceptible to such invasion. Dierschke (1982) has indicated that in Ireland, Sycamore is capable of rapid spread. Sycamore is the most likely tree species to regenerate under shaded conditions and it will most probably replace mature native species like Birch and as a result alter the character of the woods it invades (Linhart & Whelan 1980).

Birchwoods in Northern Ireland are not particularly common. One example is at Murlough Bay (Co. Antrim, D188428) where a Birchwood, which includes substantial numbers of other tree species including Rowan (*Sorbus aucuparia* L.) and Hazel (*Corylus avellana* L.), nestles under the Fair Head cliff face. Whilst the woodland is part of the National Trusts' designated nature reserve, little information is available concerning the balance of tree species composition, age structure, grazing pressure and the status of Sycamore and Ash (*Fraxinus excelsior* L.). This paper reports the findings of a quantitative study aimed at investigating some of these aspects and proposes a tentative management policy for the wood.

STUDY AREA

The wood has an east/north-east aspect and is situated on a steep slope between 90 and 190m above sea level. The terrain is littered with large boulders shattered from the cliff above and there are also some scree slopes. Study was confined to the northern parts of the wood (about 5 ha in extent) where the wood is at its most homogeneous and widest (Fig 1). The wood at this point consists of a series of plateau areas separated from each other by steep and hazardous cliffs. This presented several practical sampling problems.

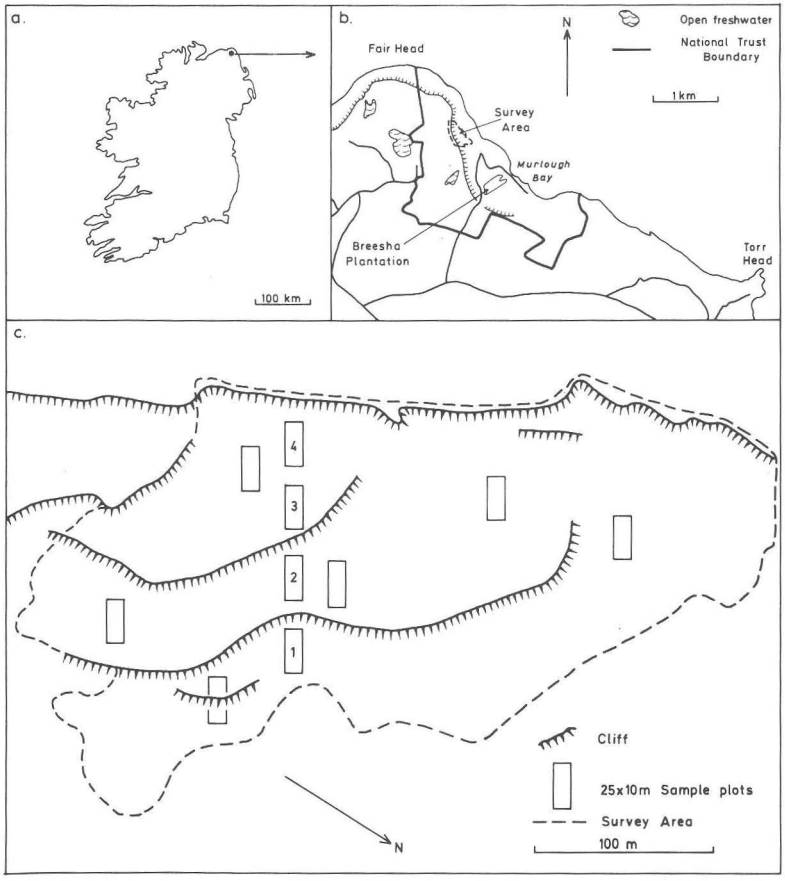

Fig 1. The woodland at Murlough Bay, Co. Antrim.
a) General position
b) Survey area in relationship to the National Trust area
c) Position of the 10 25m x 10m sample plots. Those plots labelled 1 to 4 formed the transect down the slope.

The soil consists of 86-88% sand and 12-14% silt and clay and may therefore be described as a sandy-loam. The pH ranges from 5.1 to 6.1 (Siddal 1977).

The woodland is dominated by *Betula pubescens* Ehrh. (Birch), *Sorbus aucuparia* L. (Rowan), and *Corylus avellana* L. (Hazel). Other tree species include *Acer pseudoplatanus* L. (Sycamore), *Fraxinus excelsior* L. (Ash), *Quercus* L. spp. (Oaks), *Populus tremula* L. (Aspen), *Crataegus monogyna* Jacq. (Hawthorn), *Fagus sylvatica* L. (Beech), *Salix* L. spp. (Willows), and the occasional *Ilex aquifolium* L. (Holly). The ground flora is predominantly composed of mosses (36.0%), herbs (25.7%), grasses (14.4%) and the Woodrush, *Luzula sylvatica* (Huds.) Gaud. (10.6%). Ferns, mainly *Pteridium aquilinum* (L.) Kuhn, *Dryopteris* Adans. spp. (5.4%), and *Vaccinium myrtilus* L. (1.3%) account for a much smaller proportion of the ground vegetation. Bare soil accounts for 2.7% of the ground surface (Binggeli 1980). The uncommon fern *Hymenophyllum wilsonii* Hook. is also present.

The woodland has not been free from human interference. During the 19th century, coal mining took place in the lower parts of the wood where numerous tracks can still be seen. Other signs of human activity can also be observed. For example, at the top of the wood there is a row of mature Beeches and an overgrown hedge adjacent to a collapsed stone wall. Wood extraction was carried out up to 25 or 35 years ago and it is locally known that fishermen from Rathlin Island used to cut Hazel to make lobster cages. However no Hazel stumps have been observed during fieldwork but cutting may have taken place in parts of the wood not studied.

METHODS

The following aspects of the woodland were investigated:

1. Tree species composition
2. Variation in tree species composition and the height related to position on the slope
3. Tree age distribution
4. Regeneration
5. An assessment of grazing intensity
6. The status of both Sycamore and Ash within the wood.

Since little basic information other than species lists exist for the woodland, an initial survey was designed to examine and characterise the main tree species in the area. Ten plots, each

25m x 10m were used (Fig 1). Six were randomly located, the remaining four were part of a transect (see below). In each plot, the number of each of the major tree species were recorded. Trees with a girth less than 50mm at a height of 1.3m were not included.

In order to examine variation with altitude, four 25m x 10m plots were arranged in a straight line down the slope of the woodland from the base of the cliff to the grassland below. The plots were 10m apart and therefore the total length of the transect line was approximately 130m. In each plot, the number of trees of each species was recorded together with their heights. Tree height was also recorded for trees growing between the plots — thus tree height was recorded from a belt transect 130m long and 10m wide. The ground surface was also categorised in each plot as:

1. Scree 2. Large boulders (>1.5m diameter)

3. Small boulders (<1.5m diameter) 4. Sandy-loam.

Tree age distribution was investigated in order to obtain some insight into whether the tree species in the wood were declining, actively spreading or whether the wood was in a stable state.

The methodology and analysis used here follows that of Leak (1975). Essentially the technique relies on graphical plots of Log. Tree No. x Log. Age Class. Leak (1975) has argued that three distinct relationships may be shown by such graphs:

a) Linear relationships, indicative of stable populations.

b) A tendency towards a concave slope to the graph indicative of increasing populations.

c) A tendency towards a convex slope (in its extreme form a bell-shaped curve) indicative of declining populations with a low birth rate.

In the ten 25m x 10m sample plots described above, the girth of all trees of Birch, Rowan and Hazel were measured at a standard height of 1.3m. For Hazel, the girth of the largest pole was recorded, for Ash and Sycamore, every single tree in the study area was measured. Any tree with a girth measurement below 50mm was excluded from the analysis, leaving 538 trees. Age was determined on a sub-sample of 132 trees using cores taken just above the root collar. Although the Birch cores were processed using the method of Tucker (1979), counting the rings proved very difficult and therefore there is likely to be a greater degree of error with this species than with the others. Cores were taken on 34 trees of Birch, 24 trees of Hazel, 19 trees of Rowan, 21 trees of Ash, and 34 trees of

Sycamore. These data were analysed by a Model II Regression (Sokal and Rohlf 1969). For each tree species there was a significant regression at $p<0.01$ and it was concluded that the age of each tree could be estimated from girth measurements. Using these regressions, the ages of all the trees was estimated.

To determine the extent of regeneration, 189 one m^2 quadrats were randomly positioned throughout the wood by means of a random walk. Due to the difficult terrain, the wood was subdivided into six sample plots and the number of quadrats placed in each plot was in proportion to the plot area. In each quadrat, the number of tree seedlings and saplings was recorded. Seedlings were defined as being less than one year old; saplings were two years old or more and less than 1.5m tall.

Grazing pressures were assessed by comparing the age and growth of Sycamore saplings in the wood with a fenced area (free from grazing) in an adjacent mixed hardwood plantation (Breesha Plantation). Age, current year growth increment and height were measured for a small sample of saplings from each area.

An attempt was made to investigate in more detail the status of Sycamore and Ash within the woodland. All trees of both species within the study area were located and mapped. A small, square quadrat was then repeatedly, randomly placed over each map and the number of trees of Sycamore and Ash in each quadrat recorded. These data were then analysed using a chi-square to determine if the species were randomly distributed. Canopy diameter was estimated on a sample of trees of both species. For each tree, canopy diameter was measured twice at right angles and averaged. Girth was also measured on the same trees so that a relationship between girth and canopy crown diameter could be established through regression. For both species this regression proved significant ($p<0.01$). Using this relationship, cover of the two species was estimated from girth measurements and, from the relationship previously established between age and girth, predictions could be made about changes in the canopy cover of Ash and Sycamore.

Results

Tree species composition

The estimated tree density in the study area was 1,532.2 trees/ha. The commonest species was Birch (1,016 trees/ha, 66.3%), followed by Rowan (244 trees/ha, 15.9%). Sycamore and Ash accounted for 21.4 trees/ha (1.4%) and 14.8 trees/ha (1.0%) respectively. Willows, although not accounted for in the sampling were numerous along the edge of the wood.

Variation in species composition and tree height related to position on the slope

Table 1: Variations in % species composition of five tree species, canopy height, and general terrain features in four plots in the natural woodland, Murlough Bay. Plot 1 was the lowest; Plot 4 was arranged just under the main cliff (see Fig 1).

