

# Management Requirements for Farm Woodlands

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# 1. INTRODUCTION

## 1.1 Private Forestry in Ireland

As a result of the development of incentives, private investment in forestry has increased dramatically over the past ten years (figure 1.1). Most of this new planting has been with exotic, coniferous species on marginal agricultural land. Private forests are also typified as small fragmented holdings, with the average size of holding circa 8 hectares. With a shift in emphasis in the most recent grant schemes however, the trend is changing and a growing number of private woodlands are being established on enclosed, improved land and involve broadleaf species. In 1995, 11 000 hectares of woodlands had been established on enclosed land, versus 6 343 hectares on unenclosed land (Forest Service<sup>1</sup>, 1995). This shift to better quality land also facilitates the planting of broadleaf species. In 1991, private broadleaf afforestation amounted to 386 hectares. In 1995, 25% of private afforestation involved broadleaf species i.e. 4 290 hectares. The farming group now undertakes the greatest level of broadleaf afforestation. The increase in broadleaf forests demands a high level of skills in all stages of management. This compounds the already existing problem of a lack of knowledge and experience of forestry among private forest owners in general. If the State and EU investment in these farm forests is to be realised, it is essential that these forests are well managed. Many of the new private forests are at a stage where management is crucial to their success. Furthermore, these young plantations are at a stage where they are most responsive to manipulation and most flexible to fulfil a range of possible objectives (Vasiliauskas, 1995).

Farmer Planting 1986 - 1996

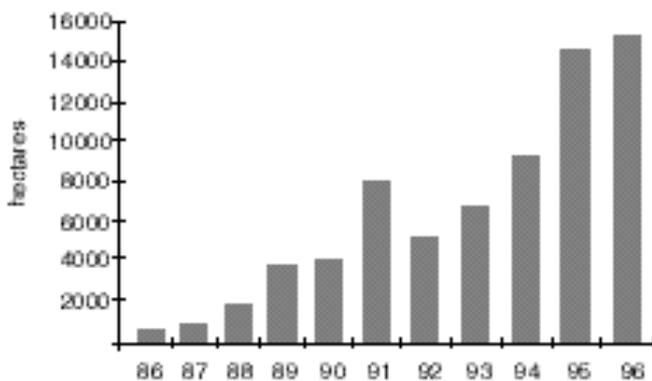


Figure 1.1 The expansion of farm-forestry in the period 1986 to 1996.

## 1.2 Management in Private Woodlands

Approximately half the forests of Europe are privately owned and many of these private forest holdings are small in area (figure 1.2). Depending on the owner, these forests can have a variety of functions. These may be singular or multiple, monetary and/or non-monetary (Hyberg and Holthausen, 1989). People in general perceive forests in different ways and forest owners are no different. Depending on how the forest is perceived, the motivations and objectives for forest management can be manifold. Individuals may be motivated by the potential income from timber or they may not. Forest owners may plant purely for aesthetic reasons, they may focus more on providing recreational areas or they may plant trees to enhance habitat diversity in an area.

There are a multitude of motivations and objectives that any one owner may have and, with this in mind, the styles of management among forest owners can often diverge considerably from the conventional, professional methods of forest management (van der Ploeg and Wiersum, 1996).

It is important to acknowledge that forest owners are a heterogeneous group (Kurtz and Irland, 1987; Lönnstedt, 1989) and their motivations and subsequent objectives/goals for their forests can be expected to vary greatly. Indeed not all their motivations and objectives will be tangible and succinct. The amount of work put into the management of the land can be expected to reflect the motives for ownership of forest land (Julien, 1986). It is necessary, therefore, to establish why forest owners get involved in forestry in the first place. Common reasons

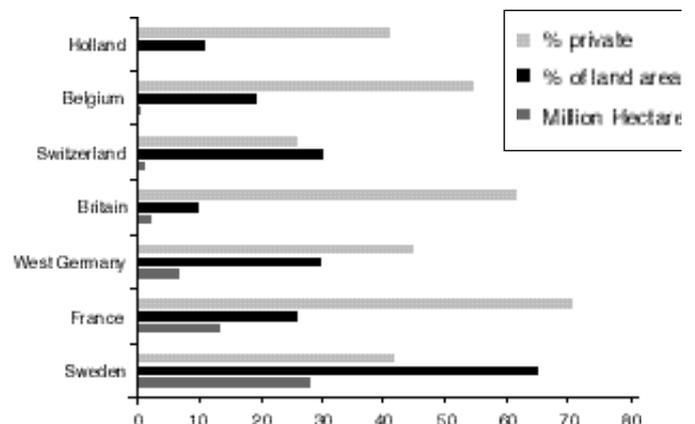


Figure 1.2 Selected forestry statistics from European countries (Grayson, 1993)

include: short-term financial gain; long-term investment; recreation and personal interest; environmental reasons and tax relief (Sanders, 1986). The motivation to plant may influence the subsequent objectives for the woodland. Woodlot management, as with any management, must take into account and indeed be shaped by these objectives. However, problems in private woodlot management often stem from the lack of identifiable and quantifiable objectives or goals (Vasiliauskas, 1995), because the forest owner is generally poorly informed about the biological and physical systems over which s/he assumes control. This may result, for example, in a lack of environmental or visual sensitivity, poor species to site selection and improper or little vegetation control after establishment, underthinning and a host of other silvicultural problems.

### 1.3 Project Background

This study was instigated as a response to generalised opinions, that the level of owner participation in the management of private forests in Ireland and in particular farm-forests, was negligible. Over 80% of farmer planting was being carried out by contractors, with the result that the owner rarely had input into the management of the plantation during the initial years (Anon<sup>2</sup>, 1994; Anon<sup>3</sup>, 1994). The lack of tradition and experience in forestry among these new forest owners had also been highlighted and was believed to compound the problem of poor owner participation in forest management. Furthermore, the prevailing belief at the time was that most private forest owners had little genuine interest in growing trees, but rather got involved in forestry mainly because of the generous grant schemes available. Thus their motives and objectives were short-term in nature and could confound the likelihood of long-term quality management so essential to forests.

As the forest sector expands in Ireland there will be an increasing reliance on private forests for the supply of roundwood. Hence it is essential, that in order to realise the full potential of private forests, that a commitment to woodland management be nurtured. However, this commitment relies upon an understanding and appreciation of forest management and forestry on the part of the owner, as well as the acknowledgement by their advisors, that management for the production of timber may not always be the forest owner's primary objective.

The three major obstacles facing the development of private forestry may be described as follows;

- (a) The incentive package now in place to encourage afforestation is generally regarded as generous. Thus there is a suggestion that farmer afforestation in particular is grant driven without a corresponding commitment to silvicultural and forest management (Anon<sup>2</sup>, 1996). This grant dependency may be compounded by the lack of forestry tradition amongst farmers and by the fact that most new forest owners have no experience of forest operations (Bulfin, 1997).
- (b) The absence of forest management skills among the private forest owner population is combined with an advisory service which may be overstretched because of inadequate staffing.
- (c) The mean size of holding in farm forestry has been estimated to be in the region of 8 hectares. Fragmented holdings which are increasingly planted with broadleaf species may be extremely difficult and costly to manage using conventional techniques.

### 1.4 Study Objectives

The extensive review of the literature carried out during this study raised many questions and specifically the following:

- (i) What level of management is being carried out in private forests in Ireland?
- (ii) Who is currently managing the private forests?
- (iii) What are the information needs of the private forest owners?
- (iv) How can this information be best disseminated?

The objective of this study was to answer these questions.

