

ANNUAL STUDY TOUR 1987 — SOUTHERN ENGLAND

Day 1 — The Forest of Dean

On our first day we journeyed to the Forest of Dean where we spent most of the time among its fine broadleaved woodlands.

Mr. John Everard, the Deputy Surveyor, welcomed us to the forest and introduced his colleagues, Mr. David Craze, Mr. Ted Jury, and Mr. John Anderson. In 1971 a Ministerial Directive was issued stating that the proportion of the woodlands under broadleaves (then at 42%) should not be reduced. The primary aim of management in the Forest of Dean is the production of wood for industry. Recreation, conservation and forest management are, however, intimately integrated throughout the forest. The main soil types are acid brown earths and coniferous heavy textured soils. There are also small areas of thin limestone derived soils and gleys. The forest is at an elevation of between 100 and 300 metres. A number of small open cast coal mines occur within the forest.

Mr. Anderson, the forester in charge of recreation, then brought us to the viewpoint overlooking the Severn River and the Cotswolds. The forest attracts one million visitors annually, most of whom are day visitors, and has a quarter of a million camper nights

per year. There are five nature trails in the forest. A sculpture trail has recently been opened and has proved to be very popular.

We then proceeded to walk through part of the forest. We were shown a stand of southern beech — a mixture of *Nothofagus procera* and *N. obliqua*. It is felt that these species have no great future in Britain because of their susceptibility to frost; three years ago trees of up to 50cm dbh were killed by winter frosts. We saw stands of beech in varying stages of maturity. Prices for beech (at roadside) were as follows:

Thinnings	up to £40/m ³
Good quality sawlog	up to £56/m ³
Veneer quality	up to £300/m ³

Ash fetched £80/m³ for trees of 30cm DBH. Firewood was selling at £10/m³.

We then saw a stand of Douglas fir Yield Class 24 which had been planted in 1912 — the mean volume per tree was three cubic metres. This stand will be felled soon as trees over 80cm dbh present difficulties for sawing.

The final stop before lunch was a stand of 80 year old naturally regenerated oak which had been underplanted with beech. It covers an area of 160 ha and is the largest block of its type in Britain. Mr. Everard felt it should be retained for its uniqueness and also for training foresters in the silviculture of oak; he hoped eventually that it will produce veneer oak.

After lunch we visited an area where oak is being naturally regenerated using the Uniform System. Because of conservation restraints only two thirds of the area under oak can be regenerated — the other third must be retained in perpetuity. On the lighter soils they have found ring shake to be a severe problem, up to 50 of stems can be affected. The shake is not a problem where oak is grown on deep heavy textured soil.

We were then introduced to Mr. David Langford, the forester responsible for conservation. There are 300 ha of woodland set aside as a bird breeding reserve. He consults regularly with the Royal Society for the Protection of Birds as to the management of these woodlands. A number of years ago nesting boxes were put up on trees which attracted pied fly-catchers back into the area. The bird life in the reserve is abundant judging by the variety and amount of bird singing to be heard. There are many species of raptors present also. Grey squirrels in the reserve are controlled annually using warfarin-treated wheat.

On our final stop we visited a Norway spruce stand Yield Class 16 which is currently being felled. It was sold at auction for £50/m³.

standing. The average tree size was 1.1m^3 with 90% being sawlog standard. Norway spruce will not be replanted here because of the danger of attack by the great spruce bark beetle. Hybrid larch will be planted instead. After thanking our hosts for such an interesting and stimulating tour of the Forest of Dean, we returned to Hereford.

Eugene Griffin.

Day 2 — Ebworth Woods, Sheepscombe.

After leaving Hereford we made our way by Gloucester into the Cotswold Hills and on to Sheepscombe. Here we were met by our host for the day Mr. John Workman, whose family has owned and managed Ebworth Woods for over a century.

The estate comprises 300 ha of woodland, mostly beech, and is a National Nature Reserve. It is interesting that an area that has been managed for the production of commercial timber for so long should be rated so highly for its conservation and aesthetic interest. The Nature Conservancy Council regard the areas as one of the few Grade 1 Beechwood sites in Britain. The area is also a Site of Special Scientific Interest (S.S.S.I.). Three men do all felling, extraction and local deliveries of timber.

