SCOTTISH WOODLAND HISTORY CONFERENCE
NOTES XVIII

Plantations in Scotland

EIGHTEENTH MEETING
THURSDAY 31st OCTOBER 2013
A K BELL LIBRARY, PERTH
ACKNOWLEDGMENTS

The Native Woodlands Discussion Group is indebted to the undernoted for their sponsorship and help in making the 18th meeting of the Scottish Woodland History Conference a success:

Forestry Commission Scotland
Coimisean na Coilltearachd Alba

In 2013, the NWDG Scottish Woodland History Conference (formerly the Scottish Woodland History Discussion Group Conference) was organised by Mairi Stewart, Chris Smout, Coralie Mills & Jonathan Wordsworth with the administrative support of Alison Averis. We are grateful to all those who helped to make the conference a success including our sponsors, chairpersons, speakers, helpers and delegates.

Front cover illustration: Fotheringham House, Angus, with parkland and hill planting (Cumming 1843): See Dingwall infra
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The eighteenth annual conference (now known as the ‘NWDG Scottish Woodland History Conference’, formerly known as the ‘Scottish Woodland History Discussion Group Conference’) was held at Perth on Thursday 31st October 2013. The Contents reflect the scope of the day, as summarised in the Introduction, followed by papers for each of the presentations.

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INTRODUCTION

Chris Smout

The annual meeting of the NWDG Scottish Woodland History Conference took place on Thursday, 31st October, 2013 at the A K Bell Library in Perth. The topic for the day was ‘Plantations’, and it proved a popular choice: about 100 people attended.

The first talk was by Christopher Dingwall, on changing styles of estate planting between the late seventeenth century and the end of the eighteenth century. He showed how estate planting began with a fixation on regularity, with dead straight vistas or rides cutting through the planted woods from some central viewpoint, as at Glamis, Mellerstain and Dumfries House. Especially striking was the Earl of Haddington’s new wood at Binning near Tynninghame. Here the earl and his wife, and some guests, all disagreed on the best spot for a viewpoint, so the earl had intersecting vistas cut from all three spots, as shown on contemporary plans and still visible on Google Earth today. Under the influence first of William Kent and then of Lancelot Brown and others, this formalism was in most places modified and eventually abandoned in favour of clumps and relaxed outlines, in schemes that, in Lord Kames words, ‘lead the mind insensibly from regularity to bold variety’. William Sawrey Gilpin criticised Brown’s clumps and called for still more natural forms, and Sir Henry Steuart moved mature trees with his special transplanting device, to create instant landscapes. The new mood was encapsulated at Blair Adam by William Adam, who had a forest plan from the house to the surrounding hills ‘to combine usefulness and profit with enjoyment and ornament’, using conifers especially in the background.

Peter Quelch followed with an account of Balgownie wood in Fife, apparently planted with oak on old outfield rigs in the sixteenth century. That was being coppiced by the 1630s, then varied with beech in the improvement era, and finally sold to the Forestry Commission in the 1920s to become predominantly a wood of Sitka spruce. It is still filled with archaeology, from ancient oak stools and the medieval rigs themselves, and incorporating a massive ancient internal bank and a hollow-way for the movement of animals. It is very rare to find such early planted woods, though they may be commoner than we think.

Richard Tipping took us even further back, arguing for plantations in prehistory. He reminded us that the common picture of hostility of early people to the encompassing forests is belied by the fact that from six thousand years ago there is evidence of management of wood pasture and hazel coppice. At Kilmartin in Argyll the structure of pollen diagrams strongly suggests deliberate planting of oak in the Neolithic, that is, an increase in oak pollen at a time when land was not being abandoned, followed by felling 400-600 years later at a time when there is no trace of oak disease. Possibly the planting was for monumental structures such as wood henges or great timber halls. It strains modern credulity that early man could have planted something intended for use four centuries later, but their concept of time may not have been ours.

The last speaker before lunch was John Gilbert, who gave us a very quick tour of the evidence for Scottish medieval planting, stretching as far back as the quick hedges planted at Jedburgh in the twelfth century, the fourteenth-century Kippenross sycamore and the fifteenth-century plantings at Queenshaugh, Stirling, on the orders of Mary of Gueldres. Possibly an increase in planting is implied by the gradual replacement of the term ‘nemus’ by ‘silva’ in charters, but it is very hard to link specific sites to documents.

In the afternoon, Chris Fleet of the National Library of Scotland gave an account of how the mapping of plantations had developed over the centuries. Pont’s sixteenth-century maps showed how general was the practice of surrounding a tower house with planted trees, but Roy’s map of ca.1750 is less useful for distinguishing plantations from natural wood than estate maps, or even county maps like John Ainslie’s
from the end of the century. With the coming of the Ordnance Survey from 1830 there is a golden age of woodland depiction, including large-scale town maps that marked individual trees. He reminded us that the NLS also holds the ancient woodland inventory from the twentieth century, and that a great deal of their immense resource is available on-line.

Malcolm Bangor-Jones took us on a tour of the Sutherland estate, where documentary records of plantations go back to the 1720s, and where by 1781 there were more than 400 acres of plantation at Dunrobin, some of it from seeds originating at Dunkeld. James Loch, the early nineteenth-century factor, had connections with the Blair Adam estate of which we had already had an account, and in the 1830s and 1840s he was a driving force in the very varied and extensive plantings of the great northern estate. Vast sums were spent on draining and planting with Scots pine, beech, willows, aspen and ash. In the Highland famine of the 1840s the Duke created employment and income for the crofters by planting around Lochinver, and both he and the Duke of Westminster contrived picturesque details in their new woods to appeal to the ladies when the men were off shooting on the moors.

James Ogilvie paid tribute to Sir Walter Scott as a forester in the Borders, and showed us what he attempted at Abbotsford. Scott personally took part in the work of planting and design, recognising the economic, social and environmental value of forestry. He was far ahead of his contemporaries in welcoming local people to access his woods, and delighting in the children who showed him the nuts they had gathered. It is fitting that he should have supplied the motto for the Royal Scottish Forestry Society.

Finally, Scott Wilson told the story of how between 1850s and the 1950s forestry in Scotland was rescued from dereliction and put on a sound footing thanks to the rise of forest education and the examples of France and Germany. Individual landowners were vital to the story, such as Ramsden at Ardverikie, Stirling Maxwell at Corrour, Munro Ferguson at Novar, and Lord Lovat in the Great Glen. They and their successors believed in diversity—there was an interesting contrast between M L Anderson, Professor of Forestry at Edinburgh, who believed in fitting the plantings to the ground (exemplified at Glentress in Peebleshire), and Lord Robinson, the head of the Forestry Committee after the first World War, who believed in radically altering the ground to fit the tree that he wanted to plant. This led us naturally to the last paper of the day, when Ruth Tittensor told the story of Sitka spruce. Its arrival she saw as the most recent success in the long story of introducing commercially valuable exotic species into Scotland—this had begun with such species as beech, sycamore, larch and even Quercus robur. She felt we needed a more rational and ecological perspective, and that Sitka was not horrible after all. As a crop on radically altered ground, she clearly prefers it to wind turbines. Syd House at this point was called upon to produce his guitar made of finest Sitka, and we ended with a few chords to play us out. It was a fine day, and a lot of fun.
CHANGING STYLES OF ESTATE PLANTING IN SCOTLAND FROM THE LATE SEVENTEENTH TO THE EARLY NINETEENTH CENTURIES

Christopher Dingwall

This paper is concerned with what are known in Scotland as ‘policies’, generally understood to mean the enclosures and ornamental planting associated with a mansion house. The use of the term ‘policy’ or ‘policies’ has a long history, dating back at least as far as the 15th century, and is believed to derive from the Latin word *politus*, meaning ‘improved’ or ‘embellished’. Thus, a lease of 1473 in the Rental Book of Coupar Abbey (Rogers 1879) stipulated that the tenant should ‘... put the grange til al polici after his pouar in biggyn and plantation of treys, that is to sa eschis, ozaries and sauch, with hanyngis’. Another legal case recorded in Sinclair’s Practicks saw Thomas Wardrop and his associates prosecuted by the Crown in 1540 for failing to maintain the policies at Kinclaven in Perthshire. Added to these documentary sources is the cartographic evidence of enclosure and planting which can be found in the work of early map makers such as Timothy Pont, Joan Blaeu and James Gordon of Rothiemay. However, while these sources can provide us with incontrovertible evidence of the deliberate plantation and management of trees, they tell us little or nothing about the style of that planting.

Amongst the earliest evidence of planting styles in the 17th century are the pictures drawn by military surveyor and artist John Slezer in the 1690s for his *Theatrum Scotiae* (1693), and for his unpublished work on Scotland’s great houses – images such as his ‘Prospect of the Town of Dundee’, or his views of Hatton House in East Lothian, and Culross Abbey House in Fife. These images can be usefully studied alongside John Reid’s book *The Scots Gard’ner* (1683) which included directions for tree planting. Slezer’s images, taken together with Reid’s instructions, reveal a fondness for the French or Dutch style of what is best described as geometrical planting, characterised by rectangular enclosures and straight avenues, often centred on the mansion house. Many landscapes planted in this style were still in place by the middle of the 18th century, so were recorded on contemporary estate plans by the likes of Thomas Winter, or by the surveyors working on William Roy’s Military Survey of Scotland, for example at Glamis Castle in Angus (Illus 1), at Mellerstain in Berwickshire, or at Loudoun Castle in Ayrshire.

Illus 1  Glamis Castle, view from Gladiator Gate with formal avenue planting c.1747
© British Library Board (K.Top.49.23.a.3)
Another favourite planting device of the period was the rond-point or star plantation, generally formed on rising ground, with a number of vistas radiating from a central point, often aligned on distant eye-catching features such as hills, churches or neighbouring houses. There is an engaging account of the formation of one such plantation c.1730 at Binning Wood on the Tyningham estate in East Lothian, to be found in *A Treatise on the Raising of Forest Trees* (1760), written by Thomas Hamilton, 6th Earl of Haddington for his grandson. In this account, a debate about the best views to be had from within the plantation resulted in the wood being planted with three separate centres, and criss-crossing vistas. This design, clearly depicted on Roy’s Military Survey, is still evident in today’s plantation, more than two and a half centuries later.

However, by the mid-18th century, fashions were changing, and we see the beginnings of a swing away from the formal or geometrical style, with the introduction of more naturalistic elements. The originator of this style is often said to be the English artist turned garden designer, William Kent, of whom Horace Walpole said that ‘...he leaped the fence and saw that all nature was a garden’. Among the landscapes created by William Kent in the mid-18th century, that at Rousham in Oxfordshire probably holds pride of place. At Rousham Kent’s landscaping respected and reflected the natural topography, rather than imposing a rigid geometrical arrangement on the existing landscape.

The best-known 18th century advocate and practitioner of this more relaxed style of planting was probably the Englishman Lancelot ‘Capability’ Brown, who had served for a time under William Kent at Stowe in Buckinghamshire, before establishing himself as a landscape designer. Although Brown never worked in Scotland, his style was widely imitated by others, including the likes of nurseryman William Boutcher and landscape designer Robert Robinson, who advertised themselves in 1760 as a ‘... partnership for designing and drawing and executing all kinds of policy and gardening’, much of it in the style of Brown. Given the changes which were afoot on many Scottish estates at this time, it is interesting to study the list of Scottish subscribers to Boutcher’s book *A Treatise on Forest Trees* (1775). That said, it was another partnership between Englishman Thomas White and his son Thomas which exerted the greatest influence on landscaping north of the Border towards the end of the 18th century, and early in the 19th century, offering advice on planting, and producing plans in a Brownian mould for around 70 Scottish estates between 1770 and 1815.

The beginning of the 19th century saw another influential figure appear on the scene in the person of botanist and garden designer John Claudius Loudon, who was born in Cambuslang, and trained in Edinburgh, before he moved to London in 1803. In his *A Treatise on ... country residences* (1806) Loudon described the changing fashions in planting, criticizing what he saw as the rather formulaic approach of Lancelot Brown, before going on to promote his own ‘irregular’ style, based in part on a closer imitation of nature. In the latter part of his career, Loudon’s prodigious journalistic output included his editorship of the *Gardener’s magazine* between 1826 and 1843, and the production of his influential encyclopaedias of agriculture and gardening, both of which continued to be published long after his death in 1843. Also of special interest to anyone interested in trees, whether native or exotic, is Loudon’s monumental work *Arboretum et fruticetum Britannicum*, in which he described the character, history and uses of trees in Britain. Loudon was among the first authors to write popular works for a wider audience, rather than for the wealthy landowning fraternity.