## 2. METHODOLOGY

### 2.1 Methodology Employed

The primary objective of this study was to assess private forest owners' knowledge of and level of participation in forest management. This study did not include the semi-state company Coillte or private investment companies, who also own and manage forests. The method of accessing this information was via a survey of 108 private forest owners carried out between May and October, 1995. A copy of the questionnaire and the frequencies produced as a result of the survey are given in full in Appendix I. Contact addresses were sourced entirely through the Forest Service who keep records of all their grant applicants. For the purpose of the study the population of landowners was stratified on the basis of the afforestation scheme in which they had become involved. The numbers sampled within each strata were proportionate to the size of the stratum. The methodology employed in selecting the sample was stratified systematic random sampling. The full methodology employed for the sampling process is explained in detail in Appendix II.

## 3. RESULTS

### 3.1 Basic Frequencies Extracted from the Survey

Some of the key results have been extracted from the survey and are discussed in the following sections.

#### 3.1.1 Forest size and type

The overall average area planted per holding was 22 hectares. This is a substantially larger figure than the national average of approximately 8 hectares and is due to the heavier weighting of a few very large forest areas that were included in the survey. A more detailed examination of the distribution of forest sizes is presented in figure 3.1 and highlights that most areas cited per unit were less than 11 hectares. The majority of forest owners (60%) had planted only one unit of forest and the most commonly occurring species was a conifer/broadleaf mixture, followed by Sitka spruce.

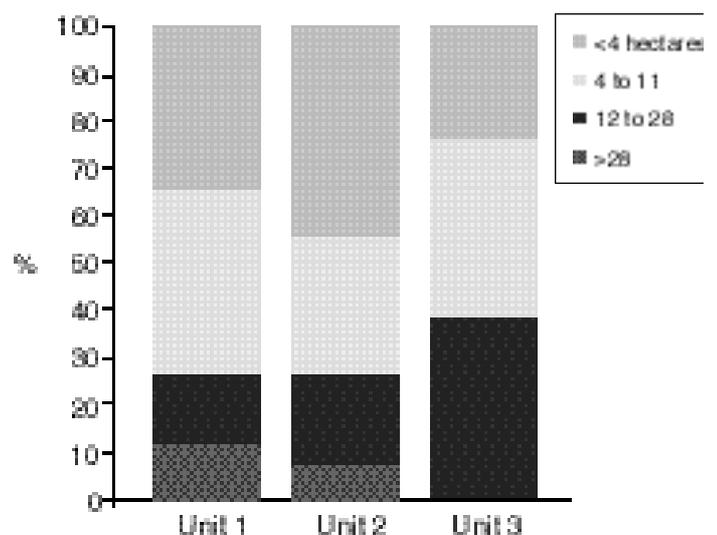


Figure 3.1. Size distribution of woodland units.

### 3.1.2 Reasons for planting

In an attempt to assess the motivations and reasons of farmers for planting and owning a forest, interviewees were asked to prioritise their reasons for planting. They were then given a list of possible objectives for their forest and asked to state which of the objectives they would consider relevant to their forest. Motivations and owners' objectives are seen as key factors in later management of the forest. The motivation to plant may reflect the owner's commitment to the forest, while the objectives of the owner for the woodland has serious implications for the management carried out.

The most frequently given primary reason for planting was to use up poor/marginal land, with 28% of respondents giving this answer (Figure 3.2). This was closely followed by "most economic use of land", with 21% giving this reason. There are possibly connections between such reasons, as prior to the introduction of the afforestation grants, the economic use of marginal land on a farm may have been limited and thus not an issue. However with the introduction of financial incentives for forestry, it has gradually become economically feasible to plant such areas. In 16% of cases personal satisfaction was given as the primary reason behind planting. This suggests that establishing a forest may have been a personal ambition for some forest owners. While 14% gave investment as their primary reason (figure 3.2), other reasons listed included; availability of grants/premia, planting to increase the value of the property, shelter, the desire to leave something behind as some form of inheritance, planting to enhance amenity or recreation possibilities, restocking, cover for game, increase on-farm self-sufficiency in timber, continue with an interest in improving the environment and assisting in nature conservation, and to use up land that was fragmented from the main farming area.

Only 69% of interviewees gave a second reason for planting. As a secondary reason, "investment" was the most popular, with 27% of respondents giving this answer. Private forestry is quite an attractive investment in Ireland as the income from it is tax free and requires little initial outlay of capital because of the establishment grants available.

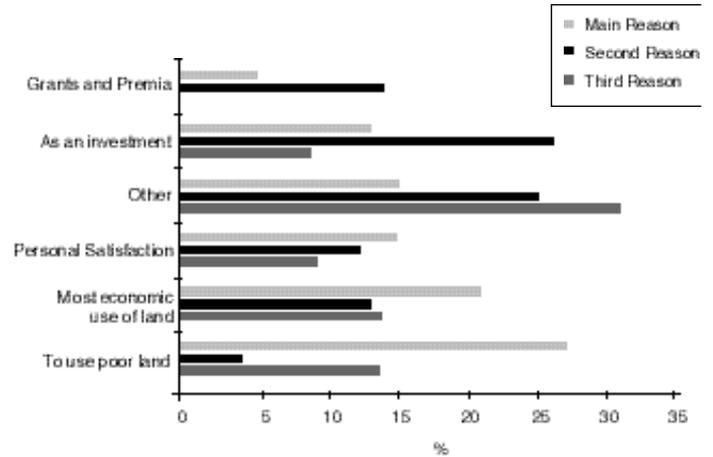


Figure 3.2 Most frequently stated reasons for planting

These results are particularly interesting in view of the fact that numerous commentators have suggested that farm-forestry is 'grant driven' and that many land owners are becoming involved in forestry simply because of the extent of incentives available. While this may be true to a certain degree, results presented in this study clearly indicate that many owners are otherwise motivated.

### 3.1.3 Owners' objectives for their forests

To assess woodland owners' objectives for their woods, a series of statements were listed and owners were asked to respond in terms of 'yes' or 'no' as to whether the statement was applicable to their plans for their woods. A summary of responses to the objectives listed is given in table 3.1.

The importance of the production of timber for sale is obvious, with 90% of forest owners including it among their objectives for their woods (table 3.1). However, the importance of timber production as an objective for forest owners varies considerably from country to country. Some owners believe timber production is very important and others consider it for the most part as irrelevant to forest ownership. However despite many countries reporting a change in management styles among forest owners from utilitarian to recreational, both this study and Ní Dhubbáin, (1994) show that timber remains an important objective in private forestry in Ireland. This is in contrast to survey results in Britain, where sporting, amenity and wildlife conservation objectives are of greater concern than the timber objective (Gasson and Hill, 1990; Johnson and Clark 1992; Britt et al, 1995; Watkins et al, 1996). Nabi et al (1983) explored the possibility of associations existing between background socio-economic factors and forest owners' objectives for their forests.

They found that the primary use of forest land was significantly associated with the sex of the forest owner, their income and their education. Timber production as a primary use was more likely to be important to male owners. The proportion of owners who considered timber production to be a primary use was also positively associated with education. No such association was tested in this study, but the association between background factors and the likelihood of an individual to be involved personally in the management of his/her forest was.

