

Society of Irish Foresters Study Tour to Sweden

5th – 8th June 2013

The 2013 study tour visited southern Sweden, a rolling countryside of farmland and forests. The forests became more prominent in the landscape as we travelled north towards the town of Växjö, where we were based for the tour. Both our host companies, Sveaskog (South) and Södra are headquartered there, and the ElmiaWood Fair at Jönköping was an hour away by motorway.

Sweden boasts Europe's second largest forested area after Russia. Its productive forests cover 28.1 million ha or almost 67% of the country's land surface. Norway spruce (*Picea abies* (L.) Karsten) and Scots pine (*Pinus sylvestris* L.) are by far the predominant species. Together they account for 80% of the growing stock which is estimated at 2,930 million m³. In northern Sweden pine is the most common species, whereas spruce mixed with birch (*Betula* spp.) dominates in southern Sweden. Sweden's annual harvest is approximately 74 million m³. The forest industry employs 205,000 people and annual exports are in the order of €14.8 billion.

This study tour gave us valuable insights into many aspects of the industry in one of the giants of the forestry world. The overriding lesson we learned was that Swedish foresters keep things simple but that they do them exceedingly well. Both Sveaskog and Södra are huge commercial entities and it is refreshing to see that silviculture is fundamental to their decision making processes. We were fortunate to have been hosted by such open and confident, professional foresters. We are indebted to them for the success of this study tour.

Pat O'Sullivan, Tour Convenor

Thursday, 6th June

The warm sunshine that welcomed us on our arrival in Växjö on Wednesday evening remained with us for the following days of the study tour. Swedish flags were flying in the market square close to our hotel. Flags were also flying on many of the houses along our route as we travelled east of Växjö to the forest at Högaskog. However, the flags were not there to welcome the visitors from Ireland but to mark Sweden's national holiday; one of several days in the year when the distinctive blue and yellow flag of Sweden is unfurled from countless flagpoles throughout the country.

The visit to Högaskog was hosted by Sveaskog, Sweden's state forestry company. Our leaders were Kjell Gustavsson, Vice-President Silviculture, at Sveaskog and Stefan Bergqvist, Forestry Field Assistant, together with his dog, Lisa. Both officials welcomed us to Högaskog with refreshments in the form of strong coffee and traditional "morning" cake. Sveaskog is Sweden's largest forest owner (3.1 million

ha of productive forest land). It employs 720 people and had annual sales of €755 million in 2012. Forestry is its core business; the focus is on silviculture, the sale of forest products and the development of the forest's other values. Sveaskog achieved FSC certification in the early 1990s and is currently working towards gaining PEFC certification also.

Sveaskog's South Division owns 280,000 ha or 8% of the productive forest land in southern Sweden. The main species here are Norway spruce, Scots pine and birch. 20% of the forest is designated Nature Conservation Land, which falls into three categories – Ecoparks, specific stands for conservation and small features. In Sweden the landowner owns the hunting rights. Revenue from hunting on Sveaskog's land accounts for 7% of the company's income. Moose, wild boar and roe deer are the main species. Interestingly, public access to the forest is a legal right in Sweden but members of the public are fully responsible for their own health and safety in the forest.

The process of planning for final felling was explained to the group by Stefan Bergqvist who manages approximately 20,000 ha of forest. His work is completely field based and his "office" is a specially reinforced tablet which has up-to-date maps, inventory information and archaeological/heritage layers (Figure 1). He prepares



Figure 1: *Stefan Bergqvist, Sveaskog forestry field assistant, with his office – a reinforced Armor tablet.*

the harvesting plan at a site and forwards it to Sveaskog's office and to the Forest Authority for approval. Cultural features, such as the 16th century "tar production" site we visited, are excluded from the harvest area and are delineated on the ground by "cultural stumps" which is a cordon of trees cut at 3 m above ground level to identify the site for exclusion from all future forest operations. In addition, approximately 100 "eternity trees" per ha are left standing to provide shelter for the following crop.