Percentage Occurrence	Plot				
Species	1	2	3	4	
Betula pubescens	89	70	60	17	
Salix spp.	3	0	0	0	
Acer pseudoplatanus	0	3	3	0	
Sorbus aucuparia	0	18	34	12	
Corylus avellana	8	9	3	71	
				Bottom	Top
Av. Canopy Height (m)	5.0	7.5	5.4	4.9	2.9
Max. Canopy Height (m)	7.5	10.0	7.0	6.5	3.5
Min. Canopy Height (m)	4.0	5.0	3.5	2.5	2.5
General Terrain Features	Sandy Loam	Small Boulders	Large Boulders	Scree	

Table 1 shows the variation in species composition up the slope; this is shown diagrammatically in Fig 2. The relative proportion of each species changed greatly along the altitudinal profile. At the bottom of the wood, where the ground was composed of a sandy-loam and conditions were damp, Birch constituted an almost pure stand with a few Willows and Hazel. However, its dominance diminished in the upper parts of the wood and it was absent from the scree slope below the top cliff. Above the first cliff, where small boulders covered a large proportion of the ground, Rowan occurred and this species increased to 34% of the total tree number above the second cliff. Here, the terrain was mainly large boulders with deep crevices between. Although Rowan was present in the topmost plot, it was absent just below the top cliff. In the wood, many of the Rowan trees had rooted onto the large boulders and, because this is a precarious position, many of the older trees had fallen. In these

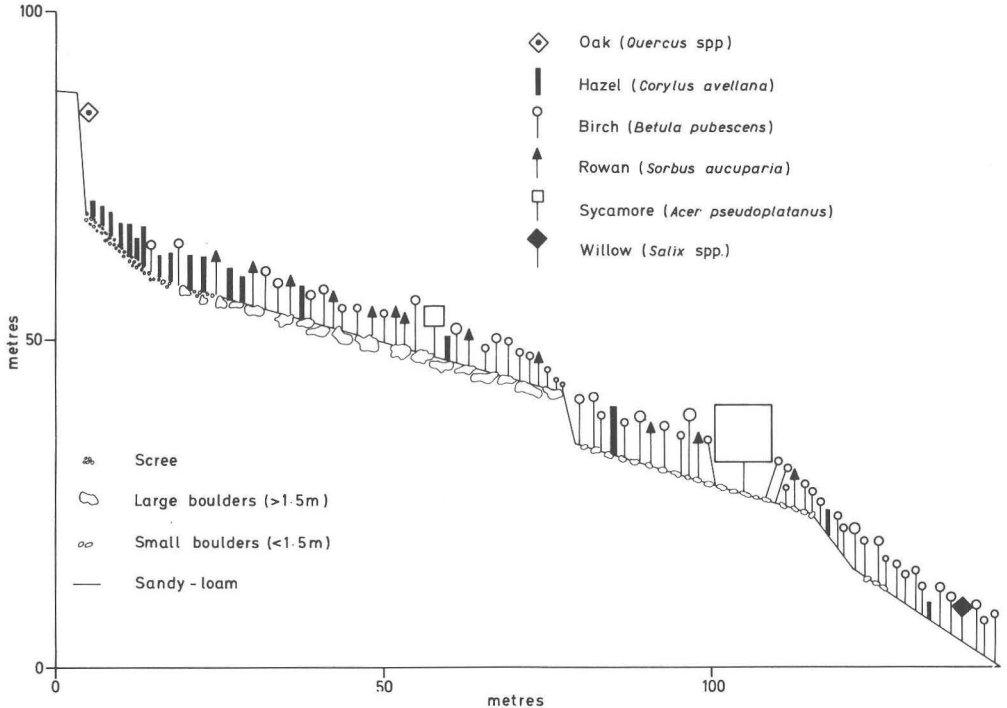

Fig 2. A diagrammatic representative profile showing the variation of tree species composition along the slope of the woodland.

cases, growth was continuing through the vertical growth of side branches. On the scree at the base of the top cliff, Hazel was found in pure stand although below, in the lower parts of plot 4, it was mixed with smaller proportions of Rowan and Birch. Throughout the rest of the wood however Hazel represented less than 10% of the trees. Sycamore was sparsely distributed through the wood whilst Ash, although not actually recorded in the sample plots, seemed to be restricted to the damper lower areas.

Oaks, although not present in the main plots, were found on the main cliff above the scree area. Thirteen Oaks or groups of Oaks were observed in this position, but only one mature Oak was found in the wood itself. The Oaks on the cliff were very stunted and mainly inaccessible. A small number were sampled and these proved to be *Quercus robur* L. although a small number of characters on some leaves might have indicated a degree of hybridity. The leaves of some individuals were rather distorted, making accurate assessment difficult.

The general pattern of species distribution was repeated in other parts of the wood from the lower slopes up to the base of the topmost cliff.

Variation in the height of the tree canopy is shown in Table 1. The average canopy height decreased from 5.9m at the bottom of the wood to 2.9m just below the top cliff. The high mean value obtained for plot 2 (7.5m) was probably due to the shelter that three tall Sycamores provided. Generally the Sycamores were much taller than the other species and stood well above the rest of the trees reaching an estimated height of 13m.

Tree age distribution

The results are presented in Fig 3 where Log. Tree No. has been plotted against Log. Tree Age for 20 year age classes for each of the five species investigated. All five species exhibited a tendency to produce a convex plot which was particularly noticeable below the 35-55 year age class. Such a result may be interpreted (Leak 1975) as indicating that the populations are declining. The two main species in the wood, Birch and Rowan, appear to be declining to a much greater degree than the others and Rowan, in particular, exhibits a tendency towards the bell-shaped curve characteristic of populations undergoing substantial decline. With the exception of Birch and Rowan, all species beyond the 75-95 year age class showed a slightly concave distribution indicating that up until the early parts of this century, the populations may have been slowly expanding. However, it would appear that the decline of both Birch and Rowan began about 50 years ago and that of Hazel, Ash and Sycamore more recently.

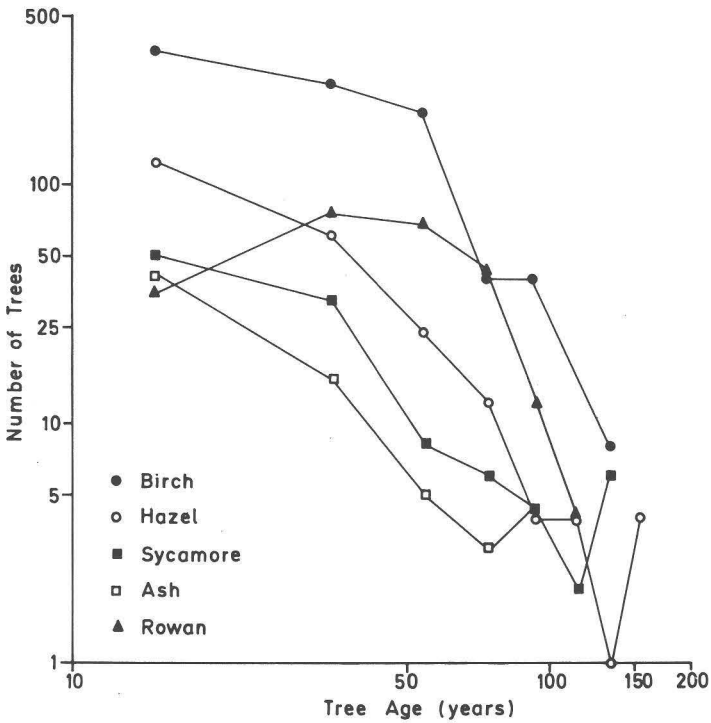

Fig 3. Log. Tree No. plotted against Log. Tree Age for 20 year age classes for five tree species.

Only Birch occurred in sufficient numbers throughout the altitudinal transect to allow any investigation of age with slope position. The age distribution was similar for all the four transect plots with a tendency for the lower plot to have a higher proportion of younger trees (<20 years old) and a lower proportion of older trees (>60 years old) than the upper parts of the slope.

Regeneration

Seedlings of only three species were recorded in the quadrats. The mean seedling density of Birch was $3.7/m^2$ ($\pm$ 2.73) and that of Rowan $0.08/m^2$ ($\pm$ 0.29). A very small number of Hazel seedlings were also recorded. Only 10 saplings of Rowan were recorded and although saplings of both Birch and Sycamore were noticed in the wood none occurred in the quadrats. The absence of Birch saplings and the substantial number of seedlings would indicate that seedling mortality is high.

Grazing Pressure

The results are shown in Table 2. In the natural woodland, the Sycamore saplings were significantly older but also shorter and with a smaller 1979 growth increment than those in the adjacent planted stand. Several saplings in the wood had a "seedling-like" appearance — one of these was only 21cm tall but 15 years old. Throughout the wood there was ample evidence of grazing, e.g. wool, droppings and damage. In the vicinity there is also a herd of (elusive) feral goats which are known to frequent the wood.

Table 2: A comparison of Sycamore saplings from the Birch-Rowan-Hazel wood and an adjacent mixed hardwood plantation.

	Birch-Rowan-Hazel wood	Breesha Plantation
Number of saplings sampled	9	15
Sapling height (m)	1.87 ± 0.28	2.76 ± 0.50
Sapling age (years)	17.0 ± 4.8	8.0 ± 0.0
1979 Growth increment (cm)	12.5 ± 9.8	90.0 ± 17.0
Number of saplings with grazed leaders	3	0

Distribution and canopy cover of Sycamore and Ash

Within the five ha studied, 107 individuals (trees, saplings, and seedlings) of Sycamore and 74 individuals of Ash were recorded. Since it was found more difficult to discern the Ash seedlings and saplings under the forest canopy, this latter figure is likely to be an underestimate. Fig 4 shows the distribution of the two species in the wood; both species were found to be non-randomly distributed and showed a clumped distribution. All the mature Ash trees were restricted to the damp lower areas with younger trees further up the slope, whereas the Sycamores were well dispersed throughout the area. Estimation of the changes in canopy cover of Ash and Sycamore over the next 50 years are given in Table 3. These data assume no further regeneration and no mortality of the existing individuals. The estimated cover of both Ash and Sycamore in 1979 was 5.9%; by 2004 this is likely to increase to 11.0% and by 2029 to 18%. It should be noted that these are likely to be over-estimates since the present positioning of small saplings and trees in clumps (Fig 4) would indicate that eventually their canopies will begin to overlap.

