

Report of the Pro Silva Europe Convention, Ireland 2007



Clare – Limerick – Kerry

14th – 16th May

Report prepared by Vincent Upton

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1. Introduction

1.1 The Pro Silva Convention Ireland

A Pro Silva Europe Convention was held in the west of Ireland from 14th to 16th May 2007 and included the Annual Pro Silva Europe Board Meeting and a tour of important forest sites in counties Clare, Limerick and Kerry. The convention was hosted by Pro Silva Ireland and brought together a diverse range of professionals from twenty countries that share expertise in close to nature forestry. Delegates included foresters, forest researchers and academics, and representatives from national forestry organisations. The tour took in a wide selection of sites, and offered an excellent overview of forestry in Ireland to the visiting delegates. Private large estates and smaller farmer owned plantations were visited during the three days. In addition large forest areas belonging to Coillte and the National Parks and Wildlife Service were included in the tour.

This event offered a unique opportunity for Pro Silva Ireland to gain valuable information and advice about the challenge of implementing close to nature systems in Ireland from some of the most knowledgeable and skilled foresters and silviculturalists in Europe. As a country with such a short history of forest management this event brought an important bank of knowledge to Ireland from a variety of nations, some of which have centuries of forest management experience.

1.2 An introduction to Pro Silva

Pro Silva was initially founded in 1989 in Slovenia. As a society Pro Silva promotes forest management that follows natural processes to ensure the economic and ecological sustainability of forestry. The societies policies incorporate aspects of forest management from the stand to the landscape level and include the use of indigenous and exotic species in forestry, biodiversity, and forest ecology. Pro Silva Ireland was founded in 2000 with the objective of promoting Pro Silva principles as an alternative to the dominant clearfelling form of management.

2. The Pro Silva Convention Ireland

2.1 Day 1 - Monday 14th May

Mount Callan Estate, Co. Clare

The forests of Mount Callan, the estate of the late Robert Tottenham, co-founder and former chairman of Pro Silva Ireland were the first stop of the tour. Hosting the group were Jane and Robin Tottenham and Andy Poore, Phil Morgan, and Huw Denman, from the Continuous Cover Forestry Group UK, led the discussions within the estate. Mount Callan estate is situated 8 km from the Atlantic coast in Co. Clare and possesses a wet oceanic climate with an average annual rainfall of 2,000 mm and high average wind speeds. The plantations lie in the leeward side of Slieve Callan itself, which rises to 423 m in height, and offers some cover from the sea. The geology and soil type of this area are a mixture of gleys, peaty gleys and peat soils over horizontal beds of carboniferous shales, sandstones, and mudstones. Soil nutrients are relatively poor and fertilisation is required to ensure productive land use. This part of Ireland has been occupied and exploited by people for over 5,000 years, which have shaped the land drastically. The natural vegetation of this area would consist of ash (*Fraxinus excelsior* L.) forest in alkaline areas and oak / hazel (*Quercus petraea* (Matt.) Liebl. / *Corylus avellana* L.) woods in more acidic areas. Currently much of the land surrounding Mount Callan is pasture, heathland and some forestry, mainly plantations of Sitka spruce (*Picea sitchensis* (Bong.) Carr.).



Pro Silva discussion in Mount Callan woods (Jurij Diaci)

In the past, Mount Callan operated as a cattle and sheep farm, however productivity was always low. Trial plantations of Sitka spruce were made in the 1960`s and the productivity of the species in this region was soon realised by the owner who began the



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gradual transformation of the land from a poor quality farm to a highly productive and dynamic forest estate. This transformation began extensively in the 1970's in the more sheltered lower end of the estate and planting was continued as economics allowed.

In establishing the plantations, land preparation was carried out using converted agricultural machinery and 1 to 2 year old seedlings were planted to reduce costs. Due to the wet and exposed climate and the soils of the area windthrow is a major problem on the estate. To try and reduce this risk, Robert Tottenham ensured drainage systems were extensive and developed a method of management, particular to the estate, which involved the early and heavy thinning of stands. In recent years the management of the estate has been altered towards the use of close to nature forestry and it is hoped that in future the entire forest area will be managed through Pro Silva principles, which aim to utilize natural forest dynamics to ensure efficient forest management.

The current species composition of the forests within Mount Callan is similar to the majority of plantations in Ireland. Sitka spruce is by far the dominant species but some Western red cedar (*Thuja plicata* Donn), lodgepole pine (*Pinus contorta* Dougl.), and noble fir (*Abies procera* Rheder) have been established in mixture with spruce or as small monoculture plantations. In addition large specimen trees such as Douglas fir (*Pseudotsuga menziesii* (Mirbel) Franco) and western red cedar and some broadleaves are found within plantations close to the house. These have been maintained to increase stand diversity. Small pockets of broadleaves are still present in the area.

The management regime used on the estate varies sharply from the excepted methods of Sitka management in Ireland, especially in the uplands. The combination of poor soil and exposed conditions coupled with the fast growth and poor rooting of Sitka spruce mean that such forests can not be managed using the conventional Irish management techniques, based on British Forestry Commission yield models. Robert Tottenham's method of thinning allowed him to manage his forests and to extract timber at an early stage in their development when the vast majority of plantations under similar conditions would have been managed under a no thinning regime.