More or less contemporary with Loudon was another Englishman Humphrey Repton, regarded by many as the successor to Lancelot Brown, who is credited with having invented the term ‘landscape gardening’. Repton’s only involvement in Scotland was at Valleyfield in Fife, for which he prepared a plan in the form of a Red Book with the help of his sons John and George. Repton’s influence on others was achieved through the publication of his beautifully illustrated *Observations on the Theory and Practice of Landscape Gardening* (1803), aimed largely at his wealthy clientele.
For a Scottish perspective on planting styles towards the end of the 18th century, one can turn to Henry Home, Lord Kames, whose ideas on planting and gardening were set out in his *Elements of Criticism* (1762), and who can be seen to have put some of these into practice on his estate of Blair Drummond, near Stirling. He argued against what he saw as a too-slavish imitation of nature, favouring a degree of formality in the landscaping immediately around the house. He commented that ‘... regularity is required in that part of the garden which is adjacent to the dwelling-house ... but in proportion to the distance from the house considered as the centre, regularity ought less and less to be studied; for in an extensive plan it hath a fine effect to lead the mind insensibly from regularity to a bold variety’. Slightly later in date was William Marshall’s book on *Planting and Rural Ornament* (1796), in which are to be found his proposals for modifying the landscape at Taymouth Castle in Perthshire by the breaking up or removal of some its more formal elements.

Another English designer who undertook commissions in Scotland was William Sawrey Gilpin, nephew of the well-known aesthete Rev. William Gilpin, whose ideas on planting are set out in his *Practical Hints on Landscape Gardening* (1832). In designing his plantations, Gilpin sought to avoid straight lines, gentle curves and regular circles or ovals, preferring instead the “…variety which arises from the contrast of projection and recess” (Illus 2). Although he worked at Kinfauns Castle in Perthshire and on several other high profile Scottish sites, the best surviving examples of his work are probably to be found at Bargany in Ayrshire and Balcaskie in Fife. We are fortunate that correspondence between Gilpin and Sir Ralph Anstruther of Balcaskie in 1827 has survived, giving us a vivid insight into the thoughts of both the client and his adviser, and revealing the way in which Gilpin was able to put his theories into practice. Though published some years later, Edward Kemp’s book *How to Lay Out a Garden* (1850) contains interesting descriptions and illustrations of the more naturalistic style of planting favoured by many landowners at the time, characterised by sinuous boundaries, irregularly shaped clumps and standard trees, generally threaded through by serpentine walks and drives.
One of the problems facing landowners then, as now, was the length of time taken for their planting to reach maturity, with the result that many did not live to see the landscapes which they created. It was Sir Henry Steuart who addressed this issue by developing an effective means of moving and replanting mature trees. His ideas are set out in his book *The Planter’s Guide* (1828), in which he described the creation of his own landscape at Allanton in Lanarkshire with the help of Thomas White (Illus 3). Although the landscape at Allanton is now in divided ownership, and has lost its focal point with the demolition of the mansion house, so is sadly degraded, many of the trees transplanted by Steuart back in the 1820s still survive to this day.

One of the best illustrations of the stages in the stylistic development of a single estate is to be found in a privately printed series of pamphlets collected together and published as *Remarks on the Blair Adam Estate* (1834). Extracts of this publication are given in Appendix 1. Its author, William Adam of Blair Adam, grandson of the architect William Adam, begins by outlining the history of the estate, describing the geometrical form of its initial landscaping by his grandfather William, and the subsequent softening of the style of planting by his father John Adam. He then goes on to explain his own system of planting, the purpose of which he says, is ‘... to combine usefulness and profit with enjoyment and ornament’ in the creation of what he describes as a terre ornée or adorned estate. Under his system ‘woods of succession’, commercial plantations subject to periodic clear felling, were to be located so as to minimise their impact on the landscape. Where the landscape impact of the plantations is greater, his preference was for what he calls his ‘woods of selection’, where a proportion of trees were to be retained so as to maintain continuous cover. Where landscape character is the primary consideration, as around a house or on its approaches he proposed what he describes as his ‘woods of ornament and policy’, in which trees were to be managed on an individual basis. In addition to this, he had what he named ‘woods open to the pasture of grass parks’ and ‘clumps’, equivalent to today’s parkland planting. He even had a category
called ‘woods at old places’, which he says are important for what they tell us about the history of landscape and settlement. In his Remarks on the Blair Adam Estate, Adam goes on to examine each stand or plantation on the Blair Adam estate, and to put forward proposals for future management – a forest plan in all but name, and one that still has relevance more than a century and a half later.

A noteworthy feature of the illustrations to Adam’s Remarks on the Blair Adam Estate is the appearance of exotic conifers in the Scottish landscape. Although Thomas White was advising clients to plant European Larch and Norwegian Spruce in addition to the native Scots Pine as early as the 1770s, the real transformation begins with the introduction of new species from America in the early decades of the 19th century. So it was that estates such as Blair Adam by Kinross, Scone Palace in Perthshire and Benmore in Argyll became pioneers in the creation of what soon came to be known as ‘pinetums’ or ‘American gardens’. But that is a story which will have to be told on another occasion.

SOME KEY FIGURES (arranged by date of birth)
Timothy Pont (c.1564-c.1614) ; geographer, cartographer
Joan Blaeu (c.1571-1673) ; geographer, cartographer, printer
James Gordon, Rev. of Rothiemay (1618-1676) ; geographer, antiquary, cartographer
John Slezer (c.1650-1717) ; military surveyor, artist
John Reid (1656-1723) ; gardener, surveyor, author.
Thomas Hamilton, 6th Earl of Haddington (1680-1735) ; landowner, planter, author
William Kent (c.1685-1748) ; artist, architect, landscape designer
Henry Home, Lord Kames (1696-1782) ; landowner, planter, author
Lancelot ‘Capability’ Brown (1716-1783) ; landscape designer
Horace Walpole (1717-1797) ; landowner, author
William Bouthcer [junior] (died c.1780) ; nurseryman, author
Thomas Winter (1736-1811) : agriculturist, surveyor, landscape designer
Thomas White [senior] (1739-1811) ; landowner, planter, landscape designer
William Marshall (1745-1818) ; agriculturist, landscape designer
William Adam (1751-1839) ; landowner, planter, author
Humphrey Repton (1752-1818) ; landscape designer, author
Henry Steuart, Sir (1759-1836) ; landowner, planter, author
William Sawrey Gilpin (1762-1843) ; artist, landscape designer
Thomas White [junior] (c.1764-1836) ; landscape designer
John Claudius Loudon (1783-1843) ; botanist, landscape designer, author

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Reid, J, 1683  *The Scots gard’ner.* Edinburgh : Printed by David Lindsay and his Partners


Repton, H  1803  *Observations on the theory and practice of landscape gardening.*


**CONSERVATION ADVICE**

Watkins, J & Wright, T 2007  *The management and maintenance of historic parks, gardens and landscapes.* English Heritage handbook.

McGowan, P & Dingwall, CH 2011  *Conserving and managing trees and woodlands in Scotland’s designed landscapes.* Forestry Commission Practice Guide.
APPENDIX 1: REMARKS ON THE BLAIR ADAM ESTATE
Extracts from the book by William Adam (1834)

Introduction: I have been accustomed, from my earliest years, to hear the French phrase of Ferme Ornée ... I accordingly have so arranged the property of Blair Adam, that the appellation of Terre Ornée (an adorned estate) may be bestowed upon it. I have adjusted this arrangement by making the ornament, and enjoyment of rides in the woods, compatible with, and even assistant to, the profitable use of the grazing and farming lands ... A very large portion of the estate being covered with wood, the object ought to be to turn as much of it as possible to regular annual profit. In doing this, attention should be paid to the shelter and decoration which the growth of the trees has produced.

Woods of Succession: By this is meant wood, whether firs or forest trees, which, when of sufficient age, should be cut down in united portions, without selection. If firs, to be replanted; and so the succession kept up. If forest trees, to be cut over, to rise again from the stool; or to be replanted, as circumstances require.

Woods of Selection: By this is meant those woods which should be used for profit, and not merely for ornament. At the same time, in regulating the profitable use of them, they should be so managed as to keep the effect of decoration which they afford to the estate, and to the surrounding country: and for that purpose they should be thinned deliberately ... Where the forest trees are deficient, or are being kept down by the dropping and overhanging of the firs, the firs should be cut away in chambers to allow the forest trees to come on... The general rule should be to regulate the cutting by select judicious marking; and that marking should be governed by attention to show from without, as well as to profit.

Woods of Ornament or Policy: [In these] ornament is the primary and profit the secondary objective. The rule to be adopted in thinning, is to preserve the finest trees, and to cut the trees of inferior size and age ... Where particular effect, or local circumstances, require a deviation from the rule, such as to open a particular view, to exclude an unpleasant object, to improve or maintain a picturesque group, to vary an outline, to prevent disclosure before arrival at the proper point, and the like, the better must be made to give way to the inferior tree; examining carefully from all aspects, and on all sides, before decision.

Clumps: [Clumps] are of two classes: one of considerable size, and placed for the purpose of excluding a bad prospect or securing a good one. The other clumps have, in general, been planted upon rocky and uncultivable pieces of ground, and arranged conformable to the shape pointed by nature. They have been enclosed with rough stone dykes, which have by degrees grown very mossy, so as not to be distinguishable from the rocks which are enclosed by them ... ‘I just plant what winna pleugh, and nature does the rest’.

Woodland Open to the Pasture of Grass Parks: All of these portions of wood are subject to the entrance of cattle from the adjacent parks, and meant for their shelter. They should be thinned cautiously and sparingly, and kept as dry as possible by shallow open drains. But these drains should never be close to them; because the cattle treading close on the edge of them injures the trees by baring their roots... The trees should be relieved of branches within reach of cattle.

Woods at Old Places: This division refers to situations where houses once stood, and about which trees are collected, that are now ancient. Each of these has a greater or lesser number of trees around them, which gave them marks of distinction, and are connected with local history, which renders them interesting ... It would be very advisable to preserve the memory of these old houses.

Summary and Conclusion: The subdivision [of woods] has served, according to my notion, the purpose of unfolding the system, so as to combine usefulness and profit with enjoyment and ornament. I have
arranged and coloured a plan [on which] all within the red line may be denominated ‘woods in which no freedom should be used’, and all between the yellow and red lines may be denominated ‘woods which should be thinned by a judicious selection’ in which freedom should be controlled by discretion. All beyond the yellow line should be considered profitable wood, of which the ‘cutting should be regulated so as to avoid, in securing the greatest profit, creating any deformity to external view’.
PLANTING PHASES IN BALGOWNIE WOOD, FIFE: EVIDENCE FROM HISTORIC WOODLAND SURVEY

Peter Quelch & Coralie M Mills

INTRODUCTION
Balgownie Wood (Illus 1) is a rectangular, gently sloping, north-east facing woodland of 44 ha acquired by the Forestry Commission in 1929 as part of Devilla Forest. It is detached and lies within open agricultural land about two miles north of the ancient coastal burgh of Culross, Fife. The findings related here are the result of a Historic Woodland Survey commissioned by Forestry Commission Scotland (Mills & Quelch 2011) and subsequently published by FCS as one of a set of historic environment conservation case studies (available at http://scotland.forestry.gov.uk/images/corporate/pdf/Managing-the-historic-environment-case-studies.pdf).