Accompanying the party on our visit were David Russell, forestry adviser to the National Trust and Laurie Clark, Woodland Warden from the Nature Conservancy Council.

All soils are derived from Jurassic limestone and are generally thin and free draining. Some heavy textured soils derived from Lias clays occur. Rainfall is 90cm (36") per year. In some periods severe droughts can occur. During the summer of 1976, in particular, more than half the trees died in a 200 year old beech stand. Ash was even more severely affected during this period.

Following an introduction we walked through the woodland. Very little planting takes place now and natural regeneration is relied upon to provide sufficient stocking of the preferred species, beech. Sycamore competition is a problem as is *Clematis* (old man's beard). Successful regeneration to produce commercial quality beech would not be possible without control of grey squirrel. Warfarin is used in late spring before the damage period in mid summer.

In the past beech was planted in 3 row: 3 row mixtures with larch. A row of larch adjacent to the beech is removed after 20 years and the remaining rows in subsequent thinnings. Although the mixture is difficult to manage it provides frost protection to the beech.

Ash occurs sporadically but is not thrifty on these soils except in

the valley bottoms. Where it does grow well it makes very good prices, in the region of £100 per cubic metre, sold felled. Beech makes about £600 per cubic metre, also sold felled. The morning walk ended at Mr. Workman's home where beverages were kindly provided to accompany lunch.

In pleasant weather we made our way through the gardens and on into the woods again. At one of the small areas of oak there was a vigorous discussion on the merits of introducing oak plants to aid regeneration in an area where the prime consideration is conservation of a genetic resource. Our final stop of the day was at a magnificent 200 year old beech stand over 36m tall.

After a rewarding day it was time to leave Sheepscombe and John Prior paid thanks to John Workman for his hospitality.

Eugene Hendrick.

Day 3 — Forestry Commission, Forest Research Station, Alice Holt

Co-ordination of our visit to Alice Holt was in the hands of Mr. Brian Hibberd who met us on our arrival. We were introduced to the work of the Research and Development Division of the Commission by its Director, Dr. Arnold Grayson. The Division is organised as 16 branches located at two Research Stations, the Director's office and main Research Station at Alice Holt Lodge and the Northern Research Station at the Bush Estate, south of Edinburgh. Three hundred and fifty scientists and professional foresters are based at the two research stations. The total national budget for forestry research is £10-£11 million p.a., of which 60% comes from Forestry Commission funds.

The object of Research Division is:

- (1) To improve the quantity and quality of wood production;
- (2) To improve the environmental impact of forestry and;
- (3) To reduce operation costs.

Research priorities are of four types:

- (1) Problems that emerge in the course of management;
- (2) Problems that researchers recognise;
- (3) Problems which the Commission is specifically asked to deal with and;
- (4) Problems described by Dr. Grayson as being of a "political" nature.

Air pollution was seen as an example of the political category which is revealing of the Commission's attitude to this problem. A great deal of money is being spent on the topic by the Commission. The attention given to the topic may be evidenced by the fact that

Air Pollution Studies formed our subject for the remainder of the morning for which we were in the hands of Project Leader, Dr. Andy Wilson. He gave us a talk which included background information on forest decline in Germany and the United States. Apparently no symptoms of damage have been detected in the UK. He described for us the Commission's research effort which is directed at studying the effects of air pollution on plants. This is not a particularly new line of investigation. It was pursued quite vigorously in many parts of the northern hemisphere long before the emergence of the present forest decline problems. The Commission uses open top chambers for its research. These provide a partially controlled environment and allow plants to grow in atmosphere with ambient levels of pollutant gases, with filtered air (the filters are about 90% efficient) or with partially or differentially filled air. Although it was not mentioned, it would appear from examination of the installation which was visited at Headly, near Alice Holt, that gas concentrations can also be enhanced. The chambers are situated at three locations in the UK. The Headly site consists of 16 chambers and elaborate monitoring and gas analytical facilities. The cost of installation is £100,000 per site and the total budget over seven years is £1.25m. Given the equipment and work required, these costs are not excessive. What is disturbing is that this money comes from Research Division's grant in aid and consequently their effort in other areas is diminished.