The thinning method adopted in Mount Callan was discussed in detail during the visit. Thinning usually began at the age of 12 years when two racks, a width of 6 m, were removed to create access for large machinery without causing damage to the remaining trees. Further racks were then cut into the forest at right angles and a selective thinning was carried out. Future management consisted of regular thinnings, at either two or three years depending on productivity, with an emphasis on selecting and maintaining the higher quality, smaller diameter trees and removing competing dominants.



Two line thinning in Robert Tottenham's woods (Donal O'Hare)

Although thinning concentrated on specific stems the creation of a single large gap was avoided, as this would increase the potential for windblow. Pruning was carried out on trees of higher quality but the system was not static and reselection of future crop trees was made at each intervention. In addition interventions were only carried out in such a systematic way when economics allowed. The system that Robert Tottenham employed in his plantations has a number of benefits including:

- The ability to thin high-risk upland stands ensuring the development of larger high value trees and a regular and early output from the forest.
- Facilitating the use of large agricultural machinery without damaging the remaining trees and supplied sufficient brush for soil protection, vital on deep peat soils, by cutting wide racks.
- The early heavy thinnings allowed individual trees to develop deep crowns and extensive root systems, which decrease the risk of windthrow.
- The diversification of the stand through the maintenance of a varied selection of smaller, high quality stems.
- The development of tree and stand conditions favourable to natural regeneration.

This system was tuned over a number of years and examples of earlier management techniques were seen during the visit. One of the oldest stands in the estate had been thinned by 50% at the age of 9 years and underwent thinnings every 3-4 years. Although conventional forest managers would consider this management technique extreme and unviable this stand, known as The Shrine in Mount Callan, showed excellent growth rates, possibly as high as YC 36, and well-developed trees. Although it was asserted that the results could be partly due to the quality of planting stock and

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provenance of the trees, this stand does show the potential benefit of employing alternative management techniques.



The Shrine (Bela Varga)

The stands located in the lower, more sheltered end of the estate contain some of the most impressive trees. These stands were established in the early 1960's and were managed in a similar way as the stands located in the mountainous areas. Stands that had been thinned heavily show good crown development and the beginnings of natural regeneration. However where thinning had been lighter little regeneration was identified demonstrating the necessity to allow crown development to achieve natural regeneration. The young age of the trees was also identified as an important constraint in achieving seed production. The excellent growth rates achieved in Ireland result in stems reaching large dimensions at an early stage in their development compared to other European countries. Stands that had not been thinned heavily present a particular problem in terms of conversion from a clearfell plantation to a permanent forest as site and tree conditions have not been prepared for this process.

In a mature stand which had not been thinned heavily some diversity in stem size was evident but many of the stems were already oversized for the Irish sawmill industry and it was felt that most of the stems would be oversized within 10 years. This fact combined with a lack of regeneration means that management options are limited. Such stands highlight the imperative to begin conversion at an earlier stage through thinning to encourage crown development and to increase light levels to facilitate regeneration from seed sources within and outside the stand. Increasing diversity through under- or future planting was also suggested although again this strategy should have begun at least 10 years ago. Hemlock (*Tsuga heterophylla* (Raf.) Sarg.) and beech (*Fagus sylvatica* L.) were suggested as suitable species for this site, although the ability of beech to grow productively on such wet sites was questioned.

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The potential result of this thinning system is the development of an open and diverse forest structure. Due to the frequent and heavy thinnings, individual stems are allowed to develop higher diameter to height ratios, larger crowns, and increased root spread than under conventional forest management, thus making the stand more stable and producing tree and stand conditions favourable to natural regeneration. This was demonstrated in the final stop of the visit, a stand planted in 1963, where a relatively rich and varied understorey of planted and naturally regenerated tree seedlings was observed. Windthrow is still experienced in this stand but it is very limited and can be beneficial in promoting natural regeneration, by opening gaps in the canopy, without reaching catastrophic levels.



Attaining Regeneration (Bela Varga)

After seedlings have been established, the next step is the management of such regeneration through selection and release. The growth of Sitka spruce seedling under a mature canopy was observed. Seedlings tend to have a bushier appearance as seedlings concentrate the available resources on expanding their horizontal area to exploit available light, however most observers agreed that as light levels increased through thinning of the overstorey seedling growth would develop vertically. Major aphid damage was observed in many of the seedlings and was thought to be connected with the throughfall of insects from the overstorey. Although such damage is recognised as a serious pest it is not believed to be linked with seedling mortality.

The difficulty in employing alternative silvicultural systems in Ireland was also discussed during the visit. A major constraint of the Pro Silva form of management is the necessity to retain trees beyond the current 'optimal' felling size and the potential to sell large diameter timber at a premium price in the current Irish timber market. Presently Irish sawmills are designed to process Sitka spruce stems of between 35-45 cm. In order to manage plantations in a close-to-nature way, a percentage of stems must



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be allowed to develop beyond this dimension to ensure stand diversity and stability as well as achieving natural regeneration. The difficulty in selling large diameter timber, over 60 cm, was highlighted and discussed and a number of observations and suggestions were made. Primarily it was felt that current markets should not dictate future silvicultural and management practices and that the processing industry will respond when supply increases. Irelands current situation in this regard reflects the industry in the Czech Republic ten years ago where sellers were forced to export very large dimensioned timber to neighbouring countries such as Germany. However as the supply of such timber increased sawmills adapted or were created within the country, both by home industry and foreign partnership, to meet this supply. The potential to export large diameter timber was also highlighted with a suggestion of Ireland exploiting growing demands in Asia by shipping such timber abroad. It was noted that the number of large stems required was not large, with an estimate of 10-20 very large stems per hectare sufficient to achieve the desired stand dynamics. From the perspective of individual stems it was observed that only the lower section was likely to be oversized and in a 'worst case scenario' this portion of timber could be removed and sold to the biofuels sector. As conifer stands mature and age they develop ecosystems similar to broadleaf stands. The maintenance of large, old stems facilitates the development of more complex ecosystem and from a biodiversity perspective these stems could be most valuable if left to develop and die naturally.