Access is via a metalled forestry track which leaves the public road just south of Balgownie Mains Farm, with a small car park for visitors. Its highest part is only 75 m above sea level, so Balgownie is lowland in character. At first sight the woodland has the appearance of a dense Sitka Spruce plantation, with some smaller areas of broadleaved or mixed woodland. At the north-east corner where it meets the Bluther Burn (at 30 m OD elevation) there is a small area of lowland flood-plain woodland with high nature conservation value. In fact Balgownie is a complex woodland with traces of previous commercial conifer crops as well as a coppiced oak history. There are stands of old larch and pine, occasional old Norway Spruce and Douglas Fir from mid 20th century commercial crops and extensive stands of Western Red Cedar, well grown but not thinned or maintained. It also has some hidden ecological assets, with woodland fungi being of outstanding richness during our time on site. The woodland has neither a simple nor a well-known history, and our survey attempted to unravel the story of the woodland’s past, with the main aim of informing its future management.
WOODLAND DETECTIVES: METHODS & OBSERVATIONS AT BALGOWNIE

Forest Enterprise staff had noticed unusual earthworks within the plantation, which could not be explained as simple boundary features. Also there were a large number of oaks through it, both alive and dead. So Coralie Mills and Peter Quelch were asked to survey the woodland and report on the findings, and to carry out some documentary and map research.

Woodland archaeology features were examined and mapped using GPS over three days in September 2011. A previous archaeological survey was useful but incomplete, so we re-surveyed significant banks and dykes as well as other features like tracks, hollow ways and even mine shafts and some boundary stones. There is a large group of filled-in mine shafts near the western boundary of the wood, but the location of the shafts does not seem related to any of the dykes and banks. So although the old coal pits are fascinating traces of industrial use of minerals under the surface, they do not seem very relevant to the history of the woodland itself. They are classic features of archaeology in the wood rather than of the wood.

Also we surveyed significant veteran trees, especially trees on boundaries and the oak stools and stumps which were scattered throughout the plantation. There were also a few old sycamore stools probably resulting from felling of 19th century planted sycamores. Early on we noticed that rig and furrow at wide spacing (typically 9 m across rig centres) ran through much of the woodland, visible on the fairly bare forest floor under the young spruce plantations and yet not caused by any modern forestry operations. Although we did not have time to survey that rig in detail (see Illus 2 – areas of rig shown schematically), the sheer extent of widely spaced rig under the woodland was a surprise and this feature proved to be crucial in understanding the woodland’s history, as we shall demonstrate below.

We researched the old maps available publicly, which were revealing as to past woodland condition and extent, particularly Roy 1750 and Stobie 1783 (Illus 7). By the First Edition OS Survey in 1861, which produced very clear maps at one inch and six inch scales and also a useful twenty five inch to the mile sheet (Illus 8), the completely wooded Balgownie Wood has firm boundaries and has become part of the cultural landscape of this part of Fife, surrounded by improved fields. The 25 inch First Edition OS map clearly shows a sawpit in the centre of the wood, and we were able to locate it, although now it is only a slight earthwork. However we could not locate any estate plans, surveyed on many estates during the improvement era, during the 18th or early 19th centuries, which typically would show the boundaries and extent of woodland at that time. Finding such a plan would still be extremely informative to historians of this site.

There were a number of oaks as well as other old trees and stumps, and dendrochronological analysis would have been very useful in pinning down the age of early planted trees and the date of last coppicing of oak. However, this survey was of a preliminary nature and there were no resources available to pay for dendrochronology. Without tree-core data, tree ages can only be estimated using the surveyors’ experience, bearing in mind the probability of fast growing trees on this site in a lowland soil and climate.

Oak is present more or less throughout the whole woodland, with the great majority of oak trees having been coppiced to form small coppice stools. They can be found on top of the internal banks, on the burnsides and throughout the woodland, even on top of the extensive wide rig. It is as if the whole woodland has been re-planted with oak in perhaps the early 19th century, coppiced once or twice, then abandoned as a coppice and left to grow on until FC ownership.
Illus 2 Balgownie: woodland archaeology interpretive map (Mills & Quelch 2011, illustrator D Connolly)
A few approximate ring-counts on cut oak coppice stems pointed towards a last cutting date in the late 19th century. After that date the multi-stem stools had mostly grown on, only to be ring-barked or cut right off as preparation for the first plantings by the FC in the late 1930s (Illus 3). The woodland abounds with ring-barked oak stools, either wholly or partially dead, with occasional axe scars in the heartwood still visible. Many living oaks have scar tissue in the bark where the ring-barking did not kill them. Others have since broken off at that scar which is a point of weakness. Some oaks re-grew below the ring-barking, creating a pseudo-pollard. Some coppiced oak stems have been cut off at about a metre and not re-grown.


Many oaks are clearly growing from previous stools but are singled stems. Probably the singling was natural rather than deliberate, considering that it seems the FC staff were more or less trying to exterminate the oaks in the late 1930s. Some oaks are maidens growing from self-seeded stock but they are rare. Occasional stools have either survived ring-barking or have not been treated, and there are a few magnificent multi-stemmed oaks remaining, like a three stemmed stool in the eastern part of the wood (Illus 3, R). A large double stemmed oak lies beside the east-west dyke (labelled ‘later bank’ in Illus 2) at its east end, but this too looks like strong re-growth from a not very old stool (mid 19th century?) and beside it is a nearly dead cut stool and a pseudo-pollard.

Illus 4 (L) Maiden oak on boundary bank, Tree Feature 12 on Illus 2; (Centre) Oak of pollard form on boundary bank, Tree Feature 32 on Illus 2; (R) Probably the oldest oak stool in the wood, near the central internal bank, where it bends to cross the gully. Tree Feature 21 on Illus 2. Photos C Mills & P Quelch
Some of the oaks on the boundary banks are of quite different character (Illus 4), though there are also many smaller oak stools on those banks. Firstly there are old maiden oaks, tapered, beginning to re-trench, sometimes burry, and with the look of being early 19th century or even late 18th century, but not earlier (eg Illus 4 L, Tree Feature 12). Uniquely there is one pollard oak (Illus 4 Centre, Tree Feature 32) on the southern boundary, with a girth at breast height of 2.5m and pollarded at 1.9m, which was regarded as possible evidence of previous grazing in the adjacent field, before it became part of the woodland.

Occasionally there are oak stools which are apparently older than the ubiquitous small stools described above, on the boundary banks, on the burn-sides and on the internal bank-sides. In some places they were notable by their absence for example in the south west enclosure. Only a few were seen altogether but that makes them even more significant. The central bank had perhaps the most examples. The best individual stool (Tree Feature 21, Illus 4 R) lies on the burn side of the central bank above the road, at a point where the bank crosses a small burn and turns a sharp corner. The seven oak stems are all small and have all survived ring-barking, but they are in a definite circular shape with a circumference at ground level of 9.8m, and have all the appearance of being a late-medieval stool (Illus 4 right).

**DOCUMENTARY EVIDENCE AT BALGOWNIE**

We were very fortunate in the field of documentary history, as detailed scholarly research had already been carried out for FCS by Alasdair Ross of Stirling University and his report (Ross 2007) was important in understanding the early history of the wood. The history is complex but in brief summary, Balgownie had, during medieval times, been part of the extensive lands belonging to Culross Abbey. In the 16th century, the abbey lands passed into private hands, first to the Colville family who had been the abbey commendators (officials) and who became the superior landlords of Culross-shire after the reformation.

However, as early as 1557 Balgownie was held as a major tenancy by the Erskine family, when James Erskine, lord of Balgownie, was identified in an agreement with a neighbour as having rights to the superior landlord’s profits, coal and wood. The Erskines rapidly expanded their estates around Culross and more widely through the late 16th and 17th centuries. They were actively building up a network of land and industrial assets including interests in salt pans and coal. Their lands expanded to the south of the Forth and, together with the lands of Balgownie, were erected into the Barony of Balgownie in 1642. Alasdair Ross’ research uncovered two 17th century contracts for sale of standing wood from Balgownie, to local timber merchants, made by John Erskine in 1635 and 1671. As astute entrepreneurs, the Erskines clearly recognised the value of productive woodland at a time when supply could not meet demand.

Balgownie was acquired by the Cunningham family in the late 18th century at the time when major improvements to the land were ongoing, and then passed in 1863 to the Dalgleish family who sold it to the Forestry Commission in 1929.

**BOUNDARY FEATURES: UNLOCKING THE PAST**

Our survey of earthworks and boundary features found that most current woodland boundaries were defined by a bank and ditch typical of the improvement period, often with old beech and oak trees on top of the banks. Sometimes the beech have the character of overgrown hedges. One internal bank was also of this character in the south west corner and showed that an additional area was added to the older woodland during the improvement era (see Illus 2, SW corner of woodland, defined by boundaries labelled ‘later bank’). Interestingly at least one oak on the southern boundary bank and ditch had a distinct basal skirt of burr (Illus 5 centre, Tree Feature 15), which in our experience denotes a long period of grazing as a causative factor. This evidence backs up the view that the south west corner between these two dykes was previously a grazed field with beech and oak as hedgerow trees, and was later added to the woodland. The internal (east–west) later bank seems to be lower, straighter and with a well defined ditch, compared to the curvilinear medieval banks described below. It also has a clear
remnant of a beech hedge at its east end (Illus 5 L), where it meets the central north-south bank, but no other veteran trees along it. We did not see rig in the south west rectangular enclosure that this dyke creates and generally the forestry crops are younger in this area. All the evidence indicates a later addition to the woodland in the south west corner.

However certain other woodland boundaries have really quite massive banks, sometimes sinuous, which seem medieval in character (Illus 2, Illus 5 right). Even more significant is that several internal banks of the medieval type, when plotted on GIS overlays, hint at an earlier pre-improvement landscape. The main narrow, dry hollow-way is part of that old landscape, and must represent an early path or pony track, pre-dating any public road, yet which may have been the old way north through this district. A feature not shown on the previous archaeological survey was a second distinct hollow-way running east-west, just north of the upper road in the east end of the woodland, and to the east of the planted beech stand (Illus 2). We suspect that this hollow-way is left over from part of the old track running down to a ford or bridge on the Bluther Burn as shown on the First Edition OS map.

The earthworks, hollow-ways and other key features were recorded on GIS and overlain on the woodland archaeology interpretive map by our colleague, cartographer and illustrator David Connolly (Illus 2).

With well defined broad rig over most of the site, on land that clearly must have been open arable soil when the rig was in use, the evidence is pointing to medieval arable farming land, not to old woodland.
Yet the documentary evidence of 17th century sales of oak wood sales from Balgownie Wood show that oak coppicing was in operation at that time.

A useful comparative site comes in the shape of an aerial photograph, of Murrayfield Plantation in Fife, in a paper by Piers Dixon (1994) in the book ‘The History of Soils and Field Systems’ (eds Foster & Smout 1994). This photograph and text describe a farming landscape of broad rig enclosed by curvilinear earthen banks running on each side of natural gullies separating early fields, at Murrayfield Plantation, Fife, in a pattern very like the features observed under the woodland at Balgownie. There the fact that some banks overlie the rig shows that the banks post-date the rig, a possibility at Balgownie too. Most such field systems would have been lost to the massive agricultural changes of the Improvement era.

It seems from our survey evidence that a very similar system of early fields separated by high earthen banks existed at Balgownie, but were later abandoned and then afforested with oak. Since the oak was old enough to be harvested as early as 1635, according to the wood sale contracts, it implies a planting date of the late 16th century at the latest. Perhaps some natural trees were also present along the burn sides throughout history, but that is by no means certain. In other words Balgownie wood appears to be a very early plantation! By the criteria used in SNH’s Ancient Woodland Inventory it is still an ancient woodland, but clearly is not of natural origin and is in fact a secondary woodland created on farmland in the late medieval period.

Map evidence (Illus 7 & 8), primarily the way that Balgownie wood is shown on the 1750 Roy’s Military Survey (Illus 7 L), demonstrates that it is the only extensive woodland in the district that could possibly be the Balgownie wood from which wood sales and contracts had been drawn during the 17th century. Also the Statistical Account for 1791 states clearly that there are 100 acres of natural woodland in the parish at this time, and that ties in very closely with the extent of Balgownie wood on the Roy survey.