Table 3.1 Owners' objectives for their woodlands

Objectives for woodland	Yes (%) to each statement (n=108)
Production of timber for sale	90
Production of timber for domestic use	45
Recreation for family	42
Recreation for others	22
Cover for game and wildlife	34
Landscaping	42
Shelter	34

Results from the survey indicate that many private forest owners are more likely to wish to manage their forests for multiple purposes rather than for a single purpose. Very few respondents intend to allow access to their forests for the general public (22%). This was not too surprising a result considering the smaller sizes of many of the forests and the attitudes towards public access and land rights in Ireland. The fact that the majority of owners consider the production of timber for sale as important, reinforces the need for management such that quality timber may be produced and a place in the timber market assured. The use of the forest for landscaping purposes also has implications not only for the type of species planted, but also for future management decisions. Both landscaping and recreational objectives may to a certain extent conflict with the timber objective and will certainly make greater demands on the manager of the forest.

Although a substantial proportion of the owners indicated that they intended to produce timber for sale from their woodlands, 23% of these owners could not identify any activities which would influence the quality of the timber to be produced, 34%

suggested thinning and 18% suggested pruning. When respondents were subsequently asked which of the activities were being implemented in the woodland, far fewer responded to the question. But of those who implemented just one activity, thinning was most frequently stated (23% of cases). Where a second activity was stated it was most frequently pruning (59%). As 70% of the forest units were very young, being four years old or younger, this could be expected to have implications on some of the results, particularly those concerning future management and markets.

The relative youth of many of the the forests suggests that their owners will not have encountered many of the necessary management operations, such as pruning and thinning. This was in fact shown in the survey, as 44% of respondents could not yet indicate who would be responsible for the pruning of the trees and similarly, 52% could not say who would carry out the silvicultural thinning. For newcomers to forestry, such as farmers, the longevity of their tree crops is quite probably an unusual concept for them to come to terms with, resulting in difficulties in planning for the long-term.

### 3.1.4 Use of management companies

The 108 respondents were categorised into three groups on the basis of their responses to key questions. Thus those who had used a management company/contractor for all decision making and work were treated as one group (group 1). Those who had used a management company/contractor for some of the decision making and work were treated as a second group (group 2) and those respondents who were responsible for all of the decision making/work themselves were assigned to group 3. The percentage of respondents assigned to each of the three groups is presented in figure 3.3.

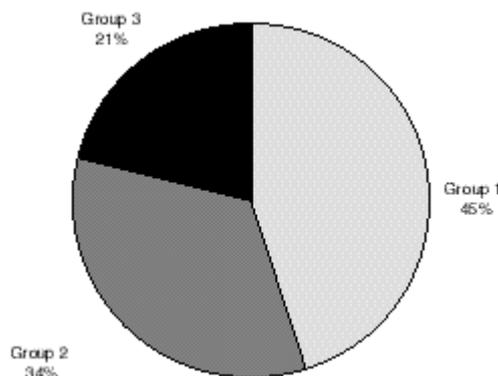


Figure 3.3. Percentages of respondents using management companies/contractors for all, some or none of the management

Thus only 21% of the respondents could be described as making most, if not all the decisions regarding management procedures, as well as undertaking all the work.

This is not a surprising result as in 1995, over 90% of all farm planting was contracted out (Anon<sup>4</sup>, 1996). In group 1, 96% had entered into a 4 year contract with a management company and 58% of respondents in this group indicated that following expiry of the contract, they would manage the forest themselves. In other countries, the involvement of the owner in the management of the forest is seen as crucial to the success of forest management. In comparison with the situation here, private forest owners in Sweden are greatly involved in the management of their forests, with 59% taking responsibility for planting, 77% for beating-up and 73% for cleaning (Holm, 1993).

Respondents were queried as to the level of their involvement in specific management tasks, with regard to both decision-making and labour input. Results showed that forest owners were more frequently involved in making decisions concerning their woodland than they were in carrying out the necessary work. The exception to this is the operation of mapping the woodland. For this job an equal percentage (22%) of respondents were involved in the decision-making and the necessary work.

Nonetheless, a very high proportion of respondents, 45% in total, involved themselves in the decision-making regarding the fencing of their property. A similarly large proportion of respondents (33%) carried out the fencing work themselves. In a Canadian survey (Julien, 1986), a similar situation arose whereby few owners participated in forest management apart from fencing and occasionally road maintenance. It is not a surprising result, as fencing is a common procedure in agriculture and therefore an operation in which respondents from the farming group would most likely have plenty of experience. In the case of drain/fence maintenance, 39% of respondents indicated that they themselves had made or would make the necessary decisions, and 42% had or would carry out the work themselves.

In contrast, very few respondents (12%) were involved in establishing a drainage system. This result is not remarkable considering the machinery necessary for installing drains is rarely found as a piece of farming machinery and so would have to be

contracted out. Furthermore few farmers might be expected to be informed as to the type of cultivation or intensity of drainage necessary for the establishment of a tree crop.

The results would suggest that private forest owners are not averse to carrying out the necessary work; rather, where the forest owners have had practical experience of an operation before, they are more confident in their own ability and predisposed to carry out the operation themselves. However, in some instances lack of machinery and time will always be considerations and even where the owner has the necessary experience, lack of equipment and/or time may not allow the owner to carry out the operations him/herself.

As might be expected, 91% of respondents did not have a management plan for their woodland. Although the majority of the units were very young, nonetheless a management plan could be very useful for planning and timing of the necessary operations. In Finland, where the extension services are well developed, the production of a management plan for the forest owner focuses strongly on the forest owner. The owner is consulted at all stages of development of the plan and the plan itself is presented in a very user-friendly manner (Wall, 1996). Such involvement of the forest owner at the planning stage is seen as conducive to the personal participation of the owner at later times when management operations are necessary, thus combating neglect of the forest resource.

### 3.1.5 Forest owners who employed management companies or contractors

Groups 1 and 2 were asked a series of questions regarding their decision to employ a management company. When asked to indicate the reasons that influenced their choice of forest management company/contractor, the most frequent reasons given by both groups were because the company was local (25% - Group 1; 30% - Group 2). A further 21% and 22% from groups 1 and 2, respectively, stated that previous personal contact with the company or an individual in the company was an important factor in making the decision to use that company. These were by far the most popular reasons for choosing the companies/contractors. Implicit from such responses is the convenience and perhaps security of using companies already known to the landowner. With regard to satisfaction with the work done, almost identical percentages of both groups expressed

that they were satisfied (77% and 76% in groups 1 and 2 respectively). The most popular reason given by both groups for using a management company was that they did not have adequate time themselves to carry out the work (40% and 31% in groups 1 and 2 respectively)

As a comparison, the forest owners were also queried as to why they felt so many other farmers involved in afforestation, employ management companies or contractors for woodland management, rather than getting involved themselves. Among the various opinions held, the most frequently stated primary reason was farmers' lack of knowledge/skills (35% of cases). In addition, many farmers (25%) indicated that they simply did not have enough time to undertake forestry operations themselves. Other reasons such as lack of equipment and the need for professionals were also mentioned. It is conceivable that lack of knowledge and/or skills among a population can be changed and their knowledge increased through improved information services. However lack of time is not so readily remedied, and will probably always remain a limiting factor to the level of participation of private forest owners in the management of their forests, particularly to their participation in the manual operations to be carried out. It may be surmised that in some instances lack of time may have been cited in place of lack of knowledge or perhaps even apathy.

To determine the importance of information/education in encouraging greater involvement in woodland management, groups 1 and 2 were asked whether the greater availability of information would have encouraged them to be more involved in making decisions regarding their woodland. Only 32% of group 1 and 27% of group 2 indicated that if they had more information they would have become more involved in making the necessary decisions regarding their woodland. When queried about doing more of the physical work in their woodlots, only 11% of group 1 and 16% of group 2 said that more information would have encouraged them to undertake more of the work.