The topic of terminal height, a further limitation to management, was also discussed in regards to the potential of retaining very large stems in the forest. It was felt that at a certain stage trees could reach a size at which greatly increases their risk of windthrow. Given the Irish situation in terms of productivity this height will be reached at a younger age than other parts of Europe thus giving managers a shorter time frame in which to achieve regeneration. It can also be assumed that if such a height exists that it will be lower in upland sites where more extreme conditions are experienced. The idea of windthrow risk increasing with height is generally accepted but whether a particular height can be identified at which damage is inevitable is uncertain. Due to the growth rates attained in this country it is clear that Irish forest managers work on a faster time frame than their European counterparts.

It was identified by the group that future options in Mount Callan will be greater as the first steps in converting this land to forest have been taken and the improvements made particularly to the soil, by the initial planting of spruce will facilitate the creation of a diverse permanent forest if desired. The timing of such a conversion is extremely important and the danger of allowing an undifferentiated forest to develop was discussed. Such a situation greatly reduces a manager's future options, particularly in regards to thinning and felling regimes.

Eagle Rock, the Burren, Co. Clare

The afternoon visit brought the group to Eagle Rock in the Burren. Ecologist, Ralph Sheppard and Sarah Wall from GMIT led the visit and offered an insight into the unique ecosystems and landscapes of the Burren and the associated history, both social and environmental. Today, the Burren incorporates 360 km² and is divided between mountainous and flat, pavement areas. The limestone on the Burren was formed during



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the Carboniferous period, 340 million years ago. Over time the area has been shaped by variations in sea level and successive glacial periods. It is believed that after the last ice age the area was lightly forested primarily with birch (*Betula spp.*), hazel, pine (*Pinus spp.*) and yew (*Taxus baccata* L.). In addition the diverse mixture of flora for which the area is famous was present from this time having survived the glacial periods, some believe, on the higher elevations of the area.

Man-made structures are common in the Burren with the oldest dating back approximately 6,000 years. It is the influence of man and agriculture that is thought to have shaped much of the current landscape. Forests were cleared to create farmland and extensive grazing ensured tree species could not return to these areas. Although this practice had a drastic affect on the woodlands of the Burren and resulted in large-scale soil erosion, these grasslands acted as ideal ecosystems for a variety of plant species and are responsible for much of the diversity present today.

After the introduction, the group crossed agricultural fields stopping to examine some of the diverse flora encountered in this area. The Burren possess an unusually diverse range of flora and fauna, including Mediterranean and Alpine plant species. Although the variety of mammalian life in this area is quite low, the Burren possess a varied selection of insect life. Where the area becomes more mountainous scrub hazel begins to dominate the land. This scrub forest acted as an example of the potential natural vegetation of the region. An important issue facing the conservation of the Burren is whether to allow the development of scrub forest where land has been abandoned or whether interventions should be made to control this spread and ensure the retention of habitats for protected plant species. Some see hazel as a weed and that its spread will reduce the rich diversity of the Burren as it reclaims agricultural land. An alternative view however is that this reclamation is simply the natural succession of a dominant native species after the removal of an artificial barrier, namely agricultural practices. To a Pro Silva group this topic is particularly interesting as it raises the question of intervening in a natural system to ensure the protection of species diversity. Managers of commercial high forests who wish to follow the principles of Pro Silva face a similar decision, as they must balance the desire to follow natural dynamics with attaining their goals in the forest.



A Hazel wood on the Burren (Donal O'Hare)

An example of the social history of the area was the final stop of the Burren visit. The group stopped at the church and well of the hermit Saint Colman. As the group left the area, the practice of removing the limestone pavement to create fields of thin soil was described. This practice is questionable as it causes such drastic and permanent changes to the landscape while producing land that is unstable and may not be very productive. From the perspective of natural resource management the Burren can act as a stark warning against over-exploitation and also as a challenging example of modern conservationism.

2.2 Day 2 - Tuesday 15th May

Curraghchase Forest Park, Co Limerick

The first visit of the day was to the Coillte owned Curraghchase Forest Park, a large mixed-use estate consisting of approximately 320 ha in total. The Park contains 247 ha of woodland as well as lawns, lakes, historic buildings and a camping and caravan site. The woodlands are diverse containing broadleaf, mixed, and conifer high forest. The dominant soil type in the area is brown earth over limestone pavement bedrock. Ash and hazel would be the dominant natural vegetation of the area with the possibility of oak and holly (*Ilex aquifolium* L.) and some yew. As part of its commitment to manage some of its woodlands as continuous cover forestry under its FSC certification, Coillte aims to convert the woodlands of the park from even-aged high forest to irregular structure forest containing native broadleaves.