Fascinatingly, the Roy map (Illus 7 L) clearly depicts Balgownie wood as an unenclosed semi-natural type of woodland, yet overlaying previous arable land of rig and furrow. The map actually shows the usual arable symbol for rig underlying the woodland. Associated with the old woodland on Roy’s map are the old settlements of Bargouney, and also Woodfoot just to the north of the wood. Another interesting placename alluding to the pre-improvement landscape is Rigghead just north-west of the wood. Stobie’s 1783 map of Perthshire (Illus 7 R) also shows the old woodland settlement but with the name Woodnook, while New Balgownie is the main farm, and the woodland has a distinctive kite shape. By the
time of the First Edition OS map (Illus 8), the woodland boundaries have been firmed up and the woodland extended in its south west corner, by absorption of that improvement era field, to give the more rectangular shape which has persisted until today.

![Illus 8 Balgownie Wood on the 25 inch First Edition OS Map: Sheet CXL 16 survey 1861, published 1866. (Courtesy of NLS). Note the kite shape has been lost due to expansion of the woodland’s footprint in the SW corner. Note also the “Sawpit” just right of centre of the image.](image)

It is interesting to consider which aspects of the evidence, either presented to us or that we found, were most useful in teasing out the story of Balgownie Wood. In fact, no single strand held the whole story, and it was only through the combination of documentary, cartographic, archaeological and tree-form evidence that it was possible to detect the history of Balgownie Wood.

The ownership history over the 500 years which we know about is not unexpectedly complex. It is necessary to know the ownership history if only to help locate useful documents relating to wood sales for instance. Also the ownership history points to times when changes and improvements are made to woodlands on the estate.

Old map evidence is very useful indeed as in certain key surveys, eg Roy 1750, Stobie 1783, and OS 1861 (Illus 7 & 8), the size, shape and to some extent composition of the woodland is visible, as are the locations of old settlements around it. An estate plan drawn during the improvement era would add a great deal to knowledge. Of course a late medieval plan or even a description of the early planting would help greatly, if such evidence indeed exists or survives.

The archaeological evidence is of course also crucial to understanding the history of Balgownie. The survival of an extensive rig field system proves convincingly the planted nature of the woodland on top of that previous medieval land-use.

Also without finding more trees or stools of clearly medieval origin there is little hard field evidence of continuity of woodland from say the 16th until the 19th century. Again the 18th century maps have a
strong role to play, as does the 1791 Statistical Account description of a hundred acres of natural woods in the parish. Above all, the existence of surviving sales contracts from the mid 17th century is perhaps the best evidence for woodland management in the century after planting.

Overall the complex post medieval history of Balgownie Wood was a surprise and a delight to discover, and one wonders how many other woodlands are hiding similar complex stories? It appears entirely possible that there could be many more.

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INTRODUCTION
There is often an unspoken assumption among historians that the first time a specific behaviour is written about is the first time this behaviour actually occurred. So in woodland history, management of the woodland resource is a feature only of landscapes from the Medieval period onwards (Anderson 1967; Vera 2000). This resource is often assumed not to have needed conserving, protecting or managing in other ways in prehistory. But in prehistory there is stark evidence of particular individual tree genera becoming rare or locally extinct, as in elm (Parker et al 2002) and lime (Turner 1962). With increasing evidence from, for instance, Swiss Neolithic lake dwellings that elm leaves were stored in byres to feed over-wintering cattle, it is possible that this resource had to be conserved. Coppicing may well have been practiced in the Mesolithic period by hunter-gatherers. Whole landscapes might well have been managed in prehistory, as suggested for the distinctive dehesa wood-pasture of the Mediterranean.

In Scotland, Tipping, Davies and McCulloch (2006) suggested that 6th century AD oak woods in northern Scotland were being conserved. In this contribution, we want to discuss the possibility, suggested from pollen analyses, that oak woodland was managed, perhaps planted by farming communities in the late Neolithic and Chalcolithic (c. 2900-2500 cal BC) near the great monumental complex of Kilmartin in Argyll (Sheridan 2012).

TORBLHAREN, THE LOWER ADD VALLEY
The River Add winds across the raised moss of the Moine Mhor in the south of the Kilmartin Glen. A project trying to explain and contextualise later prehistoric rock art (Jones et al 2011) used pollen analysis to provide environmental and agrarian contexts. Three pollen sites were analysed, which might seem excessive but is explained by recognising that size matters. Very small (<5 m diameter) pollen sites record plant communities only tens of metres around. We analysed two such peat bogs in abandoned channels some 300 m apart on the valley floor. Though the sites are close, the areas around the sites where most pollen came from are different. If the landscape differed at this scale, the pollen records would be different. Small pollen sites record very little of plant communities growing at larger scales, across the region. For these a third pollen site hundreds of metres in diameter was analysed (Tipping & Verrill 2011). We also explored with geomorphological analyses what the River Add looked like in prehistory, and we were able to understand in detail how soil erosion changed in space and time. One advantage western Scotland has is that peat, which can be radiocarbon-dated, grows on anything that stays still for very long. We scientists then had the challenge to crystallise our ideas about the landscape and bring them to life through the work of Neolithic archaeologist and graphics designer Aaron Watson. Illus 1 is Aaron’s gifted reconstruction of our mental images of the lower Add Valley as it was in c. 2500 cal BC. Others are found in Jones et al (2011).

Everything except the round-houses in middle-distance just above the valley floor in this reconstruction was there. The sky-line and upper slopes of the valley are cloaked in oak-hazel woodland. This persisted through prehistory. It was altered by slight grazing pressure from the earliest Neolithic c. 4100 cal BC but the canopy was not reduced. We invented the round-houses on the far slope to explain the intensity of soil erosion on these slopes. We placed the fields of yellow corn on that slope because the valley floor was increasingly affected by floods pushing sediment into abandoned river channels. The valley floor was grazed and almost treeless. The rock outcrop on the right is one of two on the valley floor that was carved. The archaeologists suggest that the art was being created at c. 2500 cal BC. Ritual acts in the Neolithic are often thought to have taken place at marginal, liminal locations, but the ragged procession of on-lookers from the houses shows how central to their lives the art was. The 'druids' are optional.
Illus 1  A reconstruction by Aaron Watson of the Lower Add Valley at Torbhlaren in c. 2400 cal BC.

PREHISTORIC MANIPULATION OF THE OAK WOODS

Figure 2 is a pollen diagram of a few taxa from a c. 1 m thick peat stratigraphy called Channel J. This channel lies between the rock outcrop and the lower slope behind. A pollen diagram is constructed by taking a vertical series of thin, 0.25 cm peat slices, and isolating, recognising and recording the numbers of pollen and spores in each slice. These are then combined to give a record of vegetation change. The numbers of grains in each taxon are here expressed as %tlp (total land pollen). Everything in this diagram is a percentage of all others (and some not shown: Tipping & Verrill 2011). The record is divided into local pollen assemblage zones (lpaz) unique to Channel J. Peat at key depths is radiocarbon dated, shown on the extreme left, and the date of each slice interpolated. Our second 'local' pollen record is from another channel at the base of the slope supporting the round-houses: this record is very short and is not illustrated but fortunately contains sediment and pollen dated to c. 2500 cal BC (Tipping & Verrill 2011). We will discuss in detail only the record from lpaz J3-b, above 65 cm, when people as agents in vegetation change can be identified.

By 8000 cal BC birch and hazel were already established. They were joined by oak and elm (not shown) around Channel J and in the wider region after 6100 cal BC, and by alder on valley floor wetlands. An understorey developed including rosaceous shrubs (hawthorn or rowan and bird cherry: not shown).

Grazing of livestock on the valley floor is represented by ribwort plantain in lpaz J-3b after c. 4300 cal BC, seen also in the wider region (above). Briefly in this zone after c. 4500 cal BC until c. 4040 cal BC hazel and oak may have colonised gaps near Channel J as alder declined. Bracken became a problem at this time as the woodland canopy was locally thinned. Patches of grassland expanded after c. 3900 cal BC. Early farmers were apparently pastoralists, or at least the valley floor was not used to grow crops in the first few centuries of the Neolithic. The evidence for crop-growing is very strong from c. 3500 cal BC, either on the valley floor or the lower slopes. Illus 1 has these crops above the valley floor (above).
Peat slices analysed in Lpaz J-4a are very close together. In the middle of this zone vegetation change is being recorded roughly every decade, and around 25 year intervals above 51 cm. This is important because we can relate change to generations of trees. The detail of the pollen record is almost certainly because the site lay within or directly adjacent to the trees and ‘fields’. Hazel has increased representation over c. 50 years from c. 3200 cal BC before being halved in one abrupt event at c. 3140 cal BC. Proportions of oak pollen are higher for around 50 years between c. 3160 and 3110 cal BC before they are more than halved, instantaneously at c. 3100 cal BC. These abrupt falls are very likely to have been through people felling trees close to Channel J. The pollen record then shows percentages of oak gradually recovering.

**Illus 2. A pollen diagram of selected taxa from Channel J on the valley floor at Torbhlaren between c. 8000 cal BC and c. cal AD 500.**

**A PLANTATION?**

At c. 2980 cal BC, at the start of Lpaz J-4b, oak pollen percentages increase very rapidly, in less than 50 years, the time interval between analyses in this zone, from around 10% to nearly 25%. They then climb to c. 2620 cal BC before stabilising. To put this in context, both the local pollen record 300 m up-valley and the pollen diagram representing upland and regional patterns record oak at c. 5% throughout (Tipping & Verrill 2011). Illus 1 shows what we imagine to be oak trees clustered above Channel J. We estimate that perhaps 15-20% of the ground around Channel J may have been oak trees. What was happening around Channel J was very different to everywhere else, as far as we know, in Scotland. Elsewhere this is a period of slow woodland decline and gradually increasing grassland cover through grazing pressures, not intense but sustained over thousands of years (Tipping 1994). Woodland decline is usually interrupted by periods in which the tree cover increases, generally assumed to be through local or regional abandonment of farm land. But at Channel J, one genus only was affected. This was not abandonment. Other plant communities and land uses were very stable in this sub-zone (Figure 2 and Tipping & Verrill 2011), in contrast to the short-lived clearance events that typified Lpaz J-4a. Then at c.
2400 cal BC oak trees were once more felled: there is no other explanation for this abrupt fall. Illus 2 shows that we radiocarbon dated peat on either side of the boundary between lpaq J-4b and 4c because we thought the abrupt fall was through truncation of the peat through cutting. It wasn't: it is real.

So what does it all mean? The pollen record cannot distinguish between one oak tree growing directly over Channel J and oak trees growing further away. To differentiate between these possibilities, it is best to look at the treatment of oak trees when they were felled. After this in lpaq J-4c there was still a higher proportion of oak pollen around Channel J than in the region in general. This is interpreted to mean that lots of oak trees were felled, but not all. So there was more than just the one tree. So by implication, lots of trees flowered for the first time almost instantly at c. 2980 cal BC. Trees were at least conserved and possibly planted.

But why? Western Scotland was not short of oak trees in the later Neolithic (Tipping 1994). Perhaps people in the Add Valley wanted trees of a specific size or growth form. Wooden monuments in the Neolithic consumed substantial numbers of straight tree trunks for timber halls, houses and barrows (Noble 2006). Straight-trunked oak trees will have been common in the primary woodland, of course, as they pushed up towards the sky. But these would have to be found, felled and transported through the woodland to the monument, which will have created major logistical difficulties (Tipping & Milburn 2010). It might have been that this challenge was part of the performance of the ritual, just as securing Langdale stone axes from the most exposed rock faces was (Edmonds 1995), but it might also have been that the consumption of oak trees required more planning and organisation, shaping them as standards, with or without coppice. However, are we now to imagine that every community grew its own oak trees? We need to find many more pollen sites like Channel J that describe local woods in prehistory.

Another difficulty is in the felling at c. 2400 cal BC. At this time new beliefs were spreading across Britain. We can recognise now a period between the Neolithic and the Bronze Age, the Chalcolithic, probably an imported culture. Jones (2011) links the creation of rock art to these new beliefs. But these people built stone monuments, not from timber. Perhaps the felling of the trees at Torbhlaren represented the abandonment of old ideas.