Air pollution studies would seem to be largely a public relations, 'political' exercise. The chambers while impressive cannot control climate. It has been established that sensitivity to air pollution varies with many factors which include species, the physiological state of the foliage, nutritional stress, moisture stress and climate. The experimental design is flawed by the lack of complete climatic control limiting the information which can be gained from the project. As is so often the case in research, results are relatively easy to obtain. The difficulty lies in designing the experiment so as to ask the right questions.

After lunch in the Alice Holt canteen (a memorable culinary experience), Mr. Donald Thompson, Wood Utilisation Officer, spoke to us about his work. His comments on the problems of marketing UK softwood in the future had a familiar ring. Home production is forming an increasing proportion of the softwood sawlog market. It now represents 16% to 18% of the market. In 10 years, it is estimated, the figure will be 23%, forcing it out of the soft end of the market into more competitive, more demanding and of course more lucrative areas. The emphasis now has to be on raising standards of quality and presentation.

With Sitka spruce, the emphasis is on strength properties because Sitka is not a joinery timber. Spacing and thinning influence strength properties. In Mr. Thompson's opinion, spacing greater than 2m results in serious reductions in strength as measured by stress grading. He suggested that where windthrow hazard dictated a no-thin regime, crops will never, because of truncated rotation, reach structural size, a contention disputed by many. At present there is over-capacity in British mills in the small roundwood and larger size categories. Less than 10% of British timber is kiln dried — an obviously unsatisfactory situation. It has been shown that timber performs better in stress grading if it has been dried. While he gave relatively little attention to hardwoods, Mr. Thompson did express concern about the price differential between top grade and all other material. The area of broadleaves planted is increasing. Will there be markets for this material, particularly material of intermediate quality? Markets must be found for this material. Poplar has possibilities as a structural timber. It is similar to Sitka spruce in strength and preservation properties. Preservation itself is causing difficulties now because of the toxic nature of wood preservatives.

Mr. Tim Rollinson and Ms. Janet Gaye spoke about the work of the Mensuration Branch. Their activities cover yield studies (yield tables, growth modelling, thinning and respacing studies and yield class investigations) and measurement studies (measurement methods, special projects and general advice). Yield Tables are designed to provide models of stand growth and yield which can be used for planning decisions, in particular to compare results of alternative treatments and to forecast timber production. They were never intended for use in individual stands. Because of the way in which they were compiled standard errors could not be measured, but for an individual stand, final crop volume may differ from the tables by as much as 30% to 40%. Allied to this is the problem of Yield Class estimation in young stands. Mr. Rollinson recommends that the minimum age for top height measurement for Yield Class estimation is 15 years. Top heights of younger crops are subject to excessive bias due to growth in a single season. Productivity estimates of young crops could be in error by as much as four yield classes.

Yield tables make no allowance for loss in production due to roads, rides, 'normal' understocking, etc. While there is some disagreement as to what the 15% deduction for losses should represent, Mr. Rollinson believes that a 15% reduction overestimates losses due to the factors listed above. However, recent field checks suggest that the volume of timber greater than 7cm

diameter remaining in the wood after clearfelling may well be in the range 10% to 15%. This is, for the most part, non-utilisable material. The significance of this source of error depends upon the purpose of the production forecast and the measurement of volume upon which sale price will ultimately be based.

Calculation of Production Class reduces the margin of error attached to yield table volumes. Production Class can be estimated for a forest or for a region. Measurements required are not particularly onerous, but unfortunately can only be successfully made in unthinned stands.

The main limitation of yield tables as they presently exist can be listed as follows:

1. They are inflexible, available only as paper copy, which cannot easily be read or utilised by computer.
2. Despite the large number of models, not all treatments are covered.
3. They are based on historical data.
4. They are constructed at stand level and are unreliable for estimating individual tree volume.
5. They can only be used for pure crops. The suggested assumptions to be used with mixtures are known to be invalid.
6. They assume full stocking whereas in fact, this is rarely the case.