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The first stop of the visit was a mixed stand of ash and beech. The potential of ash for hurley production was highlighted here. Currently, Ireland is importing ash from around Europe as demand, approximately 10,000m³ per annum, cannot be met by domestic supply. The existence of this market allows forked trees and thinnings to be sold at excellent prices provided the quality is sufficiently high, in particular the size of the lower section of stem and a good spread of roots at the butt are important. Diameters between 20 and 35 cm are most sought after for hurley production. From a Pro Silva perspective this market is particularly interesting as it provides a high value output from small diameter stems, such as thinnings, which may not be of great value as sawlog, thus achieving the most efficient use of the forest and timber.

The group continued through a forest of ash, planted in 1945, containing some mature beech planted in 1877 with a developing sycamore (*Acer pseudoplatanus* L.) understorey. A stop was made in a stand of dense young stems, which had regenerated on the site after the existing Norway spruce (*Picea abies* (L.) Karst.) forest had been clearfelled in 1986. Ash and some Norway spruce and sycamore naturally regenerated after clearfelling, removing the need to replant. However, respacing was carried out on the site in 2001 to approximately 5000 stems per hectare at a cost of 600 euro per hectare, a large expense despite the free establishment of seedlings.

The question of what to do at this stage was posed. It was agreed by most observers that the stand required a further thinning concentrating on selecting and releasing the best quality stems. The 'sprinter' nature of young ash was described. Given its very fast early growth it was felt that further interventions in the ash stems were necessary to facilitate this rapid development without overly stressing the trees. It was suggested that a selection of 60-80 high quality trees be made and that future management interventions concentrate on these stems. This system was described as a 'classical method' of ash management by some of the delegates and that alternatives, such as biological differentiation, should also be considered. If the stand was left for 15 years, it was suggested that, the strongest trees would differentiate themselves naturally, thus reducing costs. However it was observed in this site that ash was losing its characteristics as a sprinter and that crown development was poor. On a good quality site ash should recover after it is released either through thinning or natural differentiation but if delayed for too long trees may become too weak. To achieve biological differentiation some level of diversity is necessary in the canopy otherwise competition will be too great to allow any single tree to gain an advantage. Where stand diversity was high, thinning may even be delayed until it can be carried out profitably.

Most of the group agreed that the current stand composition should be avoided either through earlier thinning or the initial establishment of another species to help differentiation. The value of sycamore in such a stand was discussed. Sycamore, as a shade tolerant species can be extremely beneficial in managing understorey growth and in assisting in the creation of a multilayered stand. It was suggested that the initial problem was that the stand was opened up too much, through clearfelling, when the ash was regenerating leading to the establishment of excessive numbers of seedlings. This highlights one of the most important and challenging aspects of regeneration management, the control of light conditions. It is essential to increase understorey light



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conditions to ensure the establishment of seedlings but this must be balanced in a way that avoids blanket regeneration of a single species.

The question of thinning and respacing levels was raised. Although it was generally agreed that the ash stand was in need or would soon be in need of some intervention, the degree of thinning is difficult to define. The Albanian delegate offered the following formula to assist in choosing appropriate stand stocking levels at a given height:

$$\text{Albania formula } n = \frac{10000}{\left(\frac{h}{4}\right)^2}$$

Where: n = the desired stocking level per hectare
 h = the current height of the stems in metres.

This is obviously a very general formula that would require alteration to the relevant species but it can be used as a guideline. The formula also sides with the view that stocking levels in a young stand should be high, as opposed to the argument that ash should be given space to develop from a young age.

The group discussed Ireland's lack of species diversity in terms of the principles of Pro Silva. Pro Silva promotes the use of native species and the avoidance of exotic species where possible. However, these principles do not completely exclude the use of exotic species. In European terms, Ireland is in quite a unique position in regards to its number of native tree species, the lack of a native shade tolerant commercial species was particularly noted. Professor Jean-Philippe Schütz, President of Pro Silva Europe, observed that foresters 'have to work with natural light systems with non-natural systems such as monocultures' and that there may be too much concentration on using native species to the detriment of following natural forest systems.

Curraghchase Park contains an EU LIFE funded yew forest restoration project which started in 2006. This project plans to regenerate yew forest from a core area, which contains mature trees, some of which are thought to be over a thousand years old, through cuttings. Planting will consist of 200 yew cuttings per ha and ash will be allowed to regenerate around it. It will also be necessary to remove existing rhododendron, laurel and snowberry and the felling of a number of very large beech. Although it was part of the itinerary of the tour, this site was not visited due to time constraints.

The next stop was a mixed forest in which an AFI (Association Futaie Irrégulière) plot had been established. Plots, such as this one, have been established across Europe by the AFI and the management techniques and outcomes will be recorded in each. No silvicultural prescription is given for the plots and invisible plot markers, as GPS coordinates and buried iron spikes, are employed to ensure no bias arises from the plot position. A complex series of plots and transects are incorporated into the measurements which record both silvicultural and economic aspects of management.