Some sections of the survey yielded results which conflicted considerably with responses given in other sections. These contradictions were particularly evident in the sections concerning participants' intentions to get involved in the management of their forests and those sections querying the effect of advice and support on their involvement. When asked could

they identify what would encourage them to make more of the decisions themselves regarding management in the future, the majority of them (40% in group 1 and 53% in group 2) gave suggestions. The most popular suggestions in both groups were "more time" and "more information available". Only 25% in group 1 and 48% in group 2 could suggest anything that would encourage them to carry out more of the work, and of their suggestions, "more time" was by far the most common. Fifty eight per cent of those who employed management companies/contractors to carry out all of their forest management (group 1), indicated that more information/knowledge and support would encourage them to participate in forest management decision-making. A further 21% of this group might become involved in decision-making if they had more time. Similar proportions of other groupings gave comparable responses.

However, although 79% of respondents employed management companies or contractors for the management of the forest, many indicated that they would look after the forest themselves when the initial contract with the company expires. Considering previous results, the question remaining unanswered is how do participants intend to make the necessary time for forest management available?

### 3.1.6 Forest owners who did almost all the decision making and work themselves

Group 3, which consisted of those owners responsible for all the forest decision-making and work themselves, were asked to give the reasons why they were willing to do so. A summary of their responses is presented in figure 3.4.

The most frequently stated reason given for this group undertaking the decision making and work themselves was that they considered it to be cheaper (29%). In addition many indicated that they had sufficient knowledge to allow them carry out the management themselves (25%). It is interesting to note that while groups 1 and 2 believe more time and information might encourage them to be more active in the management of their forests, the main reason for group 3 undertaking management responsibility themselves, is that it is in their economic interest to do so.

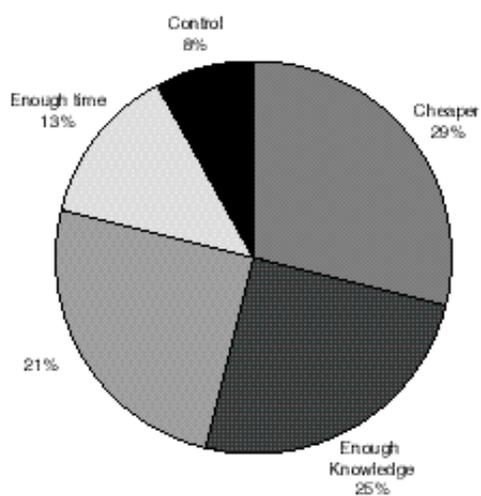


Figure 3.4 Reasons given by group 3 respondents for doing everything themselves.

respondents may be living too far away from the course venue. Alternatively it is possible that entrants to forestry find it easier in the initial stages, at least, to hire consultants or knowledgeable contractors.

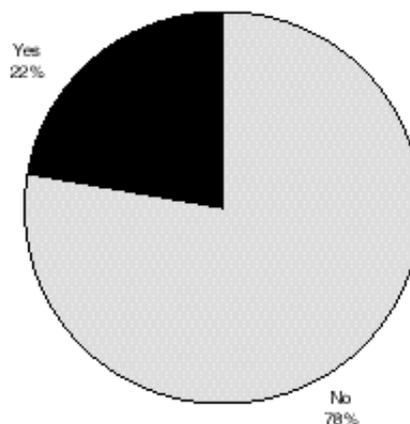


Figure 3.5. Attendance at training courses

### 3.1.7 Information needs of private forest owners

In Ireland the expansion of private forestry has been so rapid that it has not allowed for a comparable rate of evolution of the necessary extension services. Though extension was identified as a key requirement for the success of afforestation programmes in Ireland as far back as 1985 (Nugent, 1985; Bulfin, 1987), training courses and demonstrations were not available to private forest owners until 1991. The lack of research on adoption and diffusion of new technologies in forestry has largely been attributed to an inherent lack of sufficient resources and poor staffing intensity in extension organisations (Hannan and Commins, 1993). The provision of information is a key factor in determining the extent of participation among forest owners in the management of their forests. In order to assess the various forms of information transfer, as well as the forest owner's perception of them, the questionnaire included an entire section on advice, training and knowledge of forestry.

Several times throughout this study the paucity of information and knowledge among private forest owners has been highlighted. The vast majority of forest owners in this survey (88%), indicated they would like to learn more about growing trees. It was surprising therefore to find that 78% of the forest owners surveyed in this study had never attended a course in forestry (figure 3.5), although 57% of these were aware that such courses were available. Such poor uptake of courses may be because of lack of time, the course may clash with forest owners' agendas, or

Demonstrations were also poorly attended by the survey group. The majority (63%), had never attended a demonstration even though 65% of these non-attenders knew that such demonstrations had been organised. These results emphasise the extent of planning required in the preparation of extension activities such as short courses and farm demonstrations. Treacy (1979), has reported similar findings in his study of farmers' use and evaluation of demonstrations in Ireland. While the topic of a demonstration may be the single most important factor in attracting a target audience, other influences such as the timing, the urgency of other farm work, the location and the access to direct advisory contacts may outweigh the need for specialised knowledge. It is clear that the design and implementation of extension activities needs very careful and considerate planning.

Knowledge of forestry comes through various forms of media (Kelley, 1983). This fact reinforced by this survey. When respondents asked in which way they would like to receive forestry information, very few indicated just one form of information, but rather indicated that they would like to take their information from a range of sources (figure 3.6).

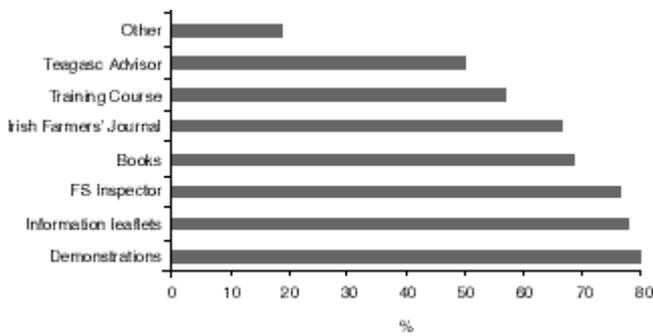


Figure 3.6. Sources from which forest owners would be willing to receive information

It emerged that some 70% of the sample read the Irish Farmers' Journal. A total of 56% of these forest owners read the articles on forestry and found them useful. Sixty four per cent of respondents knew the Teagasc advisor in their area, though 51% were not Teagasc clients. Of those who were Teagasc clients, 69% would be in contact with their advisor 1-5 times per year, but 79% of respondents had never received information regarding their woodlands from the Teagasc advisor. It should be noted that at the time of the survey (1995) the amount of forestry advice being provided by Teagasc was considerably less than at present. Furthermore, the three forestry graduate advisors currently employed by Teagasc had not yet been appointed.

When asked to state their preferences for sources of information, the Forest Service inspector visits were most favoured, with 34% giving them as their preference. Clearly one-to-one advice will always prove popular, because of the specificity of the advice received. However, where this advice is also free, as in the case of the Forest Service inspector, it may prove even more popular. Apart from this, it is also possible that as representatives of the Government department responsible for forestry, that the inspectors may also be preferred because of their perceived commercial disinterest. As overseers of the relevant forestry legislation, they may also be respected for their professional approach.

Mass media approaches are not sufficient in an extension campaign. It is crucial that adequate one-to-one contact be maintained as it is this contact which reassures an individual of the appropriateness of an innovation (Muth and Hendee, 1980).

Such personal contact does not have to be exclusively with an extension agent. Such contact may come from a neighbour/friend or even a volunteer as in the Coverts project in the United States (Goff, 1993). Similarly, discussion groups also come close to fulfilling the same role as personal contact (Dillon, 1982).