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MEDIEVAL PLANTING - AN INTRODUCTION

John M Gilbert

The picture of planting and plantation in medieval Scotland is still very much as M L Anderson painted it in his *History of Scottish Forestry* in 1967. Before 1400, he argued, trees other than fruit trees were planted here and there close to residences. This was based on the evidence of trees cut down, dated and recorded in the 19th century. From 1400 to 1600 planting was encouraged by acts of parliament and was made the condition of leases, royal, ecclesiastical and lay. This planting, Anderson concluded, did not go beyond planting individual trees or lines of trees for shelter or for ornament. There was not yet any policy of planting to meet the demand for timber (Anderson 1967, i 146-8, 254-263). Within this basic framework one or two further points can be made.

EARLY EVIDENCE

There is some possible early written evidence of planting in the name *Quikhege* recorded in 1147×51 near Jedburgh (Barrow 1999, nos 174-5). The name which could have been formed at any time from the 8th century onwards means a quickset or living hedge. Assuming such hedges were planted this could be early written evidence of planting. The parallel Norman-French *Plessis* also occurs in the same area in 1288×90 (ER i 43-4).

The Latin *virgultum* comes from *virga* meaning a rod or a slip or cutting. It means the place where *virga* can be found, i.e., where rods were found or where cuttings grew, i.e. coppice, nursery, orchard or garden. J Harvey in his book, *Medieval Gardens*, found a 14th century example in the accounts of the forester of the bishop of Durham where *virgultum* was used to describe a nursery of young trees (Harvey 1981, 17). *Virgultum* occurs fairly rarely in medieval Scottish sources but in three 12th and 13th century charters, to the Knights Hospitaller, the Knights Templar and Soutra Aisle Hospice, lands were granted with ‘granges and *virgulta* inside the burgh and outside’ (*RRS* ii, no 400; *Abdn. Reg.* ii 267-8; *Newb. Reg.* no 222). Inside the burgh the more fitting meanings of *virgultum* would be nursery, garden or orchard rather than coppice but without further evidence it is not possible to know exactly which meaning of *virgultum* should be applied. Indeed it is possible to imagine a yard or garden where all three meanings, orchard, nursery and garden could be relevant.

By the end of the fifteenth century the nurseryman’s skills were clearly well developed. In 1460×1 Mary of Gueldres, queen of Scotland, ordered the planting of trees in the Queenshaugh (NGR NS804946) at Stirling (ER vii 69) and James IV between 1497 and 1505 had upwards of 2000 trees, mainly fruit trees but also thorn trees for hedges and willow trees, planted in his gardens in Stirling (*TA* i 367 etc., ii 81, 82 etc).

ENCOURAGEMENT OF PLANTING

In the 15th and 16th centuries several acts of the Scottish parliament encouraged planting of trees (Anderson 1967 i 269-70). In the act of March 1503/4 the stress that all lords and lairds should plant an acre of ground argues that the intention was to encourage planting to meet the demand for timber (*RPS* A1504/3/119). This intention continued in an act of 1535 when wealthier landholders were expected to plant three acres of trees (*RPS* 1535/16).

As Anderson noted numerous leases and feu ferme charters encouraged planting of some sort. As early as 1428 the bishop of Aberdeen required the tenant of Terpersie (NGR NJ546202) north of Alford to make a garden and plant trees in it (*Abdn. Reg.* i 229). In the second half of the 15th century Coupar Angus was encouraging the planting of ashes, osiers and willows as well as broom (Anderson 1967 i 257) and in 1466 Scone required tenants to plant broom and enclose it (*NRAS* 776 vol 412 f8v no 11). In 1542
the abbot of Jedburgh, John Home, brother of Alexander third lord Home, as required by parliament, was encouraging improvements such as plantations of trees (NAS CH6/6/1 f17r).

A group of royal feu charters in 1510 and 1511 relating to Balquhidder, Menteith, Ochtertyre and Ettrick encouraged tenants to make plantations of oaks and other necessary trees (RMS ii nos 3407-12, 3643, 3502, 3505 3506). In 1541, following instructions to the commissioners of crown lands who arranged the leasing of royal lands, a group of feu ferme charters relating to places in east Fife required tenants to make plantations of ash, plane or elm trees and to make gardens well hedged with ash, willow, aspen and alder. The number of trees which each tenant had to plant depended on the amount of his rent (ER xvii 719, RMS iii nos 2355, 2369, 2463-2482).

SILVA

There is as yet no evidence of the plantations which these acts and leases hoped to create. In classical Latin silva which means a wood can also mean a plantation. In Scotland in the 12th and 13th centuries silva seems to be used much less frequently than the words boscus and nemus. While all the words could be used interchangeably boscus seems to have had the basic meaning of a smaller managed wood. Nemus is often used for a larger area of woodland with stands of timber, open heath and underwood. Silva seems to mean an area of timber wood. By the fifteenth century the use of silva seems to increase as the use of nemus declines. This may simply represent a stylistic change of the clerks and lawyers but one wonders if it might not actually reflect an increase in planted woods where timber could be found. This must, however, remain a hypothesis until the use of silva in Scotland can be more definitely tied to plantation.

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NAS: National Archives of Scotland.


NRAS: National Record of the Archives of Scotland.


MAPPING PLANTATIONS IN SCOTLAND: 1600-1900

Chris Fleet

Historical maps are a key source for plantation history in Scotland, and have been well-used and understood by woodland historians for many years. At their most obvious level, maps based on a direct survey provide uniquely important graphic information on the distribution and quality of woodland at key points in time. But in order to interpret these maps properly, it is often helpful to examine who made the map, what their purposes were, what technologies were available to them, and who their audiences and users were intended to be (Fleet et al 2011). Although there is an instinctive desire at one level to trust a map's depiction of woodland as positive evidence, it is often safer to question its reliability without other supporting evidence. The brief chronological summary below of some of the most important maps for woodland history addresses some of these issues, and concludes with a brief look at georeferencing and online availability.

Table 1. Principal map sources for Scottish woodland history and their online availability

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<thead>
<tr>
<th>Principal map sources</th>
<th>Dates</th>
<th>Online availability</th>
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<tbody>
<tr>
<td>Pont, Gordon, Blaeu</td>
<td>1580s-1650s</td>
<td>100%</td>
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<tr>
<td>Adair</td>
<td>1680s-1720s</td>
<td>100%</td>
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<tr>
<td>Roy and military maps</td>
<td>1747-55, 18th century</td>
<td>70%</td>
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<tr>
<td>Estate mapping</td>
<td>fl. 1740s - 1840s</td>
<td>about 5%?</td>
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<tr>
<td>County mapping</td>
<td>fl.1770s-1830s</td>
<td>about 70%</td>
</tr>
<tr>
<td>Taylor &amp; Skinner / transport / roads</td>
<td>fl.1770s-1830s</td>
<td>about 50%</td>
</tr>
<tr>
<td>Ordnance Survey</td>
<td>1840s-1940s</td>
<td>100%</td>
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<tr>
<td>Commercial (Johnston, Bartholomew, etc)</td>
<td>1850s-</td>
<td>about 50%</td>
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PONT, GORDON, BLAEU

Maps by Timothy Pont, based on a direct survey dating between 1583 and 1614, are well known as the earliest detailed graphic representation of woodland in Scotland, and their strengths and weaknesses for woodland historians have been well described and summarised (Smout 2001; Stewart 2003). They confirm that by this time the trend for plantations around the larger houses and estates for amenity, timber and shelter, encouraged by legislation of 1616, was already well underway. Pont's maps also help to confirm the location, size and extents of woodland, even if it may be difficult to discern their character or planting style. With a leap of faith or other evidence, Pont's maps can also indicate densities of planting - enclosed and open woodland - and related activities such as iron smelting (e.g. on Pont 2 of Strathnaver). That said, although Pont's maps are useful as positive evidence, in more densely settled areas such as part of Clydesdale and Renfrewshire, where space was tight, trees are probably crowded out by other symbols.

Pont used different symbols for trees - a circular and a stick-like form - that seem more likely to represent inconsistencies over thirty years of map-making rather than differences in reality. It is useful too to distinguish the multiple authors on the Pont manuscript maps, and digital imaging technology has been helpful for this. Robert Gordon of Straloch (1580-1661) was requested by Joan Blaeu to improve upon and supply additional mapping for selected areas of Scotland from the 1630s onwards for the printed Blaeu Atlas of Scotland published in 1654, and Gordon's handwriting appears prominently on about two-thirds of the Pont manuscript maps for these areas. Gordon's darker ink can be digitally selected and distinguished from Pont's paler, yellower ink, and this allows some confirmation of the
symbols and texts added by Gordon (Fleet 2001). Gordon added tree symbols to about one-third of the Pont manuscript maps, and although he often took his cues for these trees from Pont's original symbols, he often adorned and embellished what we see today (Illus 1).

Gordon was an armchair geographer often without first-hand knowledge of areas outwith his native Aberdeenshire, and it is therefore important to try to look on the maps for Pont's symbols for trees for the more authentic record. The 'Topographical Notices of Scotland' (available too on the Pont maps website, and transcribed for Macfarlane's Geographical Collections (Mitchell 1906-8)) with their valuable textual descriptions of woodland should also be read as a composite work, based on Pont's original survey, but transcribed and edited by Gordon.

The Blaeu engraved maps of 1654 provide much more comprehensive coverage of Scotland than the Pont manuscript maps and are clearer and easier to read - but they were generalised and simplified into the Blaeu house style by engravers in Amsterdam with no first-hand knowledge of Scotland's topography. In addition, apart from those few areas mapped by Robert and James Gordon, they reflect Scottish woodland in the late 16th century.

In the 1680s there was a second detailed phase of topographic recording in Scotland, initiated particularly by Robert Sibbald, Geographer Royal to King Charles II from 1682, with John Adair surveying several counties and coastal waters. Adair's maps are useful in updating the survey of Pont for selected areas a century later, (Illus 2) and some of his maps were revised and printed in the 1730s, but sadly Adair's maps survive today only for selected areas: Orkney, the Lothians, Stirlingshire, Fife and Kinross, south-west Scotland and lowland parts of Perthshire.
ROY AND MILITARY MAPPING

During the first half of the 18th century, the threat and reality of Jacobite rebellion resulted in a significant militarisation of Scottish cartography. Over 800 manuscript plans relating to Scotland survive today dating from the 18th century, drafted by military engineers in the Board of Ordnance, who had responsibility for the defence of British castles, forts and related infrastructure (Anderson 2009; 2013). Most of these are detailed plans of specific forts, but they do occasionally show woodland in the immediate vicinity of the fort or town depicted, as well as woodland along military roads.

By far the most important military map depicting woodland across all of mainland Scotland was of course the Roy Military Survey of 1747-55 (Illus 3). There has been an extensive debate about the interpretation of the Roy Military Survey by landscape historians, which there is not space to detail here (see, for example, Whittington & Gibson 1986; Hewitt 2010). In the absence of other information, Roy is a key cartographic source, but we are often inclined to put more trust in Roy’s depiction of the landscape than we should. The Survey was particularly limited by resources of men and time, and was described by Roy as ‘a magnificent military sketch, than a very accurate map of the country’ in which ‘no geometrical exactness is to be expected, the sole object in view being, to shew remarkable things, or such as constitute the great outlines of the Country’ (Roy 1785). Only selected traverses were surveyed with instruments, and the remaining landscape was often sketched in by eye. In addition, for the Highlands there is an ‘original protraction’ (available for consultation on microfiche in NLS), in addition to the ‘fair copy’ that is available online, and the two do not always show the same woodland detail.