In the heart of the AFI Plot (Donal O'Hare)

The AFI woodland incorporates a number of compartments and consists mainly of beech and ash. Most of the trees were planted in the 1940s although some beech and oak date from the mid to late 1800s. Coillte's plan for this woodland is to establish a permanent system of racks and to carry out selective thinnings to allow the understorey to develop and in time to attain an irregular structure. Natural regeneration of beech, sycamore and ash were already evident and the methods for encouraging such regeneration were discussed. Bela Varga, a Hungarian delegate, described how, after such regeneration becomes established, it is the job of the forest manager to examine what allowed the process to take place and to try and replicate these conditions in other parts of the stand. This includes the site conditions on the ground and, linked to this, in the surrounding canopy. The effect of light conditions was again highlighted in this stand when examining the variation in species composition of the regeneration over the area. Where larger gaps were created ash became established in the understorey whereas in more shaded areas sycamore and beech dominated the undergrowth.

The final stop in Curraghchase was a Douglas fir stand that had been planted in 1966. Due to low market demand at the time of establishment the stand had been respaced soon after planting. Thinning had commenced at about age 16 and has been carried out 3 or 4 times in the stand. The last of these thinnings had been relatively heavy resulting in a very open forest structure. This stand did not appear particularly healthy and it was felt the site may not have been ideal for this species, which normally prefers more mountainous areas in the east of the country, or that the poor performance could be a provenance issue. However although it appeared unhealthy the yield class of the stand was 16, a very productive forest by European standards.

Although stability is an issue in this area, this site was situated on a fertile site which reduces the risk of wind damage. However, due to the high fertility levels and the open nature of the stand, unwanted vegetation growth is a major problem in this stand.



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Particularly prevalent was bramble (*rubus sp.*), a major barrier to the regeneration of tree seedlings. This site again highlighted the need to balance light levels between encouraging regeneration and causing future problems by increasing understorey growth levels. At present this stand consists of a mature but very open canopy and a rich herb layer consisting primarily of bramble and is lacking any real middle layer. The absence of some control on understorey growth is a barrier to the regeneration of the stand, therefore, the encouragement of a middle canopy should be the current management goal. The value of hazel in this regard was noted. Where present hazel will shade out and control weed species, creating a patch of bare earth which can be exploited by the forest manager for natural regeneration when desired. Douglas fir regenerates best when patches of light and shade are present in the stand so it was felt that when regeneration began it would be from surrounding ash, beech, and hazel trees as opposed to the stand species.

The value of bramble in protecting seedlings from deer was also mentioned and it was agreed that its presence after the establishment of some regeneration could be positive as long as it did not overwhelm the understorey and remained at about waist height. Although the need for pruning was suggested to increase the future value of the stems, it was agreed that the stand should be left unthinned to further develop, allowing the trees to add volume and value and creating enough shade to control unwanted vegetation and facilitate the natural regeneration of tree species.

Private plantation, Farranfore, Co. Kerry

In the afternoon, a private Sitka spruce plantation was visited. The stand had been planted in 1991 and the first thinning was due to commence soon. This site, an almost pure spruce plantation managed towards clearfelling, offered the group an insight into the 'typical' Irish forest. The transformation of this stand to continuous cover forestry was briefly outlined. This process would begin with a first thinning similar to the traditional method as racks are required for access. After this, plus trees of superior quality could be selected along with a selection of smaller diameter trees to remain after the removal of the larger trees. Emphasis should be placed on high quality stems, not just those of larger diameters. What is important is the removal of the larger, rougher trees while ensuring smaller, higher quality trees are incorporated into the larger diameter classes over time.



Typical Irish SS Plantation (Donal O'Hare)

The suitability of the Pro Silva style of management to a small forest owner was discussed. Such a management style offers a steady, although modest, income from land as opposed to a forced investment over a long period before the liquidation of the accrued capital and the need to start again from scratch. Where a large forest area with a diverse age structure is being managed the clearfell system can produce regular outputs of timber and money. However a small forest owner does not have the same flexibility and is more reliant on what is produced by the forest.

An ash stand of 8.6 hectares, belonging to the same owner, was also visited during the stop. This stand had been planted on a green field site in 1993 and appeared to be growing well although the stand was overcrowded and the stems and crowns were small and underdeveloped due to competition. Some shaping had been carried out in the stand but no other intervention had taken place since establishment. Ash does not differentiate very efficiently itself and trees can weaken as a result of increased competition, therefore some intervention, concentrating on the best trees, is necessary in this stand.

In order to avoid overstocking the stand an initial stocking rate of 1600 stems per hectare for ash was suggested. It was implied that such a rate facilitates the very fast growth rate of ash while allowing healthy crowns and stems to develop and encouraging differentiation of the canopy structure. The reduced establishment costs are a further bonus of this stocking rate. Under the current planting schemes in Ireland this option is not possible as the establishment grant is linked with the attainment of minimum stocking levels when the stand reaches age four. An alternative management option, given the current stocking rates, is to start selection of good quality trees at a very young age, such as four years, and to remove competing neighbours to ensure good crown and stem development. Intervening at such a young stage requires lower capital investment than later in the stand development as the removal of such small trees is easier. Again the sprinter nature of ash was mentioned and the ability of young ash to



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react quickly was given as further justification for intervening very early in stand development.

A further suggestion was to avoid planting monocultures in the first place. If a second or multiple species were established, initially, biological differentiation could begin and a complex canopy system could develop naturally in the stand. The undifferentiated canopy present in this stand means intervention will be needed, which increases costs, whereas if some diversity was present interventions can be delayed without unduly stressing the trees.