Future developments in yield tables will seek to:

1. Improve flexibility.
2. Give more detail.
3. Improve accuracy, and;
4. Cover more treatments.

Mensuration Branch has for long been concerned with errors associated with the measurement, collection and transfer of data collected from sample plots. Ms. Janet Gaye has examined methods of data capture in order to maximise accuracy, speed of collection and checking and consistency of measurement. She detailed the many sources of error involved in paper based procedures and explained how these could be minimised by suitable data logging services. The Epson HX20 microcomputer, cost £490, meets the Commission's requirements for an improved data capture system. The Epson has a 32K memory, a microcassette drive and is fully

programmable in Basic. With the Epson, checks against previous data and detection of operator errors are done in the field and can be corrected immediately. When the forester is happy with the data the tape is sent into headquarters where it is read into the mainframe computer.

Ted Farrell.

Day 4 — The New Forest

Following an overnight stay at Hindhead, which is one hour's journey from London, bright sunshine and clear skies greeted us on our journey South West to the New Forest. The New Forest lies in a broad, shallow basin — the Hampshire Basin — surrounded by the low chalk downlands of Cranborne Chase, the Wiltshire and Hampshire Downs, Ballard Down and the spine of the Isle of Wight, close to the English Channel. We were greeted on our arrival by Mr. Roger Newland and Mr. Jeff Green, who acted as our hosts for the day.



Group photo at New Forest.

The New Forest was started in 1079 A.D. by William the Conqueror. The land consisted of relatively infertile woodland and furzy waste, sparsely scattered with farms and homesteads. The act of afforestation transformed a whole neighbourhood into a royal hunting preserve. Grazing of domestic animals on the King's land was however permitted and thus were established the rights of pasture still practised by the Commoners of the New Forest. It has been said that the Commoners' ponies and cattle are the architects of the Forest. As the peasants who lived in the Forest were forbidden to fence in their animals lest any fence would interfere with the free run of the deer, their animals as well as the deer severely diminished the ability of the woodlands to perpetuate themselves. The dearth of new trees became a serious problem during the middle ages, which saw an enormous increase in the consumption of wood. Enactments were made to enable large areas in the New Forest to be enclosed for the purpose of establishing woodlands, later to be thrown open when the trees had outgrown the danger by cattle. This process became known as the 'rolling power of enclosure'. The first tree act was passed in 1483 and others followed.

The Forestry Commission took over the management of the Forest in 1924. The total area of the New Forest today is 37,544 ha of which 27,022 ha are managed by the Forestry Commission. The remainder is privately owned in villages and homesteads.

The area is divided into two categories:

Enclosed land: Total area 8,646 ha; included in this category are Crown Freeholds, old hunting lodges, farms and enclosures for growing timber.

Unenclosed forest: Total area 18,376 ha. The open forest embraces heathlands, grass, lawns, rivers and unenclosed woodlands named Ancient and Ornamental in Queen Victoria's reign. It is over the entire unenclosed area of the Forest that Common Rights are practised such as grazing, turbary, etc.

Forest Management: As can be imagined there is a conflict between commercial forestry and conservationists. This means that the management forester has to have all his proposals vetted by a Consultative Panel for clearance a year before proposed work takes place. Sixty two percent of forest is coniferous and the remainder broadleaved. This ratio has to be maintained. Conifers are thinned on a five year cycle, broadleaves on a ten year cycle. Even though the highest elevation is 180m and rainfall is a low 71cm (28") per annum, windthrow is a problem. As a result crops are now being

thinned earlier. Pulpwood makes £17.70 per ton on roadside and £5 to £8 per ton standing.

Natural regeneration of Douglas fir is now being widely practised as grazing by stock is less of a problem with naturally regenerated plants than nursery stock. Because of conservation constraints crops cannot be fully clearfelled on maturity. Fifty stems per ha are retained. Natural regeneration of Douglas fir is very profuse. When the crop reaches about "nose" height it is thinned out with a hand-held brush cutter to a spacing of 2 x 2m. When the natural regeneration reaches a height of 4.5m then the remaining trees are clearfelled.