### 3.1.8 Product and Market Knowledge

To determine the degree of thought forest owners had given to the future of their forests, respondents were asked if they had given any consideration to the products of their forests. The majority of those sampled (62%), had considered their forest's products. The most popular products were; pulp, pallet, poles, sawlog, hurley ash and fencing material. However, the vast majority of respondents had not considered how or where they would market their forest products. Once again this may be a reflection of the very early stage most of these forests are at and thus their owners have not seriously considered the finer details of marketing the potential end product.

### 3.1.9 General Background Details

One section of the questionnaire queried the background details of the participants. Most of the respondents were aged between 31 and 50 years. The most frequently occurring occupational group was farming. Almost 60% of the forest owners questioned gave farming as their principal occupation, while a further 30% were professional people (figure 3.7). When asked if they had a second occupation, 30% had and of these, farming was most popular (50% of cases). A small group, 13% were members of the Irish Timber Growers' Association (ITGA), while 51% were members of the Irish Farmers Association (IFA).

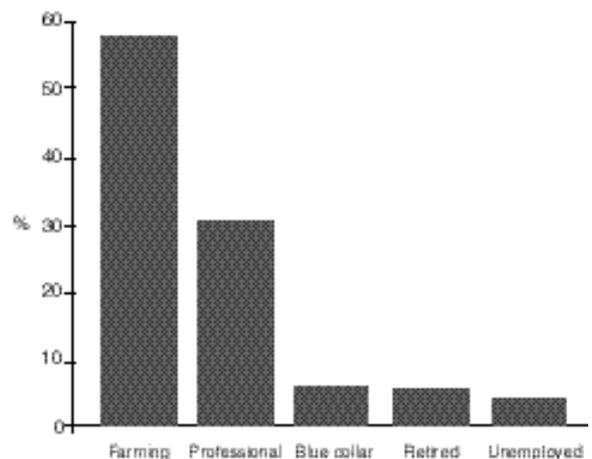


Figure 3.7 Breakdown of respondents' principal occupations

### 3.1.10 Financial subsidisation

Of the forest owners interviewed, 62% said they would not have planted without grants, though 79% said that grant level did not influence their decision on which species to plant. A total of 76% of forest owners were in receipt of premium payments and 43% of those said they would not plant without premia payments. This would seem a surprising response considering the commonly held opinion that farm-forestry is grant and premia driven. However, 56% of respondents did indicate that the premia payments were not an important part of their income, thus perhaps explaining some of their willingness to plant even without subsidies.

## 3.2 Logistic Regression

### 3.2.1 Profile of Forest Owners and their Participation in Forest Management

In the analysis of questionnaire information in this study, the data were first assembled in the form of basic frequencies. Subsequently the information was subjected to a logistic regression analysis. The purpose of this analysis was to build up a profile of the type of landowner most likely to participate in the management of their forest. Carrying out a logistic regression is very much an exploratory process, depending largely on trial and error. Nonetheless, results from the logistic regression conclude that, occupation, the prior use of the land, whether or not the landowner considers the production of timber for sale as important, as well as whether or not the landowner considers the production of timber for domestic use as an objective, can all be used to predict the probability of an individual participating in the management of their forest.

Results indicate that individuals who hold the production of timber for domestic purposes as an objective, are more likely to involve themselves in the management of their forest than those who do not consider domestic use of timber as an objective. It might be supposed that those who consider timber for domestic purposes are more aware of the various uses to which timber may be put and thus wish to maximise the potential of their forest. This awareness may extend to an overall greater interest in the development and, therefore, the management of the forest.

The effect of prior experience of forestry was evident in the results. Those who had planted land which previously carried woodland were 23 times more likely to get involved in the

management of the woodland themselves, than those whose previous land use was one other than woodland. This supports fundamental results from the survey and literature review, which indicate that lack of knowledge and the necessary skills restricts individuals getting involved in the day-to-day management of their forest. Those whose prior use of the land was forestry would presumably be more familiar with the necessary operations and thus be more confident in carrying out the work themselves.

It is interesting to note that those whose principal occupation was classed as farming were only twice as likely not to employ management companies/contractors than the "professional" occupational group. This however is probably due to the fact that the concept of forestry is as alien to many of the farming group as it is to the professional group. Those categorised as blue-collar workers and unemployed were on the other hand 40 times more likely, not to employ a management company/contractor than the professional group. The reasoning behind this might well be that they have more time at their disposal than do the other occupational groups.

## 3.3 Future Participation of Private Forest Owners in Management

### 3.3.1 A Prototype Newsletter

In order to fulfil the final objective of the study - that of how best to disseminate forest management information - and considering the apparent popularity of literature as a source of information, it was deemed appropriate to briefly assess the type of literature available to private forest owners both here and abroad. This done, it was decided that a prototype publication (or newsletter) could be produced. Considerable time and effort went into the production of this prototype. The theory behind the publication was to present technical information and practical "know-how" in an easy-to-read and understandable format. Forest owners are an extremely diverse group with a huge variety of possible concerns for their forests. For this prototype the publication had to appeal to as many different groups as possible. However, with such a varied readership, this is difficult to do if the information is also to answer specific problems of the readers.

The solution to this problem was to include several sections on different topics in the hope that at least one topic would be of current interest to each member of the audience. It was assumed

that many of the recipients would have a meagre knowledge of forestry. Pictures and sketches were included in order to hold the attention of these readers and also to emphasize certain messages from the text. The topics covered are outlined below.

(a) Forest Management

This section focused briefly on the concept of forest management, why it is necessary and how it can be achieved.

(b) Vegetation control

This topic was included as it is a serious issue for the many new forest owners. Chemical control, the various types of herbicide applicators and manual control were described. Reference was also made to pertinent publications available from the Forest Service and Coillte. Particular vegetation control concerns for Sitka spruce (*Picea sitchensis* (Bong.) Carrière), Douglas fir (*Pseudotsuga menziesii* (Mirbel) Franco), larch (*Larix miller*) and oak (*Quercus L.*) were also discussed.

(c) Thinning

A section on thinning was included for those forest owners who had more mature forests which may be at, or approaching thinning age. The objectives of thinning, as well as the types of thinning were outlined. Thinning regimes relevant to some of the more common species were also discussed.

(d) Bank vole

The bank vole was included as a topic of vermin control. Rabbits, hare and deer are far more widespread a problem in forest management in Ireland, but several of the recipients of the publication were based in Cork and Kerry where the bank vole is also a problem, thus its inclusion in this prototype.

to. Both groups were asked to indicate their willingness to receive a free copy of this prototype publication. In total 276 forest owners were informed about the newsletter. From this number 148 replied requesting a copy, a response rate of 55%.

The newsletters were sent out during the second week in November, 1996, with a questionnaire and stamped addressed envelope, as well as a cover letter requesting the questionnaires to be completed and returned. From the 148 who received the newsletter, 66 completed the questionnaire and returned it, giving a response rate of 45%. No follow up of non-respondents was possible because of conditions laid down by the Forest Service and also because of time constraints.

The questionnaire was included in order to assess the appropriateness of the format of the newsletter, as well as to get feedback on what topics are of interest to forest owners. Results from these questionnaires give some insight for the direction of possible future publications and are summarised below.