Scots pine is the preferred species in this drier area but it is very prone to damage by moose, whereas Norway spruce is much less attractive to them. When the regeneration reaches 0.5 m in height, the number of these so called "eternity trees" is reduced to 10 ha⁻¹. In addition, three "deadwood" trees per hectare are left to encourage wildlife. Almost all the lop and top is removed from the site to the road-side where it is chipped for use as bio-fuel. On a nearby site a six wheeled Eco Log 590D harvester was clearfelling 90-year-old Norway spruce. This Swedish manufactured harvester processes between 70,000 m³ annum⁻¹ and 80,000 m³ annum⁻¹. This machine's on-board computer uses the Forestry Field Assistant's harvesting plan to oversee the clearfelling operation.

Following lunch at the famous Kosta glass factory, it was back to harvesting operations in a 35-year-old stand of Scots pine which was getting its first thinning. For thinning operations, the smaller Eco Log 580D harvester was used (Figure 2). This machine had a specially adapted harvesting head which could bundle up to three



Figure 2: *The Swedish manufactured Eco Log 580D carries out a first thinning of a 35-year-old Scots pine stand.*

trees and process them simultaneously, thus greatly improving harvesting efficiency. The thinning intensity was determined by the basal area of the crop. Normally 35% of the basal area is removed at first thinning. On this site the lop and top was also being removed to the roadside for chipping. All of Sveaskog's machine operators must complete a three-year operator's training course at an approved forestry school.

In southern Sweden, first thinning is usually done when the crop reaches 35 - 40 years of age and is followed by the second thinning when the crop is 55 years of age and the crop is often clearfelled at approximately 70 years of age. The Forest Authority will not permit clearfelling until the crop is at least 65 years old. Our next stop was a typical 50-year-old pine stand. Here there was plenty of ground vegetation for moose and a number of shooting platforms to facilitate game control.

Travelling to the final stop of the day, we passed through an area which carried a fine stand of Scots pine, but the forest terrain was extremely rough due to the large number of huge boulders scattered throughout the area. Their presence impedes conventional harvesting operations and in some cases, such as here, can prevent harvesting altogether. The final stop was in a 25-year-old pine stand which had been badly damaged by moose browsing. The upper level of tolerance is 30% damage and here that limit was close to being breached. Michael O'Brien, our Chairman for the day, thanked Kjell for a very pleasant, informative day and for spending his national holiday showing us around the forest.

Overnight – Växjö Richard Jack

Friday, 7th June

On Friday morning, we travelled west from Växjö for about 40 minutes to a site at Toftaholm which is owned by Södra, the largest private growers' co-operative in southern Sweden. The Södra staff who hosted us for the day were Magnus Petersson, Magnus Linden and Anders Ehstrand, Södra's broadleaf specialist.

Södra is owned by its 51,000 members, who have 36,000 forest estates, representing more than half the privately-owned forest in southern Sweden. Many of these estates have more than one owner, the average age of owners is 60 years, and the average size of holding is 50 ha. The south of Sweden has the best growth rates which range from eight to ten m³ ha⁻¹ annum⁻¹.

Södra's main function is to secure markets for its members' forest produce and to contribute to the profitability of their forests. Members do not pay a fee, but each member invests in Södra by making capital contributions that are drawn from payments for wood deliveries. Members receive advice and training on forest management and are offered value creating forestry services ranging from planting to harvesting. The members also share in the profits of Södra's processing mills. Södra employs 3,800 staff and owns three pulp mills, 11 softwood mills and two hardwood mills. Södra is

a very democratic organisation; each member has one vote irrespective of the level of capital contributed or the size of their forest estate. Members may also be elected to Södra's Board of Directors.

The 1,500 ha site we visited at Toftaholm is owned by Södra and is used as a “best practice in forest management” demonstration area. Södra also permits the University to conduct both long- and short-term research experiments here. In January 2005, a catastrophic wind storm toppled 200 ha of old Norway spruce here. During the night of 8th January 2005, almost 75 million m³ of timber was windblown, which is equivalent to the annual harvest for the entire country. The storm came from the south-west and travelled to the east, with wind-speeds in excess of 100 km hr⁻¹. Membership of Södra significantly increased after the storm and the company bought some nurseries to ensure an adequate supply of plants for replanting of the blown areas. Approximately 90% of reforestation was done with Norway spruce, with some small experimental planting of aspen (*Populus tremula* L.) and birch, hybrid larch (*Larix X eurolepis* Henry), Sitka spruce (*Picea sitchensis* (Bong.) Carr.) and Douglas fir (*Pseudotsuga menziesii* (Mirbel) Franco).