The point at which intervention, if necessary, should begin in order to attain a healthy forest structure was discussed. A Dutch delegate suggested that thinning should be carried out when a length of clean bole has been established that is two-fifths the height of the expected felling height. This simple formula can be used as a general indicator of when to begin intervening in a stand when the production of quality timber is a goal. It combines the need to avoid the development of heavy lower branches with the necessity to allow healthy crowns to develop.

At the end of the discussion, Professor Schütz asserted that an important problem in Ireland is the continuing state subsidisation of such uniform plantations. He reckons that “there should be self-incentive to have the possibility to do otherwise”. The planting of mixtures, such as ash and birch or sycamore in this stand, instead of monocultures was advised to ensure the development of healthy stable forests. Such mixtures ensure that forest managers have a variety of options available to them in the future and that any investment of land, time or capital is not concentrated completely on a single and potentially unstable plantation type.

2.3 Day 3 - Wednesday 16th May

Killarney National Park, Co. Kerry

The final day of the tour began with a visit to Killarney National Park. This area experiences a wet oceanic climate with an average of 223 rain days per annum and an average annual rainfall of 1500mm in the lowlands and as high as 4000mm in the mountainous areas. The entire park covers an area of 10,289 ha, approximately 2,100 ha of which are woodlands. The majority of the forested area is dry broadleaf woodland (1220ha) but there is also a substantial amount of conifer plantations (700ha) and a smaller area of important wet and yew woodlands (155ha and 25ha respectively). All of these forests are non-commercial and are managed exclusively for recreation and conservation purposes. In general trees are allowed to mature and die naturally. In some areas exotic species are being removed to favour the development of native woodlands. The park has a rich and varied history and although many of the forests are of native species it is likely that the vast majority have been cut and replanted or regenerated in the past.

After an initial introduction to the park the guide and host, Frank Mc Mahon from the National Parks and Wildlife Service, led the group around one of the lakes. A wet

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broadleaf woodland was the first stop of the tour. These protected woodlands are highly influenced by winter flooding and are dominated by alder, a species that favours wet conditions. In the summer the herb layer of these forests contain grasses, sedges and irises. The next stop looked at a pure yew forest, thought to be the only one of its kind in the country. The trees are believed to be about 200-250 years old and given the poor site conditions it is unlikely that they were planted here. The shallow soil and limestone pavement are thought to be linked with this type of pure, single storey yew wood as they do not occur on deeper soils. The trees are growing between cracks in the limestone pavement and due to the density of the canopy the understorey is dominated by a rich bryophyte layer. Very little regeneration is taking place under the yew, which is thought to be linked with the poor light conditions and the age of the trees. Yew can live up to 3,000 years making the forest in Killarney relatively young. Regeneration is taking place at the forest edge where light levels are higher, however this consists mainly of ash, birch and arbutus.



Killarney's Yew wood (Martijn Boosten)

The yew wood and surrounding area have been fenced in in an attempt to exclude deer, which inhibit natural regeneration and strip bark from the yew trees. Without some protection it was feared that the yew wood would be destroyed by deer stripping bark, an activity which is believed to be carried out to access chemicals which aid digestion. Both the protected, native Red and the exotic Sika deer are a problem in the park. The main strategy is to exclude the deer through fencing where necessary and possible and to cull the population in the hope of reducing numbers to a manageable level. An annual cull of 200 - 250 animals is carried out in the park in the hope of reducing the population to 2 - 5 per 100 hectares in the long term but currently up to 28 deer per 100 hectares are present in some parts, a figure which shocked many of the European foresters. The need for a national deer strategy was discussed in relation to this problem. At present no deer control is carried out on a national basis and management is carried out independently to neighbouring areas thus deer can invade quickly even after a

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major cull. The effect of the deer was most evident in areas from which they had been excluded by fencing. Here regeneration was common, mostly of calluna, birch and arbutus (*Arbutus unedo* L.), and the rich, varied understorey and herb layer contrasted starkly with areas without deer protection.

The issue of converting conifer plantations to native woodland was discussed while overlooking Torc mountain. This mountain was planted with Sitka spruce in the 1950s but has not been managed since. The plantation contains patches of oak and ash but rhododendron has taken over in sections of the forest and it is feared this will hamper the conversion of the forest if left unchecked. At present, small coupes of spruce are clearfelled while maintaining any native broadleaf species and Scots pine in the hope of allowing the forest to regenerate naturally. In addition the removal of any other exotic species is essential to facilitate this process. This discussion again brought up the issue of favouring native species over exotic ones. Killarney National Park contains some of the oldest and most ecologically valuable oak woodlands in Ireland, the conservation of which is one of the major goals of the park. As a result of this, exotic tree species are removed in all areas where the expansion or regeneration of oak woodland is desired. Hence clearfelling of all non-native species is carried out in small coupes. Pro Silva promotes the use of native species and the avoidance of large-scale clearfelling, however of more importance is the belief that forest managers should follow natural forest dynamics. From this perspective many delegates suggested that the exotic conifer species should be kept temporarily to maintain the forest microclimate, helping to promote natural regeneration, and protecting the soil. As the native species re-establish themselves the protective conifers could be removed.