### 3.3.2 Distribution of the publication

As was the case with the initial survey, the Forest Service facilitated the distribution of the newsletter by allowing contact with grant recipients. Those who had participated in the original survey were contacted by letter thanking them for their co-operation in the survey and informing them of the availability of the newsletter. A second batch of grant recipients was also written

### 3.3.3 Questionnaire results

Of the 148 forest owners who received the questionnaire, 45% completed and returned it. The results that follow are based on these respondents. Most of them (88%), indicated that they had read the entire script. The other 12% indicated that they had read most of it. When asked how interesting they had found the newsletter, 82% indicated that they had found it very interesting and the remainder had found it moderately interesting. The third question concerning issues they would like to see covered, and the comments section for possible future issues prompted an enormous variety of responses.

When asked would they like to receive future issues, 94% of the questionnaire respondents indicated that they would. It could be suggested that many of the non-respondents were indicating their lack of interest in receiving future copies by not returning the questionnaire in the first place. If this were the case a total of 62 of the 148 who received the publication i.e. 42%, would like to receive future issues. Most of the sample indicated that they would like to receive two issues per year (30%), followed closely by 26% of the sample suggesting four issues per year. The price respondents suggested they would be willing to pay for such a publication varied greatly as might be expected. However, the vast majority of respondents indicated that they would be willing to pay between £2 - £5 per issue.

One particular topic of interest which respondents to the newsletter questionnaire highlighted quite frequently was that of markets. This is an interesting result considering that a substantial number of respondents (73%) from the initial survey had not considered the marketing of their timber products and 87% had not considered how they would market any of the other products they might produce from their woodland. It is possible that because 70% of all forests planted were four years of age or less, markets and marketing may not seem a significant issue. It is important, however, that forest owners familiarise themselves with the commercial aspects of forestry from an early stage, as the market may influence their management regime.

The large percentage requesting a copy of the newsletter in the first instance, as well as the substantial number indicating they would like future issues, would suggest that the provision of

forestry management information in literature format is an area which has great potential for expansion. The major advantage of a mailed newsletter is that it facilitates communication with a large number of small scale producers.

## 4. CONCLUSIONS

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### 4.1 Conclusions

This study set out to examine the level of management carried out in private forests in Ireland today, the individual concerned with their management, as well as the information needs of private forest owners. The major conclusions emerging from the study are presented below.

The majority of respondents indicated that they would not have planted trees if they had not received grants. No doubt for many grant recipients the grants and premia made it feasible to plant poor land or made it more economical to afforest an area than to apply any other land use. Nonetheless, very few survey participants gave the attractiveness of grants and premia as their primary motivation for planting. However, it is conceivable that although one may be motivated to plant by something other than financial subsidisation, the grants and premia actually facilitate the realisation of that aspiration and thus the two results do not necessarily conflict. It is also possible that the motivations of respondents are not distinct and easily articulated.

The objectives of forest owners for their forests were typically multiple-use rather than singular and almost all owners considered the production of timber for sale as an objective. Such results highlight the importance of carrying out quality management in these forests, so that the variety of management objectives may be achieved. Furthermore, the management may be considerably complex due to the sometimes conflicting nature of multiple objectives. If quality timber is to be produced for sale, a greater awareness of the significance of thinning and pruning will need to be nurtured among the private forest owner population as their forests approach these stages. This highlights the need for a vigorous extension service.

The study shows that in Ireland, private forest owners are more content to involve themselves in the necessary decision-making concerning the management of their forests than they are to conduct the actual operations. Lack of time is perceived to be the single largest deterrent to owners' involvement in the management of their forests. Further barriers to forest owner participation in forest operations are the lack of necessary machinery, as well as a lack of knowledge of forestry and the necessary skills. Such lack of knowledge/skills may cause a lack of confidence among new forest owners, in their ability to carry out the necessary forest management operations.

Results revealed that only a small proportion of forest owners are responsible for managing their forests themselves. However, many who are currently employing forest management companies/contractors, intend to assume responsibility for the management when their contracts expire.

A peculiar feature of the privately owned forest estate in Ireland is the predominance of forests in the establishment and thicket age classes. This skewed age structure to some extent limits the usefulness of some of the observations reported here. Nevertheless, the results presented do highlight some of the difficulties which owners have in managing their young forests. It is worthy of note that for most of the owners interviewed, this is their first venture into the business of forestry. In this context the fact that most owners do not have working plans to guide them is rather disturbing.

Many studies, particularly in America, have attempted to associate forest owners' actions with their background characteristics. This study found that the principal occupation of the forest owner, the prior use of the land and whether or not the forest owner holds the production of timber for sale and for domestic purposes as objectives, could all be used to predict the likelihood of a forest owner employing a management company rather than getting directly involved themselves. However, the results also indicate that there may be a discrepancy between a forest owner's intentions and his/her actions. The intention to do something may be there but this intention is not always carried through to action.

The significance of the provision of appropriate informative forest management material was highlighted regularly in the survey. Many forest owners did not involve themselves in the management of their forests due to a lack of knowledge and/or skills in forest management. Thus the provision of adequate extension is crucial to the quality management of Ireland's private forest resource. Furthermore, the many types of technology transfer need greater exploration. The use of radio and television, a greater selection of more specific reading material and an increase in the number of field extension staff, can all contribute to an increased awareness among forest owners, of the importance of correct and timely management of their forest.

Discussion groups have been used with success in agricultural extension in Ireland. A trial run of discussion groups might be advocated to increase discussion among forest owners, to identify people with similar interests and to highlight the various other sources of information and advice available to them.

Direct mail was successful in eliciting a very encouraging response to the prototype publication. Direct mail is an appropriate starting point when trying to reach a diverse audience scattered across the country. This approach has been used with success in other countries. It could be applied in Ireland but is dependent on access to the names and addresses of private forest owners. It would be a useful method for informing private forest owners of the various other sources of information available to them, particularly literature.

## 4.2 Recommendations

The use of management plans is now a prerequisite for grant payment and the forest owners' participation should be elicited at every stage of development of such plans. The national inventory of private woodlands which is in progress will be of particular use in the development of such management plans. Much of the information concerning private forest holdings in Ireland is at present either confidential or scattered among various organisations. Such factors have made it difficult to assess private forestry and the needs of the sector. However the national inventory has the capacity to change this situation and focus attention on the management needs of these woodlands. Management plans, when produced, should provide detailed, up-to-date costings of the various operations that will be necessary in the near future as well as the hours such operations would take. The inclusion of such data would allow the owner to make informed decisions as to whether or not the necessary operations warranted employing management companies/contractors.

The development of a database of the silvicultural aspects of private forest holdings, as well as the key characteristics of the forest owners themselves, needs to be established. This information could be acquired in conjunction with the national inventory. Such a database would greatly facilitate more specific and targeted information being made available to private forest

owners. This in turn would allow the information, available to the recipient to be more useful and probably increase the likelihood of the information being put into practice.

Lack of knowledge and skills may be addressed by adequate extension services. However, lack of time as a barrier to participation is not as easily remedied. Nevertheless, a greater variety of sources of information would allow forest owners a greater choice as to how and when they wish to receive their forest management information. Where time is of the essence, the convenience of the information is essential to its uptake by the forest owner. If the information is convenient to the forest owner, s/he is more likely to access it.

If one-to-one advice is to remain limited due to staffing problems, the use of discussion groups in local areas should be advocated. They fulfill a similar role as the personal visit, but in addition, they increase forest owners' awareness of other individuals in the locality who may be experiencing similar difficulties in the management of their forests. They also serve to inform participants of other sources of information and advice which they may not have been aware of.

To summarize, the principal recommendations of the report are:

- 1 That forest owners participate in the drawing up of their management plans;
- 2 that a database of silvicultural conditions of private forest holdings be developed in order to assist those agencies involved in private forestry;
- 3 that greater resources be allocated for the provision of advisory services and innovation encouraged in their design.