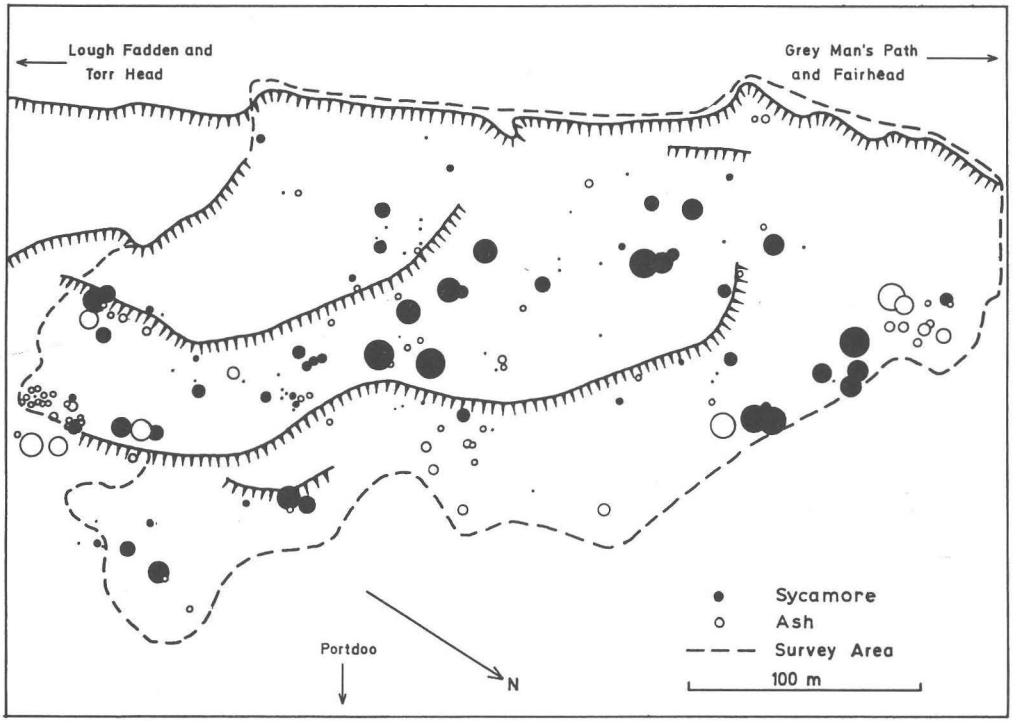

Fig 4. Distribution and canopy cover of Sycamore (*Acer pseudoplatanus* L.) and Ash (*Fraxinus excelsior* L.) in the study area.

Due to its dense canopy, Sycamore produces comparatively dense shade conditions which affects other tree species and ground vegetation alike. It was observed, for example, that underneath four large Sycamores there were decaying trunks and stumps of Birch and the live Birches at the periphery of the Sycamore crowns were all bending out towards the light with their inner branches leafless. The ground vegetation under the Sycamore was limited to moss and ferns whereas the surrounding ground flora was much more diverse and luxuriant.

Table 3: Predicted changes in the canopy cover of Sycamore *(Acer pseudoplatanus* L.) and Ash (*Fraxinus excelsior* L.) over the next 50 years.

	Percentage Canopy Cover		
Species	1979	2004	2029
Ash	2.0	3.9	6.7
Sycamore	4.0	7.1	11.4
Combined	5.9	11.0	18.0

Regression equations used:

Ash	Girth = –4.45 + (1.50 × Age) Canopy diameter = 1.8 + (0.060 × Girth)
Sycamore	Girth = –6.30 + (1.28 × Age) Canopy diameter = 1.6 + (0.058 × Girth)

with Girth in cm, Age in years, and Canopy diameter in m.

DISCUSSION

The natural woodland at Murlough Bay is predominantly composed of three tree species, Birch, Rowan and Hazel. The distribution of these within the woodland is broadly differentiated — Hazel at the top of the slope, Rowan below and Birch though common throughout the wood is more frequent on the lower slopes. Similar examples of the occurrence of Hazel scrub at the base of cliffs has been reported by Steele (1968). He argued that such a distribution may be the result of local soil nutrient enrichment due to seepage. The instability of the scree at the base of the main cliff at Murlough Bay might also favour the growth of Hazel rather than Birch or Rowan. The limited distribution of Rowan appears to be correlated also with terrain features, namely large boulders. Rowan

is particularly susceptible to grazing pressures (McVean 1964) and may be taken preferentially by herbivores. Also, Rowan regeneration appears to be extensive in the absence of grazing (McVean 1964). The area where Rowan is found is the most inaccessible to grazing animals and it is likely that it survives here but fails to spread into the adjacent areas where grazing pressure is greater. The distribution of the very small number of Oaks is probably similarly restricted; no Oak seedlings were found at all in the wood. The distribution of Ash (mainly in groups in the damper areas, Fig 4) is similar to that observed by Wardle (1961) and Okali (1966a, b) and that of Sycamore (much more widely dispersed and comparatively more isolated) is also similar to that observed by Okali (1966a, b).

McVean (1964) and Kinnaird (1968) have described the commonest Birchwood structure in Scotland as being composed of even-aged stands of Birch with young seedlings one or two years old, but with very few individuals in any of the intermediate age classes. A rarer type has trees of two generations, old trees surrounded by groups of younger individuals. The age structure of the Birch in Murlough Bay does not conform to either of these descriptions and the woodland is represented by a wide range of age classes. In the case of Birch, there were very few saplings, but a large number of seedlings indicative of heavy grazing pressure. Emberlin and Baillie (1980) have argued that the main factor controlling the regeneration of Birch is grazing although several other factors are known to influence the process and are potentially important at Murlough Bay. Birch seedlings need suitable moist conditions for successful development such as those provided by a cushion of *Sphagnum* — rare in the wood — or sheltered bare soil — often created by animals' hooves (Kinnaird 1974, Miles 1974, Emberlin and Baillie 1980). Futhermore, prolific growth occurs in ericaceous associations rather than in communities dominated by grasses such as those found in most of the wood. Saplings may also be affected by canopy cover — increasing shade limits the growth and if this is compounded by grazing the saplings are unlikely to survive (Miles 1971, Miles and Kinnaird 1979a).

The grazing pressure is evidenced by the age distribution curves which indicate that all the species investigated are declining in numbers. This is particularly true of Rowan but is also true of Birch itself. Kinnaird (1968) has argued that Birch may regenerate successfully under grazing pressure provided that there is an adequate number of seedlings which are vigorous enough to compete against the grazing pressures. In Murlough Bay, seedling number does not appear to be a problem; the difficulty seems to lie with the ability of the seedlings to overcome grazing. Kinnaird

(1968) believes that "vigour" is a function of soil fertility and on poorer sites may also be related to the development of mycorrhizal associations. The poor soil development at Murlough Bay, coupled with the effects of grazing probably accounts for the lack of regeneration and the apparent decline in the Birch population.

The main threat to adult, mature trees in the wood appears to derive from the invasion of Sycamore and Ash. Sycamore and Ash already have a strong foothold in the wood and it is predicted that their canopy cover will increase three fold in the next 50 years. Field observations have indicated that Birch cannot compete effectively with the more vigorous growth of Sycamore. Linhart & Whelan (1980) have shown that Sycamore is itself susceptible to grazing. Dense shade may also limit the growth of Sycamore (Jones 1945) but this is unlikely to be an important factor at Murlough Bay because of the openness of the Birch and Rowan canopy. Under the conditions pertaining at Murlough Bay, the Sycamore seedlings and saplings appear to be more tolerant of grazing than Birch or Rowan. It is clear that even if grazing is maintained at the present levels, Sycamore will increase its hold in the wood and become co-dominant with Ash replacing the present dominant overstorey species. From a landscaping point of view, the dark foliage of Sycamore does not blend into the lighter coloured foliage of Birch, Rowan and Hazel. Ash, on the other hand is less offensive in this respect and blends more naturally into the landscape.

One of the uncommon ferns of Northern Ireland, *Hymenophyllum wilsonii* Hook. is found in the Birch-Rowan-Hazel wood at Murlough Bay. Here it grows predominantly on large boulders. The effect of the Sycamore invasion on *H. wilsonii* is complex. Richards & Evans (1972) note that in parts of Killarney, where humidity is very high, *H. wilsonii* is found in the higher parts of the Oak canopy where the trees are tall and ground level light intensity is low. Conversely, if the canopy is lower and/or more open, then it is more likely to be found on the lower parts of the trunks or on rock surfaces. They also point out however that it is intolerant of deep shade and grows better in moderate shade conditions. Both humidity and light seem to be important factors in determining its distribution. At Murlough Bay, the effect of increased canopy cover and therefore deeper shade conditions from Sycamore invasion would probably be to the detriment of *H. wilsonii*. *H. wilsonii* has not been recorded as an epiphyte on Sycamore (Richards & Evans 1972) and therefore it may not respond to increased shade by a more elevated position.

A suggested management policy

The objectives of nature conservation in British woods have been

outlined by Peterken (1982). The following points may be considered of importance with respect to the management of the Murlough Bay Birch-Rowan-Hazel woodland:

1. Maintenence of an element of wooded wilderness in the Murlough Bay area;
2. Maintenence of an example of a Birch-Rowan-Hazel woodland;
3. To allow self perpetuation of the native flora and fauna.

To achieve these ends it would be necessary to provide a low intensity ecosystem management which should include the eradication of Sycamore, the preservation of *H. wilsonii* and the encouragement of the regeneration of the present native tree species. Ash is seen to be less of a problem because it occurs in fewer numbers, is less vigorous on the site, and blends more naturally into the landscape.

Successful regeneration will only occur when grazing is decreased or suppressed. However, if an area is fenced, Birch is unlikely to regenerate if seedlings are not already established. One paradox is that trampling may provide suitable niches for seedling establishment and this may be particularly important in years when viable seed production is poor.

Before the regeneration of native species is encouraged by a decrease or suppression of grazing, Sycamore should be eradicated. In this instance, tree barking would seem preferable to felling as this would do less damage to surrounding trees. Because of its high basal sprouting rate the Sycamore should be checked during the following years and the young shoots removed.

In this way it may be possible to maintain the character of this woodland.