Rhododendron control & subsequent regeneration (Donal O'Hare)

Rhododendron control has been a major management aim in the park for 30 years. Different control techniques have been attempted with varying levels of success. At present the technique employed is to cut the plant at ground level and to brush the stump with a 10% solution of Glyphosphate. Some plants are also killed standing by

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spraying the solution into a notch cut into the stem. Additional interventions are required after this initial treatment but this system has been found to be the most effective method for controlling Rhododendron. The use of chemical herbicides was questioned during the discussion. Some delegates questioned the need to use any form of intervention in this case and argued that over time the plantation might develop to control the Rhododendron itself. However the shade tolerance of Rhododendron coupled with its fecundity means that it has the ability to completely overtake a forest understorey, severely inhibiting the regeneration of any other species. Burning as a control method was also suggested but the air pollution and potential soil and ground vegetation damage was seen as a major negative impact of this method. Although the method employed by the NPWS involves the use of chemicals, the minimum effective amount is used and great care is given to ensure chemicals do not come in contact with the soil directly. The tour also stopped at an area where the Rhododendron had been controlled using the previous method of foliar spraying. Although this method does kill back the rhododendron it requires greater intervention afterwards and has devastating effects to the surrounding soil and vegetation. As the herbicide is being applied to the plant externally it can spread to the soil easily. This can seriously hamper the regeneration of a site and the establishment of tree species can take up to 6 years. Using the current method of cutting and stump painting can result in regeneration in as little as 6 months.



Killarney Lakes (Zoran Grecs)

The tour continued around the lake and the group was allowed to take in the surrounding views of Killarney. Areas of semi natural forest containing oak, birch and arbutus exist alongside impressive plantations of exotic species such as spruce, pine, fir and eucalyptus. The tour finally stopped in a woodland that had been recently cleared of Rhododendron and which it was hoped would regenerate shortly. The larger branches of Rhododendron are stacked and used as temporary fences around regenerating areas, as it is believed that deer are wary of climbing such unstable stacks. In this stand Professor Schütz thanked the NPWS and our guide and spoke about some of the issues arising from the visit in terms of the principles of Pro Silva. He identified that it was impossible

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to pass judgement on the management techniques of others after such a short visit and that managers in Killarney face extremely challenging circumstances. However he did raise the issue of clearfelling and how Pro Silva tries to change the belief that only clearfelling can be economically viable in forest management. In addition he questioned the use of chemical herbicides in management and wondered whether an alternative method could be used in Killarney.

Derreen Estate, Co. Kerry

Derreen Estate was the final visit of the tour, where the plantations and gardens were seen. The Estate is only a fraction of its former size and the ownership dates back to 1657 when a large portion of land in South Kerry was granted to Sir William Petty. In the mid 1800s a large reforestation programme was initiated using a variety of exotic species from America and Europe.



The majesty of Sentinals (Jurij Diaci)

Once established little management was carried out in the forests and it is assumed that the trees have remained virtually untouched for a hundred years. The result is spectacular, consisting of a dense and varied forest composed of massive trees. This area acts as a fitting end for a tour of visiting foresters. Few sights can sum up the huge potential of forestry in Ireland than such a mature stand of trees, some estimated at 42 metres in height, established not more than 150 years ago. Many of the visiting delegates remarked on the impressive growth rates achieved in Ireland and the productive potential that existed in Ireland.



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3. Results

The tour succeeded in providing a forum of discussion for some of the leading European foresters and silviculturalists about close to nature forestry and the Irish forestry situation. Although Irish forests differ greatly from many parts of Europe there are a variety of problems and goals that are shared across the continent. With a young and expanding forest estate it is essential that Ireland examines the successes and mistakes which have occurred in other countries and to learn how to repeat or avoid them.

The following of natural forest processes is a central Pro Silva Principle and where implemented should result in greater efficiencies in forest management. Over the last century, Irish forestry has primarily focused on re-establishing a forest estate and forest products industry after centuries of unsustainable exploitation. As Ireland's forests expand and mature the question of management is becoming increasingly important. Topics of discussion, which arose during the tour, that are of particular relevance to the current situation in Irish forestry include:

3.1 The value of species diversity

At a stand level monocultures are less capable than mixed species forests of adapting to change. The stability offered by diverse species stands is important for a number of reasons. From an establishment perspective, the ability of species to act as nurses is well recognised. Also the capacity of mixed species stands to self differentiate and simplify the management process was discussed in a number of stands during the tour and their value for particular species, such as ash, was repeatedly mentioned. It is also important to note that as different species often exploit varying levels in the canopy and soil layers, mixed species forests can be more stable and can utilize site conditions more efficiently.

In addition to the silvicultural benefits of mixed species forests, an over reliance on a single species has obvious economic dangers. Ireland's forest industry is hugely reliant on a single species, Sitka spruce. At present, given the dominance of Coillte, Ireland's timber market is somewhat artificial and cushioned by the presence of such a large producer and consumer of timber. If the stability of this species was damaged by biotic, abiotic or economic factors on a large scale the result to Ireland's forest and timber industry would be catastrophic. The diversification of the species composition of Ireland's forest estate would provide protection against this potential instability. In addition, the development of a wider product range, in terms of species, would encourage the diversification of the industry as a whole.

From an environmental and social perspective the benefits of mixed species forests are well known. A larger number of tree species will create a more varied range of habitats and support different organisms as well as having potential soil and site benefits. In terms of landscape, mixed species forests are considered to have a far more positive influence than monocultures.