## APPENDIX II: FULL METHODOLOGY EMPLOYED THROUGHOUT STUDY

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### 1 Introduction

The primary objective of this study was to assess private forest owners' knowledge of and level of participation in forest management. This study did not include the semi-state company Coillte or private investment companies, who also own and manage forests. The method of accessing this information was via a survey of 108 private forest owners carried out between May and October, 1995.

### 2 The Sample of Forest Owners

Before contemplating any type of survey, it was first necessary to know that it would be possible to contact a relatively large, and somewhat diverse group of people. This meant that access to the names and addresses of individuals who had planted trees would be required.

#### (i) Source of sample

The Forest Service is the division of the Department Marine and Natural Resources, with the overall responsibility for forestry development in Ireland. Part of this responsibility, includes control of expenditure of EU financial supports for forestry development in Ireland, which include the afforestation grants so pertinent to private forestry. The Forest Service is the body whom a landowner will contact if considering seeking grant aid for an afforestation project. In recent years the vast majority, if not all those involved in private forestry, would have applied for grant aid. This study was explicitly concerned with private forest owners. When approached, the Forest Service agreed to facilitate the survey. Contact addresses were therefore sourced entirely through the Forest Service, who keep records of all their grant applicants.

#### (ii) Sampling methodology

In most studies of this nature it is not feasible to carry out a saturation survey of the entire population, instead the researcher is forced to examine a sample of the total. In this situation it is clear that the sampling will be critical to the validity of the entire study. In general terms two alternatives are available; probability sampling and non-probability sampling. As probability sampling usually gives high reliability, a high degree of representativeness and high generalisability of the results, it is normally the preferred method of sampling (Sarantakos, 1993). Non-probability sampling was not considered for this study. The most widely used forms of probability sampling are simple and systematic random

sampling, as well as stratified random sampling which was the method used in this study.

#### Stratification

A stratified random sample is defined by Scheaffer et al (1990) as "a sample obtained by separating the population elements into non-overlapping groups, called strata, and then selecting a simple random sample from each stratum". These subsamples make up the final sample of the study. This stratification of the population may be based on one or more criteria. For the purpose of this study, the population of landowners was stratified on the basis of the type of afforestation scheme in which they had become involved. This stratification according to planting scheme was also, in effect, a stratification across time. It was thought that this type of sampling would permit representation of the various groups of the target population (Sarantakos, 1993).

There were a number of reasons for stratifying according to afforestation scheme. Firstly it was felt that those planting under the Western Package scheme of grants, could quite likely have a different socio-economic profile to those who planted land more recently. The incentives available, as well as the agricultural environment in Europe and in Ireland, has changed quite drastically over the past fifteen years and so too, it might be expected, have the individuals who are afforesting their land. Stratifying across schemes also ensured that individuals with forest crops at the various stages of development were contacted. Obviously, someone who planted under the Western Package scheme of grants, will own forest which is perhaps at first thinning stage, whereas those who have planted under the more recent schemes, would be at the establishment phase and will have completely different concerns.

#### Proportionality

The numbers sampled within each strata can be proportionate or disproportionate to the size of the stratum. However, Kish (1965) recommends avoiding disproportionate sampling unless there are substantial differences among the factors and differences in the cost of sampling within the strata. As these circumstances did not arise in this study it was decided to sample within strata on a proportionate basis.

### (iii) Size of sample

The survey was to consist of one-to-one personal interviews based on the questionnaire presented in Appendix I. It was estimated that approximately 135 personal interviews could be carried out, given the resources available. The numbers who had received grant aid under the Western Package, the Forestry Operational Programme and the CAP Reform schemes, were very similar (table 1). Furthermore, the majority of grant recipients had afforested under one of these schemes. A much smaller number of forest owners were participants of the State scheme and the Recreational scheme. If all the strata were to be sampled proportionately a non-realistic fraction would have been contacted from the Recreational scheme. A decision was made, therefore, to set a minimum number of four, who had to be interviewed from any one scheme. Thus from the Recreational Forestry scheme the aim was to interview four forest owners. For the remainder of the strata (schemes) the sample was selected proportionate to the total number within the strata. Thus the objective was to interview forty from the three main schemes and ten from the State scheme of planting i.e. 1.7% of the total population within the four schemes.

## 3 Sampling Procedure

One of the prerequisites to the Forest Service providing a sample was the stipulation that the sample be written to by the Forest Service first and the individual's agreement to participate obtained. A previous survey carried out in conjunction with the Forest Service in this manner, had indicated only 40% might be

Table 1. Numbers of participants in the various schemes

Scheme	Number of participants
1. The Western Package Scheme and Agricultural Holdings Scheme (WPS)	2,563
2. Forestry Operational Programme (FOP)	2,528
3. Common Agricultural Policy (CAP)*	2,500
4. State Scheme for planting (SSP)	600
5. Recreational Forestry scheme (RFS)	50

Note: \* The various schemes introduced under the CAP reform are simply abbreviated as CAP schemes. (Source: Forest Service<sup>2</sup>, 1995)

expected to agree to participate in such a survey (Ní Dhubháin and Gardiner, 1994). With this in mind a decision was made to write to 356 grant recipients (see section 4.), with the expectation that a sample of 135 could be derived from this.

A strict system was adhered to during the sampling procedure. The sampling was carried out by Forest Service staff members under the supervision of the research team. This system fulfilled both confidentiality, as well as accuracy and involved a systematic examination of the Forest Service files. These files were located in the Forest Service offices. At the time of sampling it was hoped, if somewhat optimistically, that a response rate of 50% would be achieved. The methodology employed in selecting the sample was stratified random sampling, with the sample within each strata selected systematically. While selecting the sample in this fashion had advantages in terms of saving time and effort, it is acknowledged that there are dangers associated with it. The procedure is not simple random sampling. However if there are no obvious order patterns within the population being sampled (the sample is quasi-random) it can be treated as if the sample were effectively a simple random sample. Thus one couples the benefits of such a sampling principle with the convenience of systematic choice (Barnett, 1991).

## 4 Contacting the Forest Owners

Once a sufficient number of contact addresses i.e. 356, were extracted from the Forest Service files, the next step was contacting these individuals. To further maintain their clients' confidentiality, it was deemed necessary that the Forest Service contact the sample first, by letter, in order to establish each individual's willingness to participate in the survey. An introduction letter was sent out to all 356 individuals. The letters

were mailed in two batches. Replies from the first batch showed that there were considerable differences in response rates among the grant recipients in the various schemes, with a low response from the FOP and CAP grant recipients, as well as from those forest owners receiving grant aid under the State Scheme of planting. In an attempt to make the samples more proportional to the population, a second batch of letters was sent out with a greater concentration on these three schemes. The letter was written on Forest Service headed paper and was signed by a Forest Service official. It briefly outlined the purpose of the study and requested the voluntary co-operation of the recipient in the survey. When an individual forest owner wished to indicate his/her willingness to participate, s/he was requested to complete a form giving his/her name, address and telephone number. These forms were then to be returned to the Forest Service, in the stamped addressed envelopes that had been provided.

All responses were initially returned to the Forest Service and were then forwarded on to the research team in University College Dublin. As only those who agreed to participate could be interviewed, no follow up of non-respondents was possible. While this step in itself may have introduced bias in the survey, no other option was available. The overall response rates from the various schemes are outlined in table 2. Despite attempts to balance representation among the main schemes as previously outlined, table 2 shows that response rates were still low in the FOP, CAP and SSP schemes.