ACKNOWLEDGEMENTS

The authors wish to thank the National Trust for permission to work on the site and Anne Casement and Doug. Radford for help during fieldwork. The support of the Scilley family, Shiela-Ann McKay and Phase III Newspaper is also acknowledged.

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Tree Productivity Models based on Annual Ring Widths for Contemporary and Subfossil Scots Pine in Ireland

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ABSTRACT

Ring width series from *Pinus sylvestris* L. are used to compute empirical growth functions for a number of sites, including two subfossil pinewood sites. These empirical functions are corrected for non-proportionality of annual ring width and stem volume increment. Significant correlations between stem diameter and tree productivity allow the corrected curves to be interpreted as current, mean tree productivity on each site. The trends evident in the productivity curves correspond with reported changes in pine productivity with age.

A comparison of relative productivity on the sites sampled indicates that trees growing on mineral substrates achieve higher current annual production than trees growing on peat at all ages. The rate of increase is also greater, and maximum productivity is achieved in older trees on mineral soils. Minimum relative productivity occurred in subfossil pines which grew on a midland raised bog. The observed differences in productivity are primarily attributed to differences in soil nutrient status and drainage.

It is suggested that productivity curves might be used in conjunction with information on stand density, and calibrated with quantitative productivity data to yield estimates of absolute stand productivity. This would be particularly useful in the study of subfossil woodlands where direct measurements are not possible.

INTRODUCTION

Efficient forest management requires an accurate knowledge of tree performance under specific environmental conditions in order that timber yields may be reliably forecast (Jonnson 1978). Because of extended crop rotations, the acquisition of the required data by experimental means, or by direct observation is a lengthy and expensive procedure. This paper describes an approach for reconstructing tree productivity based on simple empirical models.

Scots pine (*Pinus sylvestris* L.) was studied at a number of locations in order to relate differences in tree productivity to site conditions. Subfossil pine timbers excavated from midland raised bogs allow performance of native trees growing on peat to be assessed and thus provides a benchmark for comparison with contemporary introduced trees on similar sites.

Productivity of individual trees is strongly correlated with tree diameter at breast height, or various transformations of this

IRISH FORESTRY, 1985, Vol, 42, No. 1:33-43.

parameter such as basal area, or girth class (Heinsdijk 1975, O'Neill and DeAngelis 1981, Ovington and Madgwick 1959). Since stem diameter is the sum of annual radial increments, these can be used in deriving a model of current tree productivity with age. Derivation of the model involves computing empirical growth functions for trees on each site, and correcting these functions for the decrease in ring width which results merely from an increase in stem diameter, and which is not related to any changes in tree productivity.

Sites

Scots pines were sampled at seven sites encompassing a wide range of environmental conditions. The sites, along with some relevant data, are listed in Table 1. All the living trees sampled grew in unmanaged stands of low densities. *Pinus sylvestris* was dominant at all sites except Knocksink, where hardwoods, particularly *Quercus petraea* (Matt.) Liebl., predominated.

Trees sampled at Glashabaun and Ballycon were subfossil pine timbers. Radiocarbon dating and related pollen-stratigraphical analyses revealed that these timbers represented sub-Boreal pinewoods which existed on midland bog surfaces between 2000-1500 BC (McNally and Doyle in 1984 a, 1984 b).

Materials and Methods

Living trees were sampled by taking three increment cores at breast height (1.3m) using a Pressler borer. Subfossil timbers were sampled by cutting cross-sections with a power saw. When dry, samples were prepared for measurement using standard surfacing techniques (Stokes and Smiley 1968).

Ring widths were measured in units of 0.01mm along each of three radii per tree using a graduated moving stage and low power dissecting microscope with a cross-hairs fitted in the ocular (McNally and Doyle 1981).

Empirical Growth Functions

A mean ring series was based on all the individual radial series measured at each site. These mean site ring widths for the first 90-100 years of growth are plotted against cambial age in Fig 1. High frequency (year to year) ring width variation has been cancelled in the averaging process. Such variation is largley associated with changes in the annual climatic regime, in particular with temperature fluctuations from year to year (McNally 1983). The remaining variance is mostly associated with increasing stem diameter and development features common to all the trees (Fritts 1976).

Table 1. List of sampling sites with concise details of site conditions. Slope is given in degrees.

Sites	Trees	Grid. Ref.	Alt. (m)	Slope	Aspect	Soil
Scalp, Co. Dublin	Live	O215 200	180 — 210	50	WSW	Shallow quartz sand
Knocksink, Co. Wicklow	Live	O220 178	120	45	SSW	Red-brown boulder clay
Glencullen, Co. Wicklow	Live	O151 218	330 — 360	25	SW	Shallow Peat (0.5m) on granite
Black Valley, Co. Kerry	Live	V880 805	150	30	NW	Well-drained podzolic
Timahoe, Co. Kildare	Subfossil	N740 330	75	0	—	Peat (1.75m)
Glashabaun, Co. Offaly	Subfossil	N668 291	75	0	—	Peat (1.75m)
Ballycon, Co. Offaly	Subfossil	N550 268	75	0	—	Peat (0.75m)

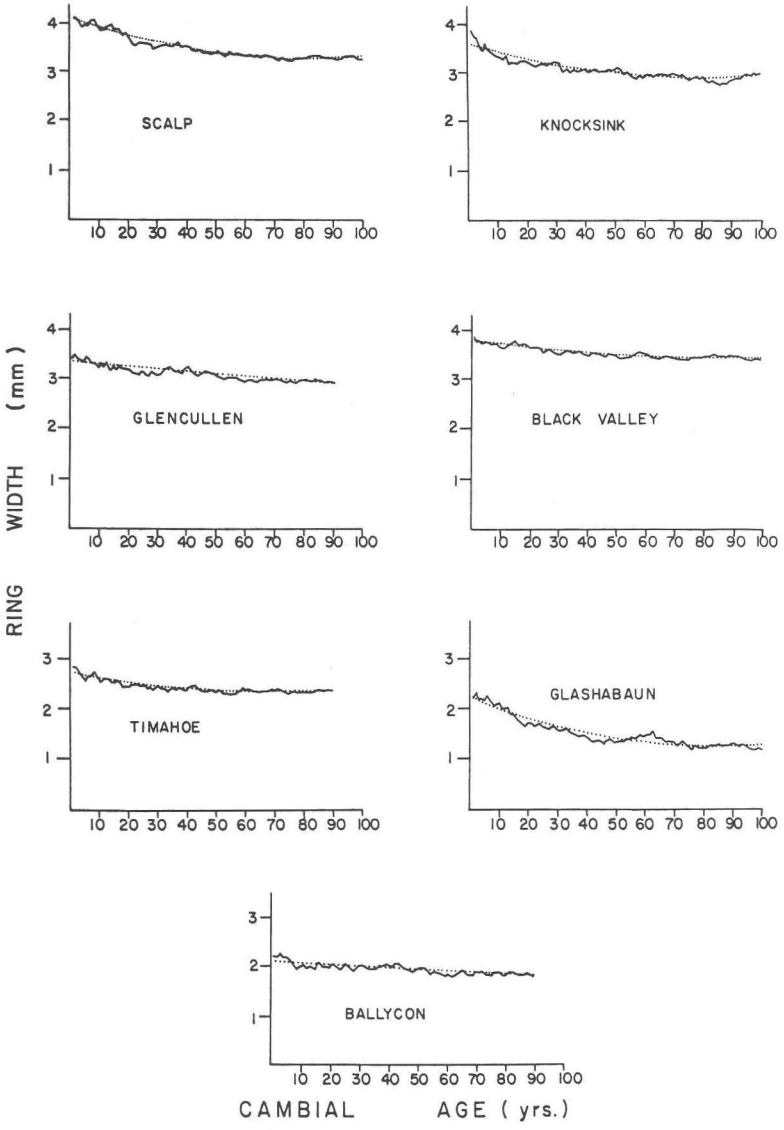

Fig 1. Empirical growth trends for each site obtained by averaging absolute ring width (mm) for increasing cambial age classes. The dotted lines in each plot are polynomial or single regression approximations of the growth trend. The equations for these curves are listed in Table 2.

These empirical growth trends have been approximated by fitting either orthogonal polynomial curves or straight lines with negative slopes (Graybill 1982). The equations for these curves are listed in Table 2, and constitute the empirical growth function for each site. Although they provide an index of changing tree productivity they are not readily interpreted because of proportionality constraints associated with the radial growth pattern.

Table 2. Empirical growth functions obtained by fitting polynomial or linear regression functions to mean ring series (0.01mm) for each site. The number of radial series on which the mean series are based (n), and the length of the series in years (yrs) are listed for each site. y^1 in each function is the predicted ring width in units of 0.01mm, and x is year number (i.e. cambial age) ranging from 1 to yrs.

Sites	Empirical Function	n	yrs
Scalp	$y^1 = 411.24 - 2.09x + 0.0123x^2$	21	100
Black Valley	$y^1 = 381.98 - 0.84x + 0.0050x^2$	9	100
Knocksink	$y^1 = 359.33 - 1.78x + 0.0113x^2$	24	100
Glencullen	$y^1 = 335.00 - 0.51x$	12	90
Timahoe South	$y^1 = 275.45 - 1.14x + 0.0084x^2$	15	90
Glashabaun	$y^1 = 221.37 - 2.33x + 0.0140x^2$	123	100
Ballycon	$y^1 = 209.25 - 0.34x$	18	90

Constant Productivity Model

Ring width provides a linear measure of the amount of timber added to the tree bole each year. However, even if the amount of timber produced (measured either as volume, or cross-sectional area increment) remained constant, ring width would decrease exponentially with increasing distance from the pith, or increasing cambial age (Fritts 1971).

Assuming that the annual increment is a constant c, the total cross-sectional area after t years of growth is

$$ct = \pi r^2_t \qquad \text{Eq. 1}$$

where r_t is the radius of the tree bole after t years. Thus, the cross-sectional area after 1 year of growth is

$$c = \pi r^2_1 \qquad \text{Eq. 2}$$

Substituting for c in equation 1 yields

$$\pi r^2_1 t = \pi r^2_t$$

which may be rewritten as

$$r_t = r_1 (t^{1/2}) \qquad \text{Eq. 3}$$

that is, bole radius after t years of growth (r_t) is a function of the initial radius (r_1). The expressions thus far have dealt with total bole radius. Ring width, or annual radial increment (k), in any year can be calculated by using equation 3, as the difference between two successive years (t and t+1). So

$$k = r_1 \left[(t+1)^{1/2} - (t)^{1/2}\right] \qquad \text{Eq. 4}$$

i.e. the difference between the radius of the bole in year t+1 and year t. This expression relates ring width in any year to the initial radius (r_1) and to cambial age (t). It assumes that annual production, as measured, by cross-sectional area increment of the bole at breast height, remains constant.