In the afternoon Mr. Paul Borwick, Head Forester Management, introduced the group to the problems encountered in reafforestation sites. The site we visited had been clearfelled of Corsican pine and replanted with the same species. The reafforestation consisted of Japanese paper pot plants, soil scarification and spot treatment with chemical. There is a drift away from bare rooted plants to the pots because of the low rainfall which causes severe drying out after planting, resulting in heavy losses even though the potted plants are 20% more expensive.

Tree shelters are now widely used in the planting of broadleaves. Tubex white coloured shelters are favoured.

Our next stop was at a harvesting site where Douglas fir was being clearfelled. Mr. Dick Maylough and Mr. Kenny Stewart were the Harvesting Foresters on the site. Thirty five thousand cubic metres are harvested annually. The timber is sold by tender to the merchant. This crop of Douglas fir made £46.20 per m³ at roadside (overbark).

Our final stop was at a campsite where the Recreation Forester, Mr. Martin Fletcher, outlined the recreational uses of the New Forest. Two categories of people visit the forest; day visitors and campers. There are twelve campsites and 143 car parks in the forest. Camping has grown from 90,000 camper nights in 1956 to 800,000 camper nights in 1983. Present peak capacity is 5,000 pitches per day.

Michael Davoren.

Day 5 — Tilhill Nursery and Westonbirt Arboretum

Day five of the tour started off with a visit to Tilhill Nursery in Surrey, about half way between Hindhead and Farnham. On arriving at the nursery, Mr. John Fennessy introduced us to the Director of Tilhill, Mr. John White. We were also introduced to the Operations Manager, Mr. Robin Simmes. Mr. White gave a brief introduction to the running of the nursery.

The nursery has an area of about 100 hectares. It is generally flat and is about 60 metres above sea level. The soil is derived from the sand of the Folkstone beds. It is easily worked and is relatively free draining. The pH varies from 4.6 to 6. In certain areas of the nursery lime is added to make the soil less acid. The nursery is generally low in potassium and get 20 tons of spent hops per acre every year as organic matter. The total nursery stock is 58,000,000 trees, comprising of 20,000,000 conifer transplants, 30,000,000 conifer seedlings, 6,000,000 conifer standover stocks, 1,500,000 hardwood seedlings and 500,000 transplants and under-cut stock.

Our first step was to look at the conifer seedbed area. This ground was sterilised in late summer prior to sowing. On the lighter soils the ground is covered with polythene for 6 weeks, to aid the sterilisation process. Sowing then begins in March, depending on the weather conditions. In all about 20 acres of ground is covered in seedbeds. The beds are protected from birds by netting and from frost by a sprinkler system. On cold nights when the temperature drops below a certain point an alarm sounds and the sprinkler system is activated. The nursery has a storage capacity of 10,000,000 gallons of water but, as 10 consecutive nights of frost would utilise 84,000,000 gallons of water, Tilhill are hoping to increase their water reserves.

Our second stop was to look at lining-out. This is done by using a lining-out board onto which the plants are clipped. The board is then placed in the trench and the roots are covered. The operation is then repeated along the bed. The operation costs £3 per 1,000 with each man doing up to 20,000 plants a day. When the lining-out runs late into the season, the plants are held in cold-storage to delay growth. Each bed contains 6 to 8 lines of plants in order to make maximum use of the limited sprinkling area. Weeds are controlled by using 'Simazine' and 'Kerb'.

The third stop was at a demonstration of precision sowing. This operation is carried out using a vacuum precision drill. Prior to sowing, the seeds are soaked in water for 24 hours. They are then left hanging in a bag in a cold room so that the excess water is allowed to drain from them.

This system of establishing trees occupies 2 to 2½ times the area of ground compared with conventional seedbeds and gives a germination rate of 70%. The beds are box pruned and undercut to a depth of 3 to 4 inches half way through the growing season. This system of growing trees seems to be showing great results with regard to root and foliage development and would appear to be a more economical way of producing good quality transplants.