ESTATE AND COUNTY MAPPING

Estate plans are an extremely valuable source of information - detailed, large-scale plans, based on an original survey, by people with a clear interest in and knowledge of woodland. Although some date from the late 17th century, most in Scotland date from the 1760s to the 1830s, associated with the main peaks of landscape 'improvement', and many estate surveyors also had knowledge of agricultural science and forestry to recommend changes on the ground (Illus 4). Sometimes we are fortunate too where a succession of plans survive of the same estate at particular intervals during this time, often showing clear changes to woodland, and as some estate maps were used as working documents they were helpfully annotated as change occurred. We are even more fortunate where written records survive to complement the maps such as valuations, letters, and reports (eg. Huxley 2012). It is often helpful to examine the varied purposes behind the estate plan, and the degree to which woodland was important in illustrating these purposes, but as the value of woodland grew, both commercially and socially, many land surveyors and landlords had a growing interest in it (Gibson 2007). Although a key cartographic source, estate maps are arguably the least well-used by landscape historians, particularly as they are scattered in a number of institutions and in private hands, and generally, with a few exceptions, have not yet been made available online.
Several estate surveyors turned their hand to create printed county maps in the later 18th century, and often used their connections to the landed gentry of the shire to enlist financial support and subscriptions. In addition, from 1759 what became the Society of Arts gave premiums and awards for county surveys, based on triangulation, at a scale of one-inch to the mile and larger, and through these combined means, by 1800, most Lowland counties had their own county map. The best of these allow excellent depiction of woodland, especially in the designed landscapes around larger country houses (Illus 5), and indicate too the wider context of new roads, bridges, mills, and other rural industries.
During the 1820s, the Edinburgh publisher John Thomson brought many of the best county maps of Scotland together, in his monumental Atlas of Scotland (1832). However, the source material for these maps was highly variable, with a minority of county maps based on an original survey, and most based on county maps some decades earlier with selective updates (Fleet & Williams 2008).

**ROAD AND TRANSPORT MAPPING**

Although not a primary source for woodland history, road and travel mapping can often provide supplementary information on woodland in the period before Ordnance Survey’s more comprehensive mapping. George Taylor and Andrew Skinner published Scotland’s first road atlas in 1776, adopting the strip-road format popularised by John Ogilby for England and Wales a century earlier. They perambulated 3,000 miles of roads, illustrated on 61 plates, and woodland was recorded in passing with other topographic information along the major routeways. The planning and construction of new roads in the 18th and 19th centuries, encouraged by landlords or Commissioners of Supply for counties, as well as by statutory bodies such as the British Fisheries Society and the Parliamentary Commission for Highland Roads and Bridges, required detailed plans by surveyors of the country through which the road would pass, and these plans necessarily include woodland. We find similar maps, albeit with a different geographic distribution, showing planned routes for canals (Illus 6) and railways, often with very colourful and detailed woodland information.
Illus 6. The original route planned for the Union Canal took a course through Callendar Estates to which its owner, William Forbes, objected, and the planned deviation with accompanying tunnel which the canal company was forced to take is shown on this map of 1818, providing excellent detail of the surrounding woodland. Reproduced by permission of NLS.

Especially from the 1820s, civil engineers and surveyors collaborated in producing hundreds of maps of proposed railways across Scotland, which from the 1840s were required by Parliament before approval, and as work progressed or plans changed, maps were required to purchase land, reassure investors and railway companies, and plan construction and operation; woodland was a useful locational topographic feature forming a backdrop to these plans.

ORDNANCE SURVEY

Ordnance Survey mapping is well-known for providing the most comprehensive mapping of woodland for the last century and a half, and there are some excellent books available providing further guidance on the interpretation of OS maps for historical purposes (Oliver 2013; Higley 2011). OS first began mapping Scotland in the south-west in 1843, and proceeded north and east to complete the first survey of Scotland by 1878. There was then a complete revision of all counties between 1892 and 1905, and thereafter, more settled areas undergoing more change were revised again, sometimes up to four times, before the Second World War. From the 1940s, OS moved from County Series mapping to the National Grid, with new maps of all of Scotland surveyed from 1944 to 1982, and again, several further revisions of areas undergoing more change. There are therefore three or more editions of OS mapping for everywhere, and often several more editions for areas undergoing more change, allowing a useful chronological record of woodland change.

OS maps were also published at a family of scales - the following are the most useful for woodland:

- one-inch to the mile (1:63,360). Good for a general overview of forest cover, with most frequent revisions, usually every 15-20 years from the 1860s to the present day.
- six-inch to the mile (1:10,560). The largest scale covering all of Scotland, and with a more detailed classification of trees, as well as orchards, parkland, and brushwood/osiers, etc. - a characteristic sheet can be viewed at: http://maps.nls.uk/view/74477147
• 25 inch to the mile (1:2,500), covering urban and inhabited rural areas (about a third of Scotland). These maps were accompanied by Books of Reference, listing each numbered land parcel on the maps with a classification (eg. Arable, Wood, Orchard, Pasture) and an acreage. Before 1888, the OS 25 inch maps also showed birch as a separate woodland category, subsequently incorporated into the deciduous category from the 2nd edition maps onwards.

• 60 and 126 inches to the mile (1:1056; 1:500) covering 62 towns (1847-1895). These adopt a similarly detailed categorisation as the 25 inch and six-inch (a legend can be viewed at: http://maps.nls.uk/townplans/symbols.html) and also show free-standing trees to a general accuracy of five metres (or 1 metre for prominent landmark, point of interest, or administrative boundary).

GEOREFERENCING
Georeferencing historical maps aligns them with their real-world location, and allows increasingly easy possibilities for comparing change over time between maps, measuring distances and areas, and overlaying historic maps with other information. Georeferencing is most effective with more geodetically accurate maps, and is of questionable value for pre-18th century maps, or those not based on a trigonometric survey. NLS has georeferenced a selection of maps from the 18th century onwards and made these available for easy viewing and comparison at: http://maps.nls.uk/geo/explore/. With fairly straightforward technical skills, it is also possible to georeference historic maps using desktop tools (a basic workflow using freely available software, for example, is described at: http://geo.nls.uk/urbhist/guides.html). Historic maps can then be overlaid and compared to other historic maps, as well as to the present day landscape (for example, using Google or Bing satellite imagery and maps), or overlaid with other georeferenced resources such as the Ancient Woodlands Inventory (available from the SNH website: https://gateway.snh.gov.uk/natural-spaces/index.jsp).

ONLINE AVAILABILITY
Most of the standard, printed maps of Scotland from the 1560s to the 1960s are available on the NLS Map Images website: http://maps.nls.uk/index.html

These sub-sections below provide direct links to particular maps, and in most cases, the Further information notes within these sub-sections provide specific background information and references.

- Pont manuscript maps (1583-1614) http://maps.nls.uk/pont/
- Adair manuscript maps (1680s-1730s) http://maps.nls.uk/mapmakers/adair.html
- Military Maps of Scotland (18th c.) http://maps.nls.uk/military/index.html
- Roy Military Survey (1747-55) http://maps.nls.uk/roy/index.html
- County Maps of Scotland http://maps.nls.uk/counties/index.html
- Ordnance Survey maps (1840s-1960s) http://maps.nls.uk/os/index.html

All the Ordnance Survey County Series maps of Scotland from 1841 to the 1950s are available comprehensively on the NLS Map Images website; we hope to add further out-of-copyright maps in the 1950s in the near future, but due to Crown Copyright legislation we are not able to put mapping published within the last 50 years online.

A table showing the main dates of OS survey and revision of Scottish counties is located at: http://maps.nls.uk/os/county-series/dates.html

Most of these NLS maps, as well as records and images from the National Records of Scotland are available through the ScotlandsPlaces website: http://www.scotlandsplaces.gov.uk/. NRS is the major repository for Scottish estate maps, as well as unpublished infrastructure and transport mapping.
More generally, the OldMapsOnline resource http://www.oldmapsonline.org/ is the largest world-wide portal to high-resolution images of historical maps, whilst the Map History gateway listing of map image websites at http://maphistory.info/webimages.html provides a useful geographical directory.

REFERENCES


PLANTATIONS ON THE SUTHERLAND ESTATE

Malcolm Bangor-Jones

In south east Sutherland estate plantations form a significant component in the present-day landscape. Most were created in the 19th century although a few date from the 18th century. Mention of the Dukes of Sutherland can bring to mind unimaginable aristocratic wealth and indeed in the 19th century the family did have the financial means to invest heavily in plantations, even though these might have to compete with other priorities for funding. But in the 18th century the Sutherland family was no different from the average landed family in terms of its financial problems. A landlord might acquire an urge to improve or embellish but the availability or lack of money could prove significant: initiatives could often be piecemeal and take time, if not an age, to come to fruition.

This brief exploration is mainly based on the Delvine and Sutherland Papers in the National Library of Scotland. The documentary evidence allows us to gain a reasonable idea of what happened in the 18th century. But it then grows in scale and from the 1830s we are confronted with vast quantities of information. For the Sutherland estate it is almost a case of too little and then too much.

THE 18TH CENTURY

Putting to one side the trees established around Dunrobin Castle itself, establishing a date for the first plantation on the Sutherland Estate is not straightforward. Roy’s mid-18th century map clearly shows a plantation at Balblair in the parish of Golspie. In addition there was another early plantation at Cyderhall, surrounding a small but precocious mansion house not far from Dornoch. Both were plantations of Scots fir. It is not clear when Balblair was established: it could have been in the 1720s, or 30s. Certainly large timber was sold from these two plantations in the 1780s. By way of background, we know that improvements were taking place on the Sutherland estate in the 1720s centred on the Mains of Dunrobin and that these included hedges and planting. In the 1730s these improvements continued, albeit at a slow pace in view of financial constraints. In addition some tacksmen were bound to establish small plantations on their lands.

Financial accounts of 1741 to 1742 list a wide variety of trees bought from the Eagles in Edinburgh (some trees came from London) for which payment was eventually made in 1768. Most of the trees would appear to have been for the garden and surrounds of Dunrobin, although as many as 1000 chestnuts were included. The “4 pound best True Red Firr Seed” was never delivered but fir seed was sent from Inverness in 1744 and 1745.

The death of the Earl in 1750 led to a necessary period of financial stringency and expenditure on Balblair plantation was halted. Eventually the young Earl took over and there are references to the purchase of seeds in 1757. Not all seeds were bought from merchants. Donald Robertson, a carter from Dunkeld was eventually compensated for the loss of his cart in the snow in March 1764 when he had been sent north by the Duke of Atholl, “Carrying seeds from Dunkeld to Dunrobin”.

Our knowledge of the estate plantations is considerably advanced by the correspondence of James Sutherland commencing in 1766. Sutherland was a military man, who was close to the Earl’s family, and who, for a significant period, took charge of the estate and discovered an enthusiasm for ‘Improvement’.

The death of the young Earl and his wife later that year when the Earl was succeeded by his infant daughter, the Countess, was one of those events which must have seemed tragic in the short term but which turned out to be very beneficial to the long-term future of the estate. The estate was administered by the Countess’s tutors who were careful to keep expenditure within limits. However,
they were prepared to authorise further planting. In August 1766 Sutherland, who had been appointed commissioner, wrote suggesting that “as the Waggon is coming North, it is an Excelent opportunity if we could get any Seeds or plants from Dunkeld or Blair, but the Duke sent so many here last spring (tho they did not thrive well) that I am asham’d to trouble his Grace”. Sutherland was also to turn most of the garden into a nursery and had “ordered the men belonging to it to more necessary work then weeding Carrots & turnips”. The nursery was a success and he hoped there would be plenty of trees ready for planting in 1768. However, “this Autom I must buy or borrow, if I was near Dunkeld I do not know but I would be tempted to lift a few from his Grace.”

Sutherland’s aim was “to endeavour to make up what has been neglected so long about this place, & I have alreadly taken many steps towards preserving our young plantation, & I still most take more, we have Gatherd a good deal of Elm & ash seed here, but I must depend upon you to get me fifty or Sixty pounds of good fir seed from Aberdeenshire. In our new inclosure above Clayside which is two hundred & seventy Acres I made Wm Hutton sow two pounds of fir Seed and two Bushels of Accorns by way of experiment, the Accorns have not made their appearance as yet, but the firs come away & look as well as those we sow’d at the same time in the nursery beds in the Garden, this is a happy discovery as it gains time & saves expence & William Hutton assures me that one plant from the seed is worth two that we carry from our Nurserys”.

All the enclosures were to be fenced with hedge and ditch: which he regarded as far superior to the stone dykes presumably built as part of the improvement of the Mains of Dunrobin: “from the day that they are built they grow daily worse and from the time you plant a hedge it grows daily better” “this fence is don much Cheaper then building Dykes”. In the 19th century the preference was for dyke and ditch.