Tree Productivity

The constant productivity function (equation 4) is used to correct the empirical growth functions for the non-linearity effects of radial growth. The initial radius (r_1) for each site is read from the empirical growth curves in Fig 1. Each of these r_1 values is entered into equation 4 and used to generate values for k for years 1-90 (or 100). These values are plotted, along with the empirical curves in Fig 2.

The difference between the empirical growth curve (e) and the curve based on equation 4 (constant productivity curve, k) is a direct measure of the current annual wood production in tree boles on the various sites (Fig 2). As the annual wood increment in the bole represents a sizeable fraction of, and is strongly correlated with total productivity (O'Neill and DeAngelis 1981), the derived curves (e – k) allow comment on the mean tree productivity at each of the sites. While they do not show productivity in absolute terms, they can be used to assess patterns of changing (current annual) productivity with tree age, and to compare the relative productivities on different sites. Hereafter they are referred to as "productivity curves".

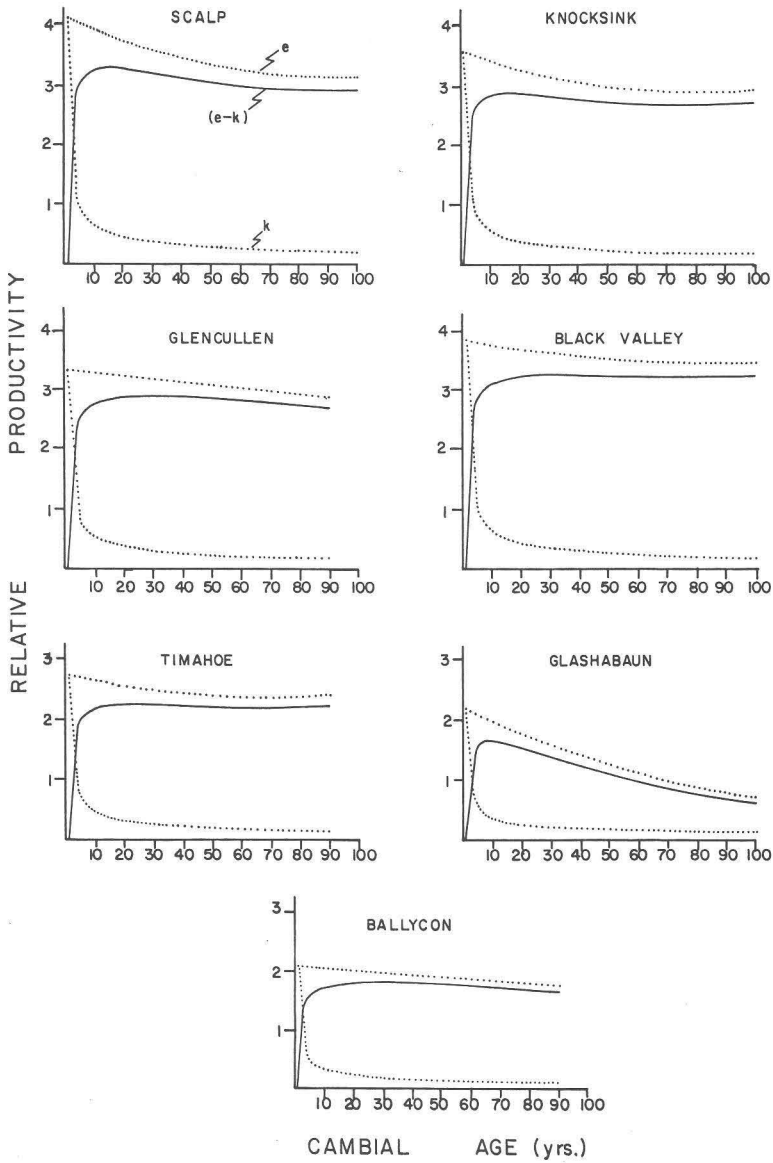

Fig 2. Plots of empirical growth functions (e) listed in Table 2, and constant productivity functions (k) based on equation 4 for each site. The curve labelled (e – k) in each plot is obtained by difference. It shows the current annual productivity corrected for non-proportionality due to linear ring width measurements of stem volume increment.

General Features of Productivity Curves

All the curves indicate a rapid increase in productivity during the early years of growth, reaching an absolute maximum between cambial ages of 10 and 30 years (Fig 2). If it is assumed that it takes 10 years for a pine sapling to reach breast height (Borthwick 1906), the real tree age is estimated at 20-40 years. This initial phase of rapid growth reflects the development and expansion of the sapling foliage and root system. This greatly increases its capacity for exploitation of soil nutrients, for assimilation and photosynthate production. Litter production, foliage dry weight and surface area, and current annual accumulation of organic matter reach absolute maxima in Scots pine between 10 and 30 years of age (Ovington 1959, Ovington and Heitkamp 1960). This is reflected by the maxima in the productivity curves over this same interval (Fig 2).

After the initial rapid increase in growth, the curves generally indicate a gradual decrease in current annual productivity. These observations are in general agreement with those of Ovington (1957) who found that current annual dry matter increment in *Pinus sylvestris* reached a maximum at 28 years of age and then declined. Such a decline in productivity with age is attributable to a number of causes. Nutrient deficiencies usually become marked at ages of 20-30 years, and even earlier on peat, when there is a maximum nutrient requirement (Carlisle and Brown 1968, Gunia 1967, McVean 1963a). Scots pine generally develops the flat crown typical of the species as it matures, and the current annual increment of leaves becomes constant after approximately 20 years (Carlisle and Brown 1968). However, the photosynthetic capacity of needles decreases with increasing tree age as well as with increasing needle age (Zelawski 1967). Therefore a reduction in total tree productivity would be expected.

Since the general trends exhibited by the deduced productivity curves are substantiated by the published observations on productivity/age relationships in *P. sylvestris* cited above, these curves are accepted as accurate records of current mean tree productivity on the sites studied. They are used as the basis for intersite comparisons of relative tree productivity.

Relative Site Productivities

Comparison of curves for all sites clearly indicates that tree productivity is greatest on sites with mineral substrates, or in the case of Glencullen, where the shallow peat substrate permits root access to mineral subsoils.

The reduced productivity of trees growing on peaty sites is attributable to the relative nutrient deficiency of such soils (McVean

1963b) allied with decreased nutrient assimilation by roots under conditions of reduced aeration (Brown *et al* 1966), and possibly accentuated by reduced mycorrhizal infection (McVean 1963a).

Amongst the peatland sites, relative productivity is greatest at Timahoe South, is intermediate at Ballycon, and least at Glashabaun. The higher productivity of contemporary pines at Timahoe South is probably due to the existence of improved soil conditions connected with ongoing commercial exploitation of adjacent peatlands and associated artificial drainage. Although the depth of peat underlying these contemporary trees and the subfossil Glashabaun pines is approximately the same (1.75m), the latter trees grew near the centre of an intact, undrained bog system where rooting conditions were probably less favourable. The subfossil trees at Ballycon however, grew on shallower peats near the margin of the then intact bog, and mean annual tree productivity was intermediate between Timahoe South and Glashabaun.

The productivity curve for the Glashabaun trees indicates that early tree growth was slowest on this site, and that limiting site conditions resulted in an early inflection of the productivity curve. Subsequently there is a pronounced decrease in annual production with increasing tree age. This suggests that the low concentration of available nutrients is sufficient to sustain early growth, but becomes limiting as the trees increase their demands on the nutrient reserves over the first 20-30 years (Carlisle and Brown 1968).

Fig 3 shows a mean productivity curve for the sites with mineral substrates (Scalp, Knocksink, Black Valley and Glencullen) compared with a mean curve for the bog sites (Timahoe South, Ballycon and Glashabaun). It is obvious that mean relative productivity is higher at all stages of growth on the mineral sites, and that the initial rate of increase is also greater. The productivity begins to decline somewhat earlier on the bog sites, and decreases more rapidly with age.

The curves presented are based on a number of trees from each site. Therefore, they provide an index of mean site productivity, integrating the effects of competition, density, nutrient availability, drainage etc. If combined with estimates of tree density and calibrated using stochastic relationships between total tree or above ground productivity and basal area, they could be used to estimate total site productivity. It would then be possible to compare absolute stand productivity between subfossil and contemporary woodlands.

The trees sampled in this study occurred in unmanaged stands at relatively low densities. Therefore the differences observed in

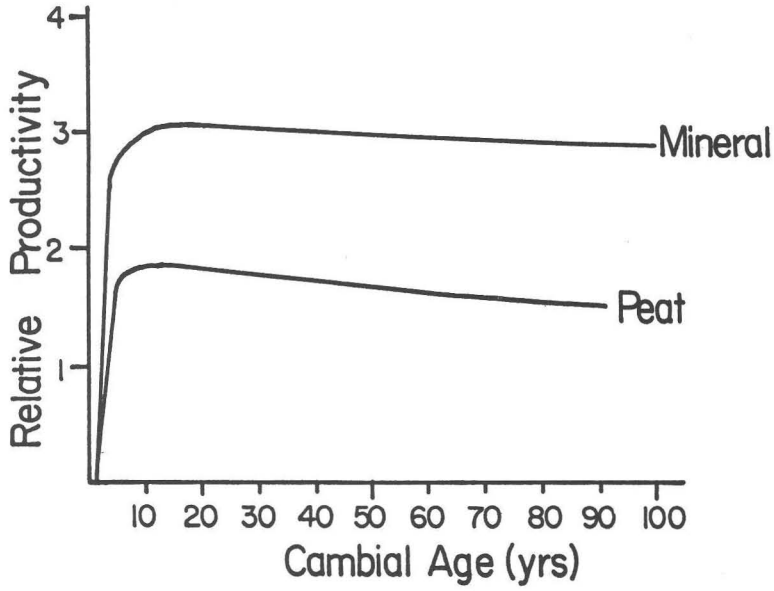

Fig 3. Mean current annual productivity curves for mineral substrates (based on four sites), and for peat substrates (based on three sites).

current annual productivity curves are mainly due to differences in site nutrient status, drainage conditions and, in the case of subfossil and contemporary woodlands, possibly to differences in the regional climatic milieu. Intraspecific competition at high tree densities is unlikely to have accounted for the different rates of annual radial increment and productivity.