Almost 90% of all clearfell sites are scarified at an average cost of €300 ha⁻¹. The preference is for mounding as it gives much better survival rates, but mounding costs are high at about €470 ha⁻¹. Södra's foresters are actively seeking to reduce the cost of mounding. Currently, they have a derogation from the FSC for using insecticide for



Figure 3: A wax coated seedling at Södra's reforestation site at Toftaholm.

pine weevil control. They are experimenting with wax-coating their seedlings (four million per year) to protect them against weevil damage. Results to date are very promising but the wax coating needs to be very flexible as the seedling diameter increases significantly during the first two growing seasons.

One of the main problems encountered on reforestation sites is the amount of natural regeneration of birch, which can be in the order of 20,000 to 100,000 stems ha^{-1} (Figure 4). The preferred species on these reforestation sites is Norway spruce as its yield class is three or four times greater than that of birch. However, it is accepted that on approximately 15% of reforestation sites, particularly on wetter sites, birch will be the dominant species. In order to successfully establish the Norway spruce crop, two “pre-commercial” thinnings of the birch are generally made, the first at seven years (Figure 5) and the second at ten.

Foresters have found that when birch is cut, the subsequent re-growth of the birch shoots is much faster than birch from seed and that is why they do not want to cut it too early. These pre-commercial thinnings are normally done with a brush-cutter but a new “chain brush-cutter” which uses a chainsaw head instead of a circular saw head, is becoming more popular. The birch is cut at approx 30 cm height as this is the height roe deer prefer to graze at, and this helps to control the re-growth. We also saw other trials where the number of birch in Norway spruce plantations is reduced to 4,000 and 1,000 stems ha^{-1} respectively, and later the birch is harvested at 8 m or 9 m height as an energy crop. However, this will inevitably lead to some extraction damage to the spruce and result in harvesting tracks being left behind.



Figure 4: *Strong birch regeneration before a first pre-commercial thinning.*



Figure 5: *Norway spruce regeneration following a first pre-commercial thinning.*



Figure 6: *The new “chain brush-cutter” which uses a chainsaw head instead of a circular saw head for pre-commercial thinning operations.*

We then visited a stand of Norway spruce that had already received a first thinning. This is usually carried out about 20 years after the second pre-commercial thinning when the crop is between 12 m and 15 m in height and has a DBH of 10 cm or greater. Approximately 40% of the basal area is generally removed; 15% from the racks which are spaced 60 m apart, and 25% from between the racks. Such crops will usually be thinned once more about 15 years later when the crop is 18 m to 22 m in height. These crops will receive no further treatment until clearfell when it should have 1,000 stems ha⁻¹ and an average DBH of 35 cm. Swedish forest law prohibits clearfelling before the crop is 65 years of age.

Our final stop was in an area of semi-natural forest which had been grazed until 70 years ago. It contained a lot of old birch but they believe that oak and beech will become more prominent as the crop ages. This area has had continuous tree cover throughout its history and therefore had very high levels of biodiversity. In Sweden, there are two types of nature conservation areas – “NO” where there is no management intervention and “NS” where some level of management is permitted. We saw some old oak trees, probably 200 years old, which were home to the Hermit beetle, *Osmoderma eremite*. This is a very rare European beetle that lives on decaying wood or mould in old trees and can fly a distance of only 20 m. In places where this beetle is found, there are likely to be a further 40 or 50 other “Red Data” species also present.

Overnight – Växjö Eugene Griffin

Saturday, 8th June

The group made the trip north to ElmiaWood, Sweden’s mammoth forestry trade fair. Located east of Jönköping, the ElmiaWood fair takes place every four years in early June. Few would dispute the organisers claim to be the world’s biggest international forestry trade fair; the Olympics of the global forestry and forest products industry!

Enthusiasts of forestry machinery and new products usually spend several days at the show to fully absorb its wide range of activities, machinery and products. With more than 54,000 visitors and some 500 exhibitors, ElmiaWood demands this level of attention. It takes place over four days and we visited it on the final day in glorious sunshine. Single-day visitors need to be quite selective as it’s very easy to be seduced by the large harvesting companies with their spectacular exhibitions of tree felling and extraction, often accompanied by heavy metal music and theatrical fire displays (Figure 7). The leaders in this regard were Komatsu, John Deere and Ponsse.