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An important point of discussion during the tour was the use of exotic tree species in forestry. As was previously mentioned, Pro Silva promotes the use of native species in forestry where possible but does not exclude the use of exotic species where beneficial to forest management. This is an important topic in both commercial and non-commercial forest management in Ireland. The use of exotic species is a vital part of the Irish forest industry and this is unlikely to change in the near future. From a Pro Silva perspective this situation is acceptable as long as a level of diversification of species is attained and that forests are used as efficiently as possible. In terms of non-commercial forest management and in particular the conversion of exotic plantations to native woodlands it is important that management techniques do not force the destruction of the forest environment. Forest management is a long and complex activity where economic and social goals and expectations must be balanced with the inherent health of the forest ecosystem.

3.2 The problems of clearfelling

As a form of management, clearfelling produces a large and homogenous crop of timber after an extended period of time. This system requires repeated large investments of capital and time, as the re-establishment of trees must take place after every clearfell. Where large areas containing stands of varying ages are being managed the inefficiencies of this system can be disguised by the consistent income provided by the forest area as a whole. From the perspective of a small forest owner, however, this system lacks sustainability as all of the capital is locked up in a single investment, which is only realised over a very short period before a large reinvestment is required to keep the system going. Close to nature forestry promotes the efficient use of a forest in perpetuity. When managed appropriately a mature, well-developed forest has the ability to offer a more consistent income than the clearfell system.

From a social perspective, clearfelling is becoming increasingly unacceptable to the general public for a number of reasons, including ecological, recreational and landscape. By avoiding the complete removal of the forest, close to nature harvesting methods have the potential to be tolerated more by the public than more destructive ones. In addition such methods can encourage a greater input into management decisions and activities on the part of the forest owner thus increasing their link to and knowledge of their forest and encouraging a greater acceptance of forestry to land owners. Where forests are treated as agricultural crops to be harvested at one time this connection is not as strong.

3.3 The necessity to begin transformation/regeneration early

Where the transformation or regeneration of a stand is the desired goal of management, interventions should start early enough that these goals can be achieved as efficiently as possible. The preparation of individual trees for regeneration in a forest context is a complex procedure and cannot be undertaken as effectively when the trees are mature. Irish foresters face an even greater challenge in this regard as Ireland's high productivity levels mean that forests develop very quickly.



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By initiating the regeneration process early on in a stands growth a manager can ensure that the appropriate tree and stand conditions are achieved so that the natural development of the forest takes place as efficiently as possible. This can result in the creation of a permanent and healthy forest that has the potential to produce a regular output of quality timber.

3.4 The need for flexibility in forest policy

One of the major criticisms of Irish forestry made during the tour was the lack of flexibility in grant schemes and consequently forest management techniques that are promoted by the Irish state. The reliance on a single form of management and the lack of diversity in species selection were both seen as problems by many of the delegates. The vast majority of current forest establishment is being undertaken by private landowners who are encouraged to plant their land by the provision of financial benefits, in terms of grants and premiums. This places an onus on the State to ensure that these new forests are economically sound, healthy and productive, both to the landowner and the country in general.

It is important that more than one single management system is recognised in Forest Service policy. This would ensure that landowners are in a better position to decide what is the best silvicultural system and management option for his / her particular forest. With the large number of small-scale plantations in the country and a question over the economic viability in managing forests of this size using clearfelling and replanting techniques, it is vital that the state places equal emphasis on other forest management techniques.



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4. Conclusion

The tour was hugely successful and succeeded in introducing forestry in Ireland to representatives from a wide range of European countries, for many of whom this was a first visit to the country. More importantly this visit presented Pro Silva Ireland with the opportunity to gain valuable insights into forest management from a diverse range of specialists. This information ranged from simple tips about basic forest management to philosophical outlooks on the nature of forestry in general.

Of particular importance were the discussions involving the transformation of established stands to continuous cover forestry systems. This process is of interest to Irish forestry, especially, as this form of silvicultural is growing in popularity both among private landowners and state agencies despite there being little history of this form of management in Ireland to build on.

By covering the range of sites visited in the tour, advice could be attained about various types and stages of forest management and how the Principles of Pro Silva can be interpreted under varying conditions. It was clear that these principles should be viewed as useful guidelines for efficient and successful forest management and not stringent rules which must be followed in all circumstances.

While leaving the last site of the tour the group made a stop at the shore of one the Killarney lakes to pay tribute to Robert Tottenham who was responsible for bringing Pro Silva Europe to Ireland. Here Professor Schütz praised the dedication of Pro Silva Ireland by saying that “Pro Silva Ireland is a little group, a young one, and it is very impressive the enthusiasm that is leading the group” in introducing and promoting the societies principles and methods under difficult circumstances. He said “to promote Close to Nature in a harsh environment, in a country where the trend is not absolutely identical to the conditions that we have in some parts of Central Europe, it was a huge challenge to present Pro Silva ideas in this country, and you have a huge challenge for the future of developing and promoting this idea and you realise it very well, in my opinion. I think every participant of this meeting will go home with respect for the work you are doing, with significant signal of the beauty and the interest of your country.”



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The Pro Silva Europe Participants May 2007 (Eamonn Keogh, MacMonagle Photography)