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Private Forestry in Sweden

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The total land area of Sweden is 45 million hectares. About half of the country is forested, 10% is used for agriculture and 9% consists of lakes and rivers. Most of the remainder is accounted for by the mountain regions in the north west. Although this latter area is of little economic importance, it provides invaluable scope for recreational activities such as outdoor sports, fishing and hunting. Sweden has a population of some eight million, with about 90% of the people living in the southern half of the country. One of the reasons for this has been the steady movement of people away from the rural areas in the north west over the past thirty years.

Forest Structure

The Swedish forest estate of about 23.5 million hectares is distributed amongst four major owner categories. The state owns 19%, forest companies 25%, communities and private citizens 48%. There are about 236,000 private owners. The average holding is about 50 hectares, but the size of holding ranges from as small as 0.1 ha to over 400 ha (Table 1). The smallest viable unit from a forestry standpoint is about 30 ha and this is usually worked in conjunction with about 30 ha of arable land. The forest land is usually divided in 3-5 separate blocks or strips.

Table 1 Area of forest and number of holdings in private forestry.

Area (ha)	Number of Holdings
0.1 — 5	38,200
5 — 25	90,430
25 — 50	49,490
50 — 100	34,460
100 — 200	16,450
200 — 400	5,380
400+	1,660

Almost 70% of private forest owners live on their holdings. However, the drift to the urban areas is still quite rapid and more and more small holdings are becoming abandoned. Of those remaining on the land 62% are over 50 years of age. Most forest owners are members of a forestry co-operative. There are nine such co-operatives in Sweden and the bigger ones are very powerful organisations. Their more important tasks are to collect and market timber for their members, and to engage in silvicultural and logging operations. They trade in roundwood, process the timber supplied by members, and provide both information and training. They operate their own field organisations with skilled labour and modern equipment. On a contract basis they carry-out silvicultural work such as site preparation, planting, cleaning, thinning and logging. In addition they provide complete management for absentee owners. They also provide an extension service for members and put on nationwide courses for private owners.

Species and Silviculture

The main species are Scots pine, Norway spruce and birch. Scots pine is the species choice on dry mineral sites and Norway spruce occurs mainly on the moister sites. However, on many sites both species form an intimate mixture. Birch is not planted, but occurs naturally on all sites. It is used mainly for firewood, but it can also form part of the species mix for pulping. Sweden has strict silvicultural laws. For example, according to the law, cleaning should be carried-out before crops reach 3m in height. Cleaning involves the removal of unwanted trees such as birch, aspen, mountain ash and badly formed conifers. Despite the law it is known that large areas in the private forestry sector are badly in need of cleaning and thinning. The stands which are thinned vary enormously in species content, age, volume and stocking density (Table 2). Thinning is carried-out mainly for silvicultural reasons and hence most owners thin as selectively as possible. Most stands are only thinned once and then the stocking density is reduced to 600-800 stems per acre.

Table 2 Stand data for stands requiring thinning.

Variable	Mean	Range
Age (years)	43	19 — 110
Stems/ha.	1957	1000 — 3870
Vol. (m^3/ha.)	142	39 — 294
D.B.H. (cms.)	11.7	7.6 — 17.3
Height (m)	10.8	5.6 — 17.1
Species (Pine/Spruce/Birch)	8/1/1	—

The average volume removed is about 80m³/ha. In thinning, winding strip roads (racks) are first opened up to give access to the stand. Trees are then felled towards the strip roads and the produce is stacked manually. Extraction is usually by horse or by farm tractor, with or without ancillary equipment (Table 3). Clear-fell areas tend to be rather small, usually about 2-2.5 ha. The logging yields in clear-felling from mean yield class sites is about 300m³/ha. The actual volume harvested annually increases from North to South, (Table 4) as does productivity.

Table 3 Means of extracting thinnings in private forestry.

	% of Harvested Volume
Horse	15
Farm Tractor	
Without Loading Equipment	21
With Wire Crane	29
With Grapple Loader	8
Forwarder	26
Other Machinery	1

Table 4 Annual cut (m³/ha.) by region and forest size.

Region	Forest Area (ha.)					
	25	25-50	50-100	100-200	200	Average
Northern Sweden	2.6	1.7	1.7	1.2	0.9	1.3
Central Sweden	4.3	3.2	2.9	2.6	1.8	2.5
Southern Sweden	4.0	3.0	3.0	3.0	2.6	3.1

Reafforestation nowadays is mainly by planting. In 1982, 67% of the area for reafforestation was planted and the remainder was regenerated by natural means. Prior to planting most owners cultivate by scarification. Planting espacement depends upon site quality, but usually varies from 2.0m on high quality sites to 1.5m on poorer ground. Scarification is a prerequisite for natural regeneration. Norway spruce is not regenerated naturally since good seed years are irregular and seed trees are very likely to be windthrown. Scots pine is often regenerated by the Uniform System. In naturally regenerating Scots pine about 70-100 seed trees/ha are left on the ground. These are removed about 10 years later when regeneration is assured and they then give a very valuable short term boost to the forest income. Private owners do very little beating-up or pruning and the percentage of owners who use fertiliser in their forest is very small.

Forest Management

Forest land is taxed according to site quality. The normal rate is about £0.3/ha. Harvested timber is also subject to tax. However, private owners can claim tax relief for their labour input in their own forest and as a result few farmers pay any tax. Farmers, therefore, prefer to do all their own forest work (Table 5). As a result most timber is sold at roadside, where sawlog and pulpwood are currently valued at about £27/m^3 and £6/m^3, respectively. However, the use of contractors to do forest work in increasing as owner-occupiers become too old to do the work themselves and as more and more young people migrate to urban areas.

Table 5 The distribution of logging work (% of volume removed) by category of worker.

	Felling	Extraction
Own Management		
Forest Owner and & Family	45	42
Hired Labour	19	24
Forest Owners' Association	14	15
Stumpage Buyer's Contractors Association	22	19

Each forest owner is obliged to follow a ten year working plan. Working plans may be drawn up by inspectors from the State Forest Service or by co-operative extension officers. Owners bear 50% of the cost and the remainder is paid by the State at an agreed rate/ha. Working plans highlight areas which require cleaning, thinning or felling and follow-up inspections are normal in an attempt to see that the work is carried-out. Forest owners are encouraged to road and drain the forest areas and substantial grants are available for these operations. Forest work in private forestry fits easily into the pattern of farmwork for the year. Dairy cows are normally housed at the beginning of October when the season for thinning and felling starts. About 40% (30 million m^3) of the annual logged volume in Sweden comes from private woodlands and 12 million m^3 of this is pulpwood.

The Forest Bank

It is virtually impossible to estimate the value of forestry to the farm owner in Sweden, because much of the logged produce is retained

on the farm. About 1/3 of all the wood cut is retained for firewood. Sawlogs are often processed locally and retained for farm use. In addition many farmers only harvest wood once every five years or so. This is usually in anticipation of some additional expenditure on the farm. In this way the forest becomes the 'standing bank' for the farmer, to which he can turn to purchase a new tractor, replace his dairy herd or expand other aspects of his farming enterprise. This capital function of the forest in the total farming enterprise is quite striking and planting now, to ensure the capital supply for the future, is part of every farmer's thinking.

Submission to Review Group

The setting-up of the Review Group was considered by Council to be one of the most important events in Irish Forestry for many years. It gave the Society an unprecedented opportunity to express its views concerning the future of forestry in the country. Council met twice to prepare its submission. At the first meeting the ideas which the Council wished to put forward were developed. A draft submission was subsequently prepared by a small group and this was revised and augmented at the second meeting.

The document was not sent to individual members before submission because it was felt that this would be impractical and because individual members could make their own submissions to the Review Group. The submission is printed here, in full.

Editor

SUBMISSION FROM THE SOCIETY FOR IRISH FORESTERS TO THE REVIEW GROUP ON FORESTRY

Wood is a basic renewable resources produce in forests which, because of their long production cycle, must be protected, maintained, managed for maximum output, and extended where appropriate.

The Society of Irish Foresters was founded in 1942 with the object to "advance and spread in Ireland the knowledge of forestry in all its aspects". The Society has a membership of 650 which is comprised of the majority of professional foresters in state, semi-state and private organisations. There is also a substantial number of members associated with sawmilling and private forestry.

The Society wishes to comment on forestry in Ireland today with particular reference to:

(1) Market Research.
(2) Irish Forest Production and Potential Productivity.
(3) Employment.
(4) Management of Forest Resource.
(5) Research Needs.
(6) Multiple Use of Forests.

1. Market Situation

Ireland supplies approximately 20% of its present demand for wood products. Production forecasts from the Forest and Wildlife Service indicate that timber production from both state and private forests will lead to self sufficiency in conifer wood by the turn of the century.

However, wood imports constitute 60% of the total EEC consumption representing a cost of 13,000,000 ECU to the Community. On a global scale there will be a substantial increase in the demand for wood and wood products from a constant or diminishing forest area.

In responding to the terms of reference set for the Review Group, the Society suggest that many of the difficulties which have arisen might have been avoided if the Minister had set up a Consultative Committee as authorised by Section 10 of the Forestry Act of 1946.

2. *Irish Forest Production and Potential Productivity*

The mild wet climate of Ireland is well suited to the growth of many coniferous species. This fact gives the country a very significant comparative advantage over all other EEC countries. In terms of forest productivity, one hectare of land in Ireland will produce the same amount of wood as four hectares in other EEC countries. Moreover, in the context of acid deposition, which is assuming greater significance over much of Europe, Ireland is particularly favourably located and unlikely to incur any reduction in forest productivity. Planning for the wood based industries has assumed that an annual planting programme of 10,000 hectares will be maintained. The Society views with concern the failure to meet this programme in recent years, in view of its predictable effect on the supply of industrial raw material. As site quality is of the utmost importance on the level of supply, the traditional attitude towards the afforestation of marginal land should be altered. This will require a vigorous and sustained public education programme to highlight the value of forestry to the Irish economy and the need for a rational use of the land resource. In this context farm woodlots could contribute significantly to local wood and energy demands.