However, there were also many harvesting units designed for small-scale forests. We tend to forget that in Sweden, and throughout much of Europe, average forest size can be small and their owners prefer machines which are adapted to



Figure 7: *Attention grabbing displays at an ElmiaWood demonstration area.*

harvest such sites. Discussing forestry issues with Södra foresters the previous day, we learned that while some forest owners leave the management of their crops to the experts, many take a hands-on approach. The huge interest shown in ElmiaWood supports the view that many Swedish forest owners are actively managing their own forests.

As there is practically no afforestation in Sweden, the emphasis is on harvesting and reforestation. Although Sweden is over five times larger than the island of Ireland, it has a population of only 10.6 million but has some 355,000 forest owners. The State owns 25% of the forest estate which is managed mainly by Sveaskog, an organisation with similarities to Coillte, while a further 25% of forests are owned by private companies. However, half the forests are in private ownership, so it's easy to see why forestry is not only a key industry but also a way of life for so many people in Sweden. This was reflected in the attendance at ElmiaWood, although it also attracts a large number of overseas visitors from around the world including Ireland.

The catastrophic windblow of January 2005 created new challenges in reforestation, mainly in private plantations in the south where much of the damage was caused and where most of the forests are privately owned, unlike in northern Sweden where forests are predominantly state owned. It was obvious from the previous two days of the study tour that the re-emergence of competing birch

in reforestation sites is a major silvicultural issue. Innovative new brushcutters designed to clear birch around recently established Norway spruce exemplifies the Swedish “can do” approach to successful reforestation. These were on display and are now the main tool used during the first few years after establishment as chemical weed control is banned. Insecticides are also banned in controlling the pine weevil in reforestation sites. Environmentally friendly ways to treat seedlings to control damage by this insect pest were on display at the show. In some instances, plants were dipped in wax up to 80°C around the root collar and this was proving to be an effective control method (as was already seen at the Södra reforestation site at Toftaholm; Figure 3). Another method involved the application of water-based glue to the seedling, which is then sprayed with sand.

Having dealt with the weevil, the next problem in the reforestation site is preventing deer and moose from eating the tips of young trees. Interagro Skög AB has developed an environmentally friendly spray, Arbinol B, which it claims is a deterrent because of its bitter taste. Jokingly referred to as the “anti-Bambi method”, it might have potential for use in Ireland to control deer damage.

There was a strong emphasis on technology, computerisation and innovation in forest planning, management and measurement. Likewise, environmental issues featured highly and the main forest certification companies had a strong presence there. Even the large-scale machines are adapting to environmental issues and are equipped to minimise damage to soil and flora.

ElmiaWood placed huge emphasis on renewable energy and this is now part-and-parcel of Swedish forestry from chip and pellet production to traditional log production and its associated log processors, log splitters and traditional axe users. With an annual cut of 74 million m³ Sweden can afford to feed its sawmills, panel board and pulp mills as well as the wood energy sector. The wood energy sector is designed for local production with short haulage distances, which is more easily achievable in a country with greater than 60% forest cover.

The exhibitors made every effort to cater for both specialists and the general public alike by patiently explaining the virtues of their merchandise and services (Figure 8). Advice and technical lectures were accompanied by souvenirs, food and drinks, which ranged from coffee to birch sap.

Finally, for those who missed the 2013 ElmiaWood or for those who wish to re-visit the show, the organisers extend a *céad míle failte* or *välkommen tillbaka till ElmiaWood* on 7th -10th June, 2017!

Overnight – Växjö Donal Magner



Figure 8: *Yes, we did encounter moose during our visit to Sweden!*

Tour Participants (34)

Pacelli Breathnach, Richard Clear, John Connelly, Clodagh Duffy, PJ Fitzpatrick, Jerry Fleming, Tony Gallinagh, Eugene Griffin, John Guinan, George Hipwell, Richard Jack, Erick Johnson, Joyce Johnson, Kevin Kenny, Brendan Lacey, Brendan Lally, Donal Magner, Tony Mannion, Jim McHugh, Willie McKenna, Paul McMahon, Liam Murphy, Frank Nugent, Benny O'Brien, Dermot O'Brien, Michael O'Brien, Paddy O'Kelly, Tim O'Regan, Matt O'Rourke, Pat O'Sullivan, Paul Ruane, Kieran Walsh, Trevor Wilson, Cathal Woods.