In October 1769 he reported that he was measuring Ben Braggie, the hill above Golspie so that he could submit to the Countess’s tutors “the expense of inclosing it as I have set my heart on having it planted, our planting thrives very well, I put out several Bushells of Acorns in the new inclosure to the North of the house & they thrive to a wish, I have wrote to London for twenty Bushells for nixt season”. The plantation proceeded and in 1773, Sutherland reported that “in the new inclosure of Bhinwragie there has been fifteen hundred thousand fir plants planted in it this Season, & if the Autum is favourable I expect the like number will be planted”.

By 1781 there were 482 acres planted on the land surrounding the Mains of Dunrobin. Planting continued after the Countess was married to Earl Gower (who succeeded as Marquis of Stafford and was latterly first Duke of Sutherland). However, the pace increased in the 19th century after the Countess and her husband inherited the Bridgewater fortune and embarked on their ambitious programme of estate development.

**THE ERA OF JAMES LOCH**

The estates commissioner, James Loch, who died in 1855, is central to the history of plantations on the Sutherland estate, particularly to the significant expansion which began in the 1830s. Loch was one of the foremost estate managers of his day, able to play a full part in proposing schemes of improvement, both in Sutherland and on the family’s estates in England. He was always ready to draw upon expert advice, even though he was often drawn by his enthusiasms into the detail. Loch had lived at Blair Adam with his uncle William Adam, a renowned improver and planter. Indeed Loch supervised various improvements at Blair Adam himself.

Loch’s correspondence gives us a good impression of his role. In 1825 he reported “Yesterday I was at Skelbo... The trees near the buildings and along the side of the Walk, have been most judiciously pruned and they are looking vastly well Accordingly. Your Oaks, I must admit, are looking as clear and healthy
and Green as Oaks can do. and I did not see many dead midsummer shoots of last year, which had died. 
... it appeared to me that a very little judicious thinning of the Scotch firs, in the Upper End of the plantation, would let up a great many ashes and wych elms which did not come away at first, but are now thriving.” An estate worker “said he would be very sorry to prefer a lesser Ash to a good fir. The spruces in the dell on the side of the old road to the little ferry, have extraordinary shoots.” Loch had “walked all over the Clashmore plantation which is now thriving well. It has suffered however from the Black Cock picking out the bud of the leading shoots.”

In 1829 he reported that “The Skelbo Additional plantation will make a great figure from the whole country & from its having been Carried considerably further West, as I once mentioned to you, it makes a better termination than it did. The other parts appear to have recovered entirely, in consequence of their having been drained an improvement much required in all plantations that have a long slope on such hills. but they are now far too close & thick.”

In 1835 there was a serious discussion about laying open one of the Skelbo plantations for cattle. “it involves a very large & very serious & important subject connected with the future interest & management of this estate. ... I am deeply impressed with this Conviction both from my own experience, & that of all great planters that you cannot combine with any advantage the two great objects of wintering in young plantations & rearing wood, & that when it is done, the permanent & large value of the timber is given up for the less and more temporary one of Wintering Cattle”. This did not prevent one of the servants putting cattle into a plantation where they ate many of the young oaks. In the meantime the crofters were using the thinnings to protect their turnips & grass.

The succession of the second Duke in 1839 gave Loch the opportunity to promote a considerable expansion of the estate plantations. That year he outlined his proposals for a new plantation in Dunrobin Glen. “As I am the author of the Scheme, I will set down the general outline of what occurs to me… leaving the detail to be filled up by more practical men. Upon the whole I should prefer making Oak the principal Standard, and I should think the bottom & many parts of the side of the Glen, well suited for this trees, intermixing it with the Sycamore, the Scotch Elm, & the Ash. The Sycamore being placed in the most exposed positions, and though I mention the Ash I believe that those upon the Coast side are very flush in their nature, & make bad Timber. I am very desirous that the Nurses in the bottom & in the wetter parts of the Sides Should consist in a great measure of Spruce & Silver fir, where I should like them planted back a little from the sides of the Riding, to bound it in the same beautiful manner that those at Blair Adam are – of course I do not object to a mixture of the Larch & Scotch fir where the Soil demands those trees. I fear it is too far north for any of the poplar tribe, otherwise some of the black & white Italian Poplars might be tried in this Situation. Alder of course should be placed in all those places where they are required, and along the Course of the Burns, such Willows as the Climate will admit of. On the Sides of the Hills the hard wood will become of course more Scanty, though I take that in most places the Oak will grow as a Copse, though it may not arrive to be a Standard. The Larch, the Scotch Fir, & the Birch will become the more prevalent tree, grouping them according to the Soil & the Situation. I think also that the Aspen should not be forgot, it is a picturesque tree in the highland, & has an advantage of pushing out numerous Suckers & thus produces a thickness & cover very advantageous for the protection of the more tender trees.

But before commencing this great operation I should like to know something of its cost and how many years it would take in its execution. The fir trees that I should like to plant are about the size of two years out of the nursery beds or a very little older. My calculation is that they will be about 8 miles of outside fencing. If it is proceeded with a regular gang must be got for the fencing and another for the draining and forming the ridings and the expenditure must be distributed among the number of years which may be settled upon. Would it be possible to do it in three years?”
AFTER LOCH

Loch published a report which stated that, between 1836 and 1842, some 2091 acres had been planted at a cost of £2344. Most subsequent accounts have quoted these figures with the result that the extent of planting on the estate has been greatly underestimated. Not only were there plantations established prior to 1836 but the number and extent of plantations grew significantly after 1842. The larger plantations had been established by the late 1860s but from the late 1860s to the late 1870s there was planting along the line of the new railway from Invershin in the south to Forsinard in the north and in the 1870s there was planting associated with some of the land reclamation schemes on the estate, particularly in the parish of Lairg. In 1891 Sutherland estate plantations in the parish of Dornoch alone extended to 4581 acres.

In the absence of a readily accessible summary, the estate accounts provide a very useful perspective. An analysis of income and expenditure on the woods in the Dunrobin Management shows that annual expenditure was of the order of £800 from the late 1820s, grew to £1200 by the early 1840s, increased to well over £2000, dipped in the late 1840s (probably on account of the cost of Famine Relief), but was generally more than £2000 in the mid to late 1850s. Most of this expenditure related to the establishment of new plantations, although it included the management of the natural woods and the construction of walks and drives, especially in the plantations around Dunrobin and Uppat. Income, on the other hand, was generally low until the 1850s when it began to match expenditure.

The estate accounts provide evidence of the costs involved in establishing a plantation. The investment in enclosing – whether with turf dykes, stone walls, sunk fences or paling - could be considerable and the work was often spread over several years, for instance, 5028 yards of dyke for the Balblair and Culmaily plantations took six years (1824-30) to complete and cost £594. A great deal of draining was undertaken. Planting was a task for both men and women (women also undertook weeding in the nurseries). Afterwards there was pruning, thinning, and the filling of gaps. Contractors and labourers undertook the preparatory work but much of the harvesting was undertaken by permanent squads of estate employees. Some people were removed to make way for the new plantations and provided with houses. The plantations tended to be on the lower quality land and so the number of households removed was probably of the order of 10 to 12 and therefore nowhere approaching the numbers removed in the Clearances proper.

Profit and loss accounts for the Dunrobin management woods and sawmills from 1868 to 1881 show a total income of £45,790 set against expenditure of £68,638 of which £15,534 was ‘extra’ and mainly consisted of expenditure on Dunrobin woods, drives and walks (from 1865 separate accounts were kept for the woods as opposed to the estate sawmills from which it is possible to ascertain the value of the
timber ‘sold’ from the plantations to the sawmills for processing). Year after year, significant amounts of timber were given to the crofters or ‘lotters’ for their houses (locally grown pine did not match the quality of American or even the Speyside product). In the 1870s large amounts of timber were supplied for estate purposes, particularly for the reclamations and for the various industrial schemes. A new sawmill was established at Brora in 1875 which included a shed for drying timber using surplus steam. The third Duke of Sutherland’s interest in new technology ensured that traction engines and the railway were used wherever possible to transport timber to the sawmills.

By 1877 it was reported that the woods in the Dornoch District were being badly managed. Many trees had been cut for estate purposes - over four years for the Lairg reclamations – which should have been left to grow. It was also suggested that it had been a mistake to let plantations for pasture: it was impossible to keep drains clear and in many places the ground had become saturated. It appears that pressure on the plantations was reduced and the quality of management improved. Challenges continued and included, for instance, the problem of plantations as refuges for marauding deer, the squirrel nuisance, and the impact of low prices for timber which militated against timber extraction from hillier areas and also encouraged estate processing of timber. In the 1890s some earlier plantations on marginal land were effectively abandoned.

The Dunrobin management district contained by far the greatest proportion of the estate plantations. In the other two managements, Tongue and Scourie, taking in the north and west coasts, woodland was much less evident in the landscape. There were areas of natural woods which were managed, principally through thinning, but there were also some small plantations. These included, for instance, small plantations around Lochinver, where the Duke of Sutherland established a holiday lodge in the 1840s, around Loch Assynt Lodge and on islands in Loch Assynt in the 1860s, and around Loch More Lodge at Achfary. The plantations around Lochinver included larch, spruce, Scots pine, “Scotch elm” and birch along with some ash, willow, poplar, sycamore, beech and oak - though not all became well established. Most of these smaller plantations were established for amenity and might include scenic walks and the creation of small picturesque features. Some have never been harvested.
CONCLUSION
The experience of the Sutherland estate in the 18th century when successive owners showed a gradual but growing interest in Improvement was probably typical of many landed estates. Improvement was not solely about the purely agricultural: planting was an important element. However, lack of ready finance could often act as a constraint upon lordly ambition.

In the 19th century the estate finances changed: if there were financial constraints this was because of the scale of what was being undertaken and, periodically at least, the impact of competing priorities for financial resources. Overall, however, a huge investment initiated a considerable expansion of the area devoted to estate plantations, mainly in the east of Sutherland.

Illus 3  Memorials to (L) James Loch, Uppat Wood, Sutherland, and (R) 2nd Duke of Sutherland, Culag Woods, Lochinver, Sutherland

The role of James Loch was central: not only as a force behind the initiative but also in formulating and planning the plantations. There is a sense in which Loch, conscious of the passing years, became the man in a hurry. While he was proud of his own achievements, he also saw himself as fulfilling the wishes of his aristocratic employers. The plantations, with associated rides and walks, were a central part of the creation of an aristocratic estate landscape. The plantations may be regarded as sitting alongside the development of an estate architecture with its own style: both served to enhance the reputation of successive Dukes.

Studies of the Sutherland estate in the 19th century have wholly ignored the plantations: not only in terms of their aesthetic dimension and contribution to the landscape, but also as part of a significant economic enterprise, particularly from the 1850s. Indeed, the plantations were established for both delight and utility. The employment impact of the estate plantations and saw mills was significant and the provision of timber for house building made a positive difference to the lives of the small tenant population. This is not to argue that the plantations were always well-managed: in the 1870s plantation trees appear to have been sacrificed to meet the short-term needs of the estate programme of industry and reclamation. In this, as in many other areas, there is a great deal of potential for further research.
SIR WALTER SCOTT AND SCOTTISH FORESTRY

James Ogilvie

INTRODUCTION
Sir Walter Scott’s life spanned 61 immensely productive years during the Age of Enlightenment – that period of great artistic and scientific creativity during the late 17th and 18th century. As a historical novelist, playwright, and poet, Sir Walter Scott’s name became almost legendary throughout much of the western world during the 19th century due mainly to his popular writing. However, he was much more than a writer. An advocate by profession, Scott was also politically active. But it is for his estate management in general and forestry in particular that he is remembered by landscape and forest historians.

Born in Edinburgh in 1771, Walter suffered ill-health as a child and spent long periods in the rural Scottish Borders where he roamed the countryside and learned how to read and write. Scott’s association with the wild scenery of the Borders and romantic ruins like Smailholm tower clearly left a lasting impression on the lad: an impression that would later surface in his immensely successful novels.

After finishing his schooling Scott studied law in Edinburgh, but his close associations with the Scottish Borders continued throughout his life. One of his letters (written when he was 21) describes an outdoor experience near Kelso:

‘I am lounging about the country here’ he wrote ‘to speak sincerely, as idle as the day is long. For “outdoors” amusement, I have constructed a seat in a large tree, which spreads its branches horizontally over the Tweed. This is a favourite situation of mine for reading, especially on a day like this, when the west wind rocks the branches on which I am perched.’