3. *Employment*

The current employment level in forestry is 7,000 people. This figure covers in-forest operation, harvesting, transport, pulpwood processing and sawmilling. With the maintenance of the 10,000 ha afforestation programme, employment would reach around 15,000 in the early part of the next century. Forestry has provided productive employment and thus maintained infrastructure in many

remote areas where agriculture alone could not provide economic livelihood. Forest industries are located near forest and therefore the wealth generated stimulates further rural development. Experience in other countries has shown that the forest enterprise is particularly suited to development by committees or co-operatives.

4. *Management of the Forest*

The primary aim of forest management is the achievement of a sustainable yield, which means a never-reducing supply of the renewable resource to the wood processing industries. To ensure the orderly management and maintenance of the forest resources, it is essential that the ultimate control factors such as protection, proper exploitation and regeneration, which influence sustained yield, must be vested in the state. This should be seen as a separate function from the operation of a forest enterprise, which may be under the control of such diverse interests as the state, semi-state, private companies or individual owners.

5. *Research Needs*

The level of resources available for forest research in the Republic of Ireland has not been adequate to meet the demands of a pioneering enterprise for both state and private sectors, and this shortfall will be even more pressing in the future.

6. *Multiple Use of Forests*

The main objective of the forest enterprise is the production of wood. However, there are many economically unquantifiable recreational benefits such as orienteering, hill walking, shooting and other such activities, which are provided without loss of wood production.

Society Activities

ANNUAL GENERAL MEETING 1985

COUNCIL REPORT 1984

Symposium

"Forestry — A National Resource" was the theme of the 1984 Symposium held at UCD on 6th April. Six papers were presented on the subject. The Symposium was attended by 190 members.

Annual Study Tour

The Tour took place in Wales from 13th-19th May, a full account of which is in Irish Forestry, Vol. 41 (2).

Meetings

A field day was held in late October in Kildare. Its theme was "Land Use Options for Midland Bogs". The day began at An Foras Taluntais Research station at Lullymore with indoor introductory talks from Mr. A. J. Cole and Dr. R. Hammond (AFT), and Mr. G. McNally (Bord na Mona) on the various options being tested on cutaway bogs. The large attendance then proceeded outdoors hoping to view a newly afforested area, which had been planted in 1983 by FWS on land leased from BNM. After a introductory talk by Dr. M. Carey on these soils in relation to potential forest production, the group had no option but to return indoors due to torrential rain. The afternoon was spent at Mr. J. Wilson-Wright's plantations at Coolcarrigan. Discussions were held on the treatment of young coastal lodgepole pine on raised bog, Christmas tree production, economics and desirability of pruning, nutritional problems, and the treatment of dense natural regeneration of lodgepole pine after fire.

A very successful evening meeting on the "Silviculture of Ash for Hurley Production" was held at UCD in December. The speakers were Mr. B. Fitzsimons of the FWS Research Branch, and Mr. P. Staunton, a hurley manufacturer from Ashford, Co. Wicklow.

The Society wishes to thank those who presented papers at the Symposium, all those who helped in organising the field day and evening meetings. Special thanks are extended to the Institute of Chartered Foresters who were extremely helpful in organising the Annual Study Tour in Wales. Thanks are also due to the Forest and Wildlife Service, Dublin, the Northern Ireland Forest Service and University College Dublin, for their co-operation and assistance during the year.

Annual General Meeting

The AGM was held at UCD on 5th April. The Minutes were published in Irish Forestry, Vol. 41 (1).

Forestry Walks

Council decided not to hold walks in 1984 and to review the situation for a year.

Publications

Irish Forestry Vol. 41 (1 and 2) was published.

The Forests of Ireland (second edition) edited by Dr. N. O Carroll was published in November. Mr. Sean MacBride, Honorary Member of the Society, launched the book. The other three Honorary Members were present.

Examinations
No candidates sat for examinations.

Henry Memorial Plot (Avondale)
Future development of the plot is still under consideration.

Educational Award Fund
One of the two prizes of £100 worth of forestry books was awarded for the first time. Mr. J. Galligan of Bray was the UCD recipient. The name of the winning Kinnitty student has not yet been announced.

Overseas Development Group
The Group held a meeting in UCD on 13th October organised by R. Keogh and chaired by Dr. T. Farrell. Present at the meeting were representatives from the All Party Committee on Development, Department of Foreign of Foreign Affairs, Semi-State Organisations, the Universities and 'Third World' relief agencies. Dr. L. Roche, President of the International Union of Societies of Foresters also attended.

The problems of tropical deforestation were discussed. The exchange of views that followed was extremely valuable in clarifying the need for forestry expertise in developing countries, as well as the difficulties for Irish forestry personnel in spending time abroad. The meeting concluded with the general agreement that a new effort be made to encourage greater participation by Irish institutions and Irish foresters in the development of forestry in Third World Countries.

Review Group on Forestry
The Council made a submission on behalf of the Society to the Review Group which was set up in November, 1984.

Elections
The post of President and three posts of Technical Councillor were filled by election. Because one of the existing Councillors became Vice-President, another Technical Councillor, was elected for a one year term. As there was one candidate only for the remaining posts these were filled without election. The total poll in the 1984 election was 225.

Membership
Number of members at 31st December 1984:

Technical	*Associate*	*Student*	*Total*
466	109	36	611
New members elected in 1984:			
7	11	4	22

We note with regret the deaths of the following members: Mr. D. Carroll, Mr. O. Cowman, Mr. P. Flynn, Mr. T. McEvoy, Mr. T. Moyhihan.

Attendance at Council Meetings
6 Council meetings were held during the year. Attendance at the meetings was as follows:

E. P. Farrell, J. Fennessy, L. Furlong, E. Griffin, E. Hendrick ..... 6 meetings
M. O'Brien, J. O'Driscoll ..... 5 meetings
J. Gardiner, N. O'Carroll, J. Prior, P. Raftery ..... 4 meetings
D. Ward ..... 3 meetings
E. Morrisey ..... 1 meeting
C. Farmer, P. Glennon ..... 0 meetings

J. Gardiner and D. Ward could not have been present at two of the meetings due to being abroad.

Signed: E. GRIFFIN,
Hon. Secretary.

March, 1985

MINUTES OF THE 43rd ANNUAL GENERAL MEETING THURSDAY, 28th MARCH, 1985 AGRICULTURE BUILDING, UNIVERSITY COLLEGE, BELFIELD, DUBLIN 4.

Attendance

The outgoing President Dr. N. O'Carroll took the chair.

Present were: D. Mangan, E. Hendrick, J. Prior, J. Connelly, E. Griffin, F. O'Dea, J. Griffin, C. O'Carroll, B. Lacey, F. Mulloy, D. Ward, J. Fennessy, R. Keogh, J. Gardiner, M. Carey, L. Furlong, P. Joyce, J. O'Driscoll, M. O'Brien, B. Fitzsimons, J. Dillon, L. P. O'Flanagan, P. Raftery.

Apologies: C. Kilpatrick, D. McAree, J. Phillips.

Secretary's Business

The Minutes of the 42nd Annual General Meeting, having already been circulated to members, were agreed and signed by the President.

Matters Arising from Minutes

The President noted that due to a typing error, Louise O'Reilly, the first girl recipient of the Foresters Certificate, had been referred to as Mr. L. O'Reilly in the Minutes which had appeared in 'Irish Forestry'. The Editor will put an erratum in the next issue.

M. Carey raised the question of decentralisation of Society Meetings and Symposia — it seemed that the Dublin/Bray members are too well represented on the Council. The President replied that these points had been discussed by Council and action has been taken in that a meeting held in Dublin before Christmas is to be repeated in Limerick later this year. Council had decided not to change the current year's Symposium out of Dublin. The President said that Regional Groups could be established quite easily by interested people, and that one of them could in turn elect to host and organise the Annual Symposium. M. O'Brien said that generally local people were unwilling to organise meetings. J. O'Driscoll said that on the recent election ballot paper there were many country nominees; the fact that nearly all Council members were from Dublin/Bray was a democratic decision of the members who voted.

The Council Report for 1984 was then discussed. R. Keogh stated that work done by himself and other members on Overseas Development during the year had not been referred to. It was agreed that an amendment would be made. The adoption of the 1984 Council Report was proposed by P. M. Joyce and seconded by E. Hendrick.

Treasurer's Business

P. Raftery explained that it might appear from the balance sheet that there was a deficit of approximately £400 in the running of the Society for 1984. However, two items — the Educational Award Fund — £916.61 and uncashed cheques for the 1983 Forest Walks — £501.84 were included in the incoming balance of £7,223.56. Also, an uncashed cheque for £620 which would not normally be paid until 1985 was shown in the accounts as having been paid. The net result of these transactions meant that there was a surplus of £1,628 in the day to day running of the Society in 1984.

Adoption of the 1984 Abstract of Accounts was proposed by J. Gardiner and seconded by M. Carey.

Confirmation of Elections

The meeting confirmed the 1985 Council election as follows: President, M. O'Brien; Vice-President, J. Prior; Hon. Secretary, R. Griffin; Hon. Treasurer, P. Raftery; Editor, J. J. Gardiner; Business Editor, E. Hendrick; Hon. Auditor, W. H. Jack; Technical Councillors, M. Carey. J. Fennessy, A. Pfeifer, J. O'Driscoll (for one year only); Associate Councillor, B. Hussey.

President's Valedictory Address

In the original version of the Society's Constitution and Rules, Rule 5 required of the President that "at the Annual General Meeting at which he demits office he shall, inter alia, review the advances in forestry or forestry knowledge during the year".

The 1971 version, still current, does not include that requirement, but neither does it prohibit the practice. I believe it to be useful that the Society should, for the benefit of members, have a published record of the significant events in the world of forestry during the term of office of each President. I recommend to my successors that they should also consider whether they accept this as a desideratum. I propose to review, in summary, what I have regarded as the important events of the past two years. Because of its potential effect on the future of forestry in the Republic of Ireland, it would be difficult not to give first place to the setting-up by the Minister for Fisheries and Forestry of a Review Group on Forestry in November 1984. The terms of reference of the Review Group are:

> With a view to ensuring that the Country's afforestation programme and, in particular, the substantial resource which it represents, is developed and exploited to the best national advantage, having due regard to the role and function of the National Development Corporation where relevant —
>
> (1) to examine the present structure, organisation and operation of the Forest and Wildlife Service of the Department of Fisheries and Forestry;
>
> (2) to consider what changes, if any, are necessary;
>
> (3) to make specific recommendations on such changes;
>
> (4) to submit a report to the Minister for Fisheries and Forestry by 1st June 1985.