The fourth stop was a visit to the cold stores. There were three

cold stores in all, two small jacket type stores and a more modern 'Humi' cold store costing about £200,000. They are used for the storage of both seeds and plants. Trees are stored during the dormant season before growth is initiated. Use of the cold stores facilitates the extension of the planting and lining-out seasons.

The next stop was at the machinery shed. The machines used were:

1. Vacuum precision drill.
2. Grass sowing machine, for sowing seedbeds.
3. Transplanter for the larger hardwoods.
4. Lateral pruner.
5. Reciprocating undercutter.
6. Lifting machine.

The cost of the above machines is approximately £26,000 in total.

The last stop was at the polyhouses. These are polythene tunnels in which Sitka spruce is grown from a limited supply of genetically superior seed material. The aim is to produce a tree with 10% to 15% greater volume of timber. About 2,500 seeds costing £200 were planted into small pots and allowed to germinate. After germination they were planted into bigger pots and allowed to develop well, so that at the end of the second year in the polyhouses they are big enough to take 100 cuttings from each tree. The cuttings are planted and allowed to root, after which they are taken from the polyhouses and lined-out outside at twice the normal spacing. At the end of the growing season, five cuttings are taken from each tree and planted in the polyhouses to repeat the operation. The cost of these transplants would be two to three times the normal cost.

After that very interesting tour it was time to leave Tilhill. The President, Mr. John Prior, extended our thanks to Mr. White and Mr. Simmes.

Our next destination was to the Westonbirt Arboretum in Gloucestershire. The curator Mr. John White welcomed the Society and took us on a tour of the Arboretum. The Arboretum was established in 1829 when Robert Holford started planting his first trees in a fertile field.

These trees were mainly oaks, pines and yews. Towards the end of the century his son George extended the planting into the old woodland nearby and started planting 'Silkwood' which today is maintained as a scientific collection. Sir George's nephew took it over in 1926 and continued to collect and add more trees. Then in 1956 the Forestry Commission acquired the property and built a visitors centre in 1978 which includes a shop, cafe and other amenities.

The area of the Arboretum is 600 acres and contains 16,000 listed specimens. About 700 new species and about 500 packing up species are planted each year. About 190,000 visitors visit the Arboretum each year and the bulk of these arrive in the autumn to see the beautiful colours of the trees and shrubs such as the Japanese Maple, Acer Glade and the hickory.

The Arboretum is maintained by a workforce of 25 with the help of sit-on mowers, hydraulic lifts, etc. On our walk around we saw some very interesting specimens such as Rhododendrons, Great White Cherry of Japan, Japanese Maple, Lawson Cypress, *Sequoiadendron giganteum*, Wellingtonia, Dove tree, and many many more too numerous to mention.

After the walk we adjourned to the visitors' centre where we had the opportunity to have a cup of coffee and invest in some literature from the shop. After our brief stay in the visitors centre we headed for our hotel in Carmarthen where we had dinner and a very enjoyable evening.

Padraig Egan.

Attendance

Convenor: John Fennessy.

John Brady, Euphemia Collen, Lyal Collen, John Connelly, Maureen Cosgrave, Myles Cosgrave, Tony Crehan, Jim Cronin, Jim Crowley, Michael Davoren, Pat Doolan, Jim Dooley, Joe Doyle, Padraig Egan, Ted Farrell, John Fennessy, Gerry Fleming, Mathias Fogarty, Lily Furlong, Frank Gibbons, Eugene Griffin, Eugene Hendrick, George Hipwell, Tim Hynes, Richard Jack, Pat Kelly, Brendan Lacey, Eamonn Larkin, Eddie Lynagh, Pat MacAuliffe, Philip MacDonnell, Jimmy Mackin, Tony Mannion, Gerard Mawn, K. McDonald, P. J. McElroy, Michael O'Brien, L. P. O'Flanagan, Pat O'Kelly, Martain O Neachtain, Brendan O'Neill, Tim O'Regan, Denis O'Sullivan, John Prior, Gerard Riordan, Martin Ruane, Domnick Ryan, Mossie Ryan, Robert Tottenham, Joe Treacy, Ari van der Wel.