Table 2 Summary of response rates within the various planting schemes

Scheme	Response	
	Number	Percent
1 (WPS)	36	43
2 (FOP)	31	28
3 (CAP)	36	31
4 (SSP)	12	31
5 (RFS)	4	50
	Total = 119	Average = 36

## 5 Respondents

A total of 119 completed forms were returned i.e. an overall response rate of 36%. These were forwarded to the Forestry Department in University College Dublin. These forest owners were then contacted and a mutually acceptable time was arranged at which the questionnaire could be completed. Of the 119 returned forms, 11 were not used because on a number of occasions the individuals concerned were not contactable, or it was impossible to arrange a mutually convenient time for an interview to take place.

## 6 Piloting the Questionnaire

Prior to drafting the questionnaire, pertinent literature and comparable surveys were reviewed. The most helpful surveys were sourced in the U.K. The first draft was submitted to representatives from the Western Forestry Co-operative, Teagasc (the state agency for all aspects of research, vocational training and advice in relation to agriculture, horticulture and forestry) and the Irish Farmers Association. Following their assessment, changes were made and a second draft of the questionnaire was administered to a random group of 18 forest owners. As a result of this pilot survey some further changes were made. The final version of the questionnaire was a comprehensive and lengthy document, which was then administered to the full sample of 108 forest owners. This final version as well as the frequency results are presented in Appendix I.

### (iv) Layout of the questionnaire

The final document had seven sections which may be summarised as follows:

- (i) Section one dealt with the description of the forest units, their area, the species planted, their age, proximity to

owner's residence and the previous use of the land planted. This section also queried the owner's reasons for planting and the objectives towards which the plantations were to be managed.

- (ii) Section two concerned management of private forests and attempted to identify the decision makers and the source of the labour. It queried the owner's involvement in the day to day management and the owner's knowledge of the plantation.
- (iii) Section three On the basis of their response to key questions in Section two, respondents were assigned to one of three categories:
  - 1 Respondents who employed a management company/contractor for all of the decision making and work.
  - 2 Respondents who employed management companies/contractors for some of the decision making and work.
  - 3 Respondents who were responsible for all of the decision making/work themselves.

Little difficulty was experienced in assigning respondents to categories one and three. Those assigned to category two were individuals who had clearly used a management company/contractor for much of the work, but had also made some decisions themselves regarding their forest and who may even have done a small amount of the work themselves. Depending on their grouping, forest owners were then asked questions pertinent to their particular situation.

- (a) Group one  
Respondents assigned to group one were queried as to why a management company/contractor was employed, the duration of the contract, the owner's satisfaction with the work done and whether or not grant and premia payments were assigned to the management company/contractor. This ownership category was also asked to respond to questions concerning the extent of their knowledge and/or experience

of forestry operations. Finally, respondents in this category were asked to identify anything that might encourage them to become more involved in their forest and its management.

- (b) Group two  
Respondents assigned to group two differed from those in group one because they had not relied entirely on a management company/contractor, but rather had become involved in the decision-making process and in some cases had carried out part of the work. Questions put to this group were very similar to those posed to group one respondents. Such questions sought to elicit reasons for using a management company/contractor, their level of satisfaction with the work, if they or anyone in their family had previous experience of forestry work and suggestions of measures or incentives which might encourage them to become more actively involved in the future management of their forest.
- (c) Group three  
This last category consisted of those participants who had carried out most of the work themselves. The questions posed to these individuals were concerned mainly with the activities they had carried out and those which they intended to in the future. Similarly they were queried about previous experience of silvicultural type work. Furthermore, their motivation in carrying out the work themselves was ascertained. This group was also invited to suggest ways in which information, advice and support could be provided to new entrants to forestry.

All respondents, regardless of category, were then asked their opinion as to why so many farmers planting trees employed management companies/contractors.

- (iv) Section four queried the level of advice received by grant recipients prior to establishment, as well as the type and amount of information they received post planting. It also questioned the types of problems experienced by the respondents in their woodlands and how they solved these problems.

(v) Section five examined the level of knowledge and training of the respondents. This section attempted to ascertain whether respondents had attended any of the Forest Service/Teagasc training courses, demonstrations, or field days and whether or not they had found them beneficial. The respondents were also queried as to what form of information transfer they would accept and which form they would prefer. The forms suggested included leaflets, books, training courses, demonstrations and more visits from the Forest Service inspectors or Teagasc advisors.

(vi) Section six inquired into the participants' awareness of the markets for forest products. The objective of this section was to determine to what extent respondents had considered what their products would be and how and where they would market these products. This section also examined whether owners perceived wood quality as significant and if so, how wood quality could be manipulated through forest management. Also under scrutiny were the owners' concerns for the future of their woodlands. They were asked whether they, in hindsight, would do anything differently, if they intended to plant again, and if so to suggest changes which they might institute as a result of errors in the first instance of planting.

(vii) Section seven dealt with the socio-economic background of the respondents. It sought to establish the age, marital status, child dependency, level of education, affiliation to associations, principal and other occupations and experience in farming of respondents. In addition it attempted to derive information concerning the farming enterprise (where applicable) and quality of the land. Respondents were asked to categorise the farm in terms of rough grazing, woodland, crops, pasture, hay, silage and the system of farming they carried out.

The last group of questions in this section concerned the grants and premia which the respondent was receiving. Questions queried how important the level of grant premia aid was to the respondent and if and how this influenced his/her decision to plant.

#### (v) National distribution

Interviews were carried out in every county in the Republic except Monaghan. This was purely a function of the random nature of the sampling procedure.

## 7 Administering the Survey

The survey was carried out by a team of four interviewers. In order to ensure consistency throughout the survey, it was necessary that the same emphasis be given to particular questions by all four interviewers. To facilitate this consistency, a briefing session was organised for the questionnaire administrators. At this briefing the standard format of each interview was outlined and the procedure to be followed was clarified. The purpose of this briefing was to reduce interviewer/interviewee bias as much as possible.

### (vi) Format of interview

Each interview commenced with an informal chat with the participant, to help put them at ease with the interviewer and to reduce the formality of the situation. The interviews did not simply consist of a "straight run" with the questionnaire, but rather allowed for the interviewee to digress into forestry topics of particular concern or interest to them. The purpose of these two techniques was to make the interviewee more comfortable with the questionnaire process and more open with their responses. In all cases participants were reassured of the confidential nature of the questionnaire, so as to alleviate as much as possible any reticence that they might have had in offering frank answers.

## 8 Categorising of Questionnaire Responses

In the drafting of the questionnaire it was considered essential that in order to collect the maximum amount of information, a large number of the questions would be open-ended. An open-ended question is one which does not suggest an answer, but rather allows the respondents to answer the question completely unaided. The questions varied in type and to facilitate statistical analysis, they were first coded numerically.

## 9 Analysis of Data

As outlined the purpose of the survey was to:

- (a) Assess the level of input, non-industrial private forest owners had in the management of their forests; and
- (b) Assess the information needs (with regard to forest management) of these individuals.

The questionnaire was lengthy and contained a substantial amount of information. A program was written for the SAS (Statistical Analysis Software) package. Output from this program

included basic frequencies and cross tabulations of the various variables. With such detailed information available from the survey, it was felt that it would be beneficial to try to combine many of the background statistics to produce a profile that would predict the likelihood of an individual becoming personally involved in forest management. Such an objective necessitated some form of multivariate analysis. Two multivariate analysis techniques were examined, namely principal component analysis (Dillon and Goldstein, 1984) and logistic regression (Collett, 1991; Kleinbaum, 1994). It was concluded that logistic regression was the most appropriate analysis technique because of the categorical type data involved (Dillon and Goldstein, 1984).

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