The Society has made a submission to the Review Group and I hope that the submission, together with an explanatory note to members, will be published in 'Irish Forestry' as a permanent record.

This review represents the first comprehensive and independent examination of forestry since the Departmental Committee which reported in 1908. If might be added that it is difficult to identify any specific outcome which can be ascribed in its cause to that report.

There were three publications related to forestry in 1984. Firstly, *The Forests of Ireland,* a new book with an old title, was published for the Society. The book was launched on November 14th by Sean MacBride, S.C., Nobel and Lenin prizwinner and honorary life member of the Society of Irish Foresters. I am sorry to have to report that, in my opinion, the publisher has priced the book at a level which is militating against its circulation in the numbers which might otherwise have been expected.

Secondly, there was a report published entitled, *The Case for Forestry.* This was the text of a report to the Government submitted in July 1982. On its basis the Government affirmed the long term planting target of 10,000 ha per annum, to include forest regeneration (known in the Forest and Wildlife Service as reforestation) on State forest land, and also including private sector afforestation. It is disappointing to record that the short term target of 7,500 ha per annum, to be implemented by private sector afforestation, is not being achieved. Finally the Report of the Interdepartmental Committee on *Quota/Tender Sales Systems for Disposal of State-Owned Timber* was published towards the end of the year.

It is perhaps a commonplace arising out of the cynicism of the media that none of these publications achieved a degree of publicity commensurate with that which had been given to items of adverse comment related to State Forestry in the recent past.

The purpose of State Forestry in Ireland is to provide a sustainable supply of raw materials for industry, and on the demand side the picture has been favourable. Sawmills have upgraded their operations and their capacity is such that there is a lively demand for all the sawlog material that can be put on the market. The demand for pulpwood was improved by the construction of a medium-density fibreboard (MDF) plant at Clonmel, officially opened in April 1984, and the re-opening later in the same year of an improved and streamlined chipboard factory at Scariff, Co. Clare.

In a more speculative vein it may also be true to say that 1984 will be remembered as the beginning of the era in which a re-appraisal of the EEC attitude to agricultural surpluses led to an understanding of the wood-producing capacity of large areas of Ireland, and of the potential benefits of this production, both for Ireland and for Europe.

Finally, I would like to refer to the work of the Society itself. It is not often that we receive direct evidence of the degree to which it achieves its object "to advance and spread in Ireland the knowledge of forestry in all its aspects", but I have become aware that certain promising developments in the silviculture of lodgepole pine, now being implemented in some areas, arose out of the Society's day meeting held in Co. Mayo in October 1983.

Before standing down I wish to thank all the members of the outgoing Council for their work throughout the period, a period in which my own commitments have prevented me from giving to the Society the amount of attention I would have wished, and I also thank Ms. Lily Furlong for her help in our distribution among members of *The Forests of Ireland.*

I hand over my office to the new President, Mr. Michael O'Brien.

Any Other Business

The new President, Mr. Michael O'Brien in the Chair.

F. Mulloy said he wished to record his gratitude to N. O'Carroll for his work in editing the book, *The Forests of Ireland.* However, he was surprised that the book was dedicated to the late Mr. T. McEvoy only, as he thought there were many others who contributed significantly to the promotion of forestry in Ireland over the years. M. Carey asked who supported the costs of the publishing the book? N. O'Carroll said the publishers, Turoe Press, bore all the expenses and that when they had cleared them, they would pay a royalty per copy sold, to the Society. On the question of the high cost of the book, N. O'Carroll said every effort had been made to keep the price low and the he had complained to Turoe Press about the eventual publishing price. J. Prior wondered why the sterling and not the Irish price was printed on the book.

It was stated that it was compulsory by English law to have the price printed on the book, but this was not the case in this Country. E. Griffin stated that sales of the book at the end of February stood at 270 cloth and 590 paperback

J. Dillon asked what was the situation with regard to Forest Walks. The President said it was hoped to re-start them in 1985. F. Mulloy asked if the Society had planned to do anything with regard to 1985 being dedicated "International Year of the Forest". E. Griffin replied that the matter is on the Agenda for the next Council meeting.

A discussion followed on the quality and content of articles in 'Irish Foresty'. N. O'Carroll stated that there were other journals in which articles on amenity or wildlife would be more appropriate than in a journal about forestry. J. Gardiner (Editor) said that it was difficult at times to obtain enough articles for certain journals,

and that he had never refused any scientific articles on forestry. D. Mangan felt that many of the articles were too scientific, particularly for some of the associate members. B. Lacey suggested that a review article on a specific aspect of forestry might be printed each year. Some members felt that it would be better to have the"Notes for the Assistance of Contributors" printed at the back of the Journal rather than at the beginning.

R. Keogh raised the question of opening the Symposium to non-members and an inclusive discussion followed.

J. Dillon said that the Society did not appear to be attracting the membership of young private planters. It was felt that many of them probably did not know of the existence of the Society. M. Carey suggested that an advertisement be placed in "The Farmers Journal" from time to time. The President said that the incoming Council would discuss the issue.

The meeting concluded at 9.50 p.m

PUBLICATIONS RECEIVED

Forestry Commission, London

Report on Forest Research, 1984.
Price (in U.K.) £6.80.

Forestry Commission Bulletin 61.
Technology Transfer in Forestry. 1984. (For Review).
Price (in U.K.) £6.50.

Forestry Commission Bulletin 62.
Silviculture of Broadleaved Woodland.
Price (in U.K.) £9.50.

Forestry Commission Leaflets:

71. Ploughing of Forest Soils
Price (in U.K.) £1.70.

84. Guide to Upland Restocking Practice.
Price (in U.K.) £2.30.

Arbiculture Leaflet I. The External Signs of Decay in Trees.
Price (in U.K.) £1.00

Forestry Commission, Forest Records:

126. Oak Wilt. Price (in U.K.) £0.90.

128. The Production of Poles for Electricity Supply
and Telecommunication.
Price (in U.K.) £1.00

Forestry Commission Research and Development Paper 32.
Reclamation of mineral workings to forestry.
Price (in U.K.) £1.50.

Public Record Office Northern Ireland

A Register of Trees for County Londonderry, 1768-1911.
Price £5.50.

Society of Irish Foresters

The Forests of Ireland (for Review).
Price: Turoe Press. Hardback: £13.46; Paperback: £7.95.

SOCIETY OR IRISH FORESTERS — STATEMENT OF ACCOUNTS FOR YEAR ENDED 31st DECEMBER, 1984

1983	*RECEIPTS*		*1984*	*1983*	*PAYMENTS*		*1984*
3,473.94	*To Balance from Last Account*		7,223.56	59.49	By Stationery and Printing		82.06
	To Subscriptions received			3,302.00	By Printing of Journals		3,871.00
	Technical 1984	4,243.16		1,055.23	By Postage and Telephone		1,081.13
	Technical 1983	413.04		110.00	By Expenses re Meetings		100.00
	Associate 1984	789.55		24.58	By Bank Charges		25.10
	Associate 1983	64.78		903.45	By Secretarial Expenses		1,504.80
	Student 1984	74.00		300.10	By Value Added Tax		549.90
	Student 1983	30.00		133.42	By Examination Expenses		90.30
	Other Arrears	162.80		—	By Affiliation Fees		50.47
5,671.68	Advance Payments	332.41	6,109.74		*By Honoraria:*		
					Secretary	50.00	
	To Interest on Investments				Treasurer	50.00	
	Savings Account	81.26			Editor	50.00	
	Educational Building Society		8.97	200.00	Business Editor	50.00	200.00
563.60	Lombard & Ulster	831.47	921.70	—	By Forests of Ireland (Hon. Members)		41.84
				200.00	By Study Tour Expenses		430.00
				—	By Educational Award Fund		916.61
	To Journal			2,508.44	By Forest Walks (1983)		501.84
	Sales	348.82			*By Balance*		
2,014.03	Advertising	1,621.08	1,969.90		Current Accounts	387.91	
					Savings Account	95.50	
					Educational Building Society	130.30	
32.55	Gains on Sterling		33.86	7,223.56	Lombard & Ulster	6,200.00	6,813.71
			IR£16,258.76				IR£16,258.76

I have examined the above accounts, have compared them with vouchers and certify same to be correct, the balance to credit being IR£6,813.71 which is held in the current accounts at the Ulster Bank (£1,028.92 less £641.01 unchased cheques), Ulster Savings Bank Savings Account, B2960, Educational Building Society Account 130441, and Lombard and Ulster Savings Deposit Account 675146F. There is a holding of IR£100 Prize Bond No. R855061/080. Ir£877.50 is held in Trustee Savings Bank Account 323 001 35909 for the Educational Award Fund.

Date: February 28th, 1985

Signed: W. H. Jack, Hon. Auditor.

EDUCATIONAL AWARD FUND

1983	*RECEIPTS*	*1984*	*1983*	*PAYMENTS*	*1984*
	To Transfer from General Account	961.61		By 1984 Award	106.28
	To Interest	67.17		By Balance	877.50
		IR£983.78			IR£983.78

I have examined the above account and certify same to be correct, the balance being IR£877.50 which held in the Trustee Savings Bank Account 323001 35909.

Dated: February 28th, 1985 *Signed: W. H. Jack, Hon. Auditor.*

Three ways to keep trees weed-free with Roundup®

Pre-plant treatment

Overall spraying of plantation areas prior to planting. Target weeds should be actively growing, with sufficient leaf area to give good reception of the spray. Woody weeds, heather and bracken are best treated in full leaf or frond, before the foliage changes colour in the autumn. Best results are obtained between mid-July and end-August, when brambles and most scrub species will also be susceptible.

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Spruce: Sitka, Norway.
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* *treat only in late summer months; avoid early spring treatments.*
** *treat only during autumn and winter.*

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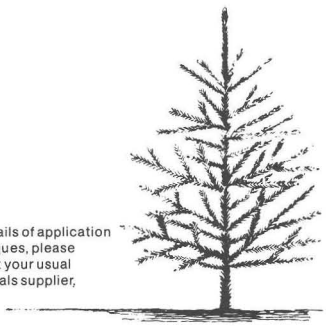

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