Most people know about Sir Walter from his books (especially the Waverley Novels) but in truth, his talent for writing was only one facet of this complex and charismatic patriot. He was also a keen historian. In 1818 he was credited with rediscovering the long-lost Scottish Crown Jewels, which had
been squirreled away in the depths of Edinburgh Castle a century before. He was also something of a spin doctor, organising the visit of King George IV to Scotland in 1822; the first visit of a reigning monarch to Scotland for nearly 300 years. In the process Sir Walter practically re-invented Highland dress and clan tartans, which had been banned since the 1745 rebellion.

Looking at his life, we can see that Sir Walter was a tireless and honourable polymath with a keen sense of history and a great love for Scotland. Given his prodigious output of novels, essays and journals it might be expected that he would have no time for trees. And yet he had a very keen interest in forestry which he put into practice on his beloved Abbotsford Estate near Galashiels in the Scottish Borders (Illus 1 & 2). Formerly known as ‘Clarty hole’ this area of unimproved farmland and moorland was developed by Scott between 1811 and 1825 and became his country residence during the last 20 years of his life. During that time he planted, tended and managed most of its woodlands, aided by his faithful general factotum Tom Purdie. Today Abbotsford is internationally renowned and considered by many to be one the most significant of Scotland’s designed landscapes.

‘I bought this property bit by bit, as accident threw the means of purchase into my hands: I could not lay it all out in a consistent plan, for when I first came here I merely bought a few acres and built a cottage, as a kind of occasional retreat from the bustle of Edinburgh. By degrees I got another and another farm, till all you now see came to me. If things go on improving at the rate they do in the matter of travelling, I dare say I shall be able to live here all the year round, and come out every day from the Court. At present I pass about seven months of the year at Abbotsford; but if the projected railway is established, and we have steam-coaches upon it running at twenty miles an hour, it will be merely good exercise to go in to breakfast and come back to dinner.’

This latter reference to the proposed Galashiels railway line resonates even today as the same line is being reinstated.

SIR WALTER SCOTT AND FORESTRY
So, what of his forestry interests? As an authority on the subject Scott practiced what he preached. In his own words, he ‘... could claim some knowledge of the subject, from sixteen years’ undeviating attention to the raising plantations of considerable extent.’ He wrote several detailed essays and technical diaries about forestry, including ‘On Planting Waste Lands’, ‘On Landscape Gardening’ and ‘Sylva Abbotsfordiensis’. In the latter he referred to Abbotsford’s 400 acres of plantations as being ‘... chiefly (indeed almost entirely) raised by myself’. He goes on to say ‘I hope I may be able ... to add something to the map of correct knowledge on this interesting and natural topic so at least to amuse myself and to interest those whose lot it may be to walk under the shade of the trees which I am now engaged in planting’.

At that time most foresters started their careers as gardeners, but of course Scott was a lawyer by training and a writer by inclination. So what motivated him to take an interest in forestry?

In Scott’s day woodland covered only a small proportion of Scotland’s land surface (compared with 18% today). So his early countryside explorations may well have sparked an interest in ecology, forestry and the cultural value of landscapes which, later on, bore visible expression in the woodlands he so lovingly created at Abbotsford. In 1801 he was elected to the Forest Club, a dining club formed by a group of 13 landowners within the Ettrick Forest. Dinner conversations with his fellow estate owners would doubtless have contributed to Scott’s knowledge on the subject too.
Several accounts of Sir Walter’s enthusiasm for the subject of forestry appear in John Gibson Lockhart’s Memoirs of the Life of Sir Walter Scott (1837), such as ‘... his woods were now in such a state of progress that his most usual exercise out of doors was thinning them. He was an expert as well as powerful wielder of the axe, and competed with his ablest subalterns as to the paucity of blows by which a tree could be brought down. The wood rang ever and anon with laughter while he shared their labors; and if he had taken, as he every now and then did, a whole day with them, they were sure to be invited home to Abbotsford to sup gaily …’
Scott’s detailed records (eg Illus 3 and below) reveal an expertise not only in planting and managing woodlands but in the wider art and science of forestry. In many ways he could be regarded as two centuries ahead of his time, given his advocacy and demonstration of sustainable forest management. Just a few of the many possible quotes from his writings illustrate this:

On choice of species
‘Supposing the production of tall timber trees to be the ultimate object, we would recommend, for the formation of a large forest, the oak and larch as trees best to be depended upon.’ (Remember that this was just before David Douglas’ important species introductions from the Pacific northwest).

On planting
From John Gibson Lockhart’s (1837) Memoirs of the Life of Sir Walter Scott ‘On reaching an elevated point near a wild mountain lake, from whence we commanded a view of many different parts of his estate, and saw the progress of his improvements, I remarked that it must be interesting to engage in planting. ‘Interesting!’ he cried; ‘You can have no idea of the exquisite delight of a planter - he is like a painter laying on his colours—at every moment he sees his effects coming out. There is no art or occupation comparable to this; it is full of past, present, and future enjoyment. I look back to the time when there was not a tree here, only bare heath: I look round and see thousands of trees growing up, all of which, I may say almost each of which, have received my personal attention. … Farming I hate; what have I to do with fattening and killing beasts, or raising corn only to cut it down, and to wrangle with farmers about prices, and to be constantly at the mercy of the seasons? There can be no such disappointments or annoyances in planting trees.’

On brashing
‘I had occasion the great advantage of the unsightly but beneficial practice of depriving the Scotch firs of several rows of their branches. This operation makes them grow to thickness... for no treatment makes the trees grow so rapidly to bulk of wood whereas left untrimmed exhaust themselves in branches.’

On public access
‘I will venture to say, that not one of my young trees has ever been cut, nor a fence trodden down or any kind of damage done, in consequence off the free access that all the world has to my place.’

And in a note by Mr Andrew Shortreed written in 1839 after Scott’s death: ‘Talking one day upon this subject, he told me that he had much more pleasure when the children from Darnick and Melrose would come up to him with a pocketful of nuts, pulled from his own trees, than to see them scampering off the instant they got a peep of him. He had the satisfaction to find, too, that instead of having his woods destroyed, like man-trap, spring-gun men, and prosecutors in general, the trespassers seemed as careful as if they were their own.’

On thinning
‘I firmly believe plantations may be brought many years in advance by judicious thinning. With regular thinning this plantation in so favourable a situation ought at the end of twenty one or twenty two years to have been worth some money.’

‘The hard-wood is now so advanced in this spot oft planting that it admits of a number of larch trees being cut out. Accordingly Tom Purdie & I cut to the number of fourscore about the thickness of a man’s leg and such usually sell at 4/ or 5/ per dozen.’
On shelter
'This stripe\(^1\) was formed for the purpose of sheltering the ground to the eastward ...'

On flood protection
'In 1814 a number of alders were planted to protect the water dike – they have thriven very well. In 1820 a great number of cuttings of the sand-willow were stuck on the outside of the flood-dike to break the force of the water.'

On landscape design
The following account is from Captain Hall’s Journal records of Sir Walter. ‘His excellent taste in planting has produced a very important effect. In laying out his plantations, he was guided, partly by a feeling that it was natural and beautiful to follow the 'lie of the ground,' as it is called, and partly by an idea that by leading his young wood along hollows and gentle slopes, he would be taking the surest course to give it shelter. But though he had only the prosperity and picturesqueness of the wood in view, he has also, he finds, added to the value of the adjoining fields that remain unplanted.'

On amenity
'The North east corner was cut off to give a better line to the plantation looking from the belfrey at Abbotsford.'

'I expect much from this plantation which was formed from lea. It will be seen from a great distance and has a very pleasing outline.'

'A few old trees always have a happy effect amongst young wood but are rarely or never beautiful when left as a single patch on an exclusive down or thick on a hill such like a Burgundy-patch-plaster.'

On recreation
A very pretty walk leading to Huntly-Burn has been made through this stripe by Tom Purdie who has directed it with great skill.

Abbotsford cost Scott the princely sum of £25,000: many millions of pounds in today’s terms. Much as in the recent financial crisis, Britain was rocked by the 1825/26 banking crisis. Sir Walter was heavily invested in the Ballantyne Printing business which collapsed, owing him £100,000. Rather than take the easy option of declaring himself bankrupt or accepting financial assistance from his supporters he determined to write his way out of debt, working tirelessly day in and day out – a fact that probably shortened his life. By the time of his death at Abbotsford in September 1832 he had cleared 70% of his debt: the rest was subsequently paid off by the sale of copyrights.

\(^1\) i.e. a planting strip or shelterbelt.
According to popular tradition, Sir Walter Scott so favoured this view (Illus 4) and paused there so frequently en route to Abbotsford that his horses eventually learned to stop there without command. They are reputed to have stopped there even when pulling Scott’s funeral carriage towards Dryburgh Abbey—a spot he identified at an early age as his resting place. In 1840 building work started on The Scott Monument in Edinburgh's Princes Street (Illus 5). As ‘the largest monument to a writer in the world’ it’s a fitting memorial for one who himself ‘lived life large’.

**SCOTT’S FORESTRY LEGACY**

From his writing we catch clear glimpses that, long before the term *sustainable forest management* was invented, Scott recognised the importance of all three of its components: economic, environmental and...
Moreover, Scott’s views on such matters as landscape design and public access were far ahead of his time. Today his vision of a functional yet beautiful landscape is still inspirational to modern foresters. Abbotsford continues to be managed according to his vision.

We should all take to heart the quotation that comes from his novel the *Heart of Midlothian*, and the motto of the Royal Scottish Forestry Society ‘*the exhortation of the dying Scotch laird to his son: “Be aye sticking in a tree, Jock – it will be growing when ye’re sleeping”.*’

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INTRODUCTION
The current model of Scottish plantation forestry sees a single introduced conifer, Sitka spruce (*Picea sitchensis*) managed under a simple clearfell-replant silvicultural system, dominating timber production. Despite promotion of diversification in response to climatic change and emerging pests and diseases, alternative species and silvicultures still account for a smaller proportion of the resource. This model of plantation forestry was a consequence of a series of influences, and decisions taken in response to those, during the past century. At no time was it an inevitable consequence, and it may come to be seen only as one phase in the development of more diverse and mature Scottish plantation forests.

FORMATIVE INFLUENCES
Major formative influences on the development of 20th century plantation forestry in Scotland were:-

- Victorian and Edwardian under-management of plantation resources in response to reduced market demand for home-grown timber after 1870. With the demise of industrial charcoal coppice and naval timber markets, domestic demand was increasingly met by colonial imports of structural softwoods from North America and of furniture hardwoods from the Tropics. Many plantations established since the Napoleonic Wars were poorly tended and some older plantations (especially of larch in Perthshire) were felled without restocking. In some localities there was a gradual loss of plantation forest area in favour of hill deer and sheep range.

- Campaigning efforts of several major Scottish landowners with personal interests in plantation forestry to promote forestry education, government assistance for the expansion of private forestry and, eventually, for the development of State forestry. These were co-ordinated by the Royal Scottish Arboricultural (later Forestry) Society from its inception in 1854. The influence of British colonial forestry experience in India, Burma, Malaya and Africa was seminal, as were ‘scientific forestry’ concepts from French and German forestry schools.

- Emergency shortages of timber for mining and construction, arising from German submarine blockades during the First and Second World Wars. Near exhaustion of inadequate and poorly tended home plantations provided the impetus for greater government intervention in plantation forestry expansion, with establishment of the Forestry Commission in 1919.

- Emergence of industrial-scale, highly-mechanised forest management and timber processing, especially in the three decades following the Second World War. In particular, adoption of Scandinavian-inspired ‘spruce shortwood systems’ placed a premium on creating a large supply of standard-dimension lumber from one (or at most a few) favoured species. Sitka spruce was attractive on grounds of robust establishment on marginal upland sites, rapid initial growth rates and production of timber with a high strength to cross-sectional area ratio.

DEVELOPMENTAL STRANDS
Principle developmental strands in Scottish plantation forestry during the period 1854-1954 were:-

- Strong emphasis on domestic forestry education and research from the 1880s onwards. Establishment of forestry teaching at the Universities of Edinburgh and Aberdeen allowed the development of a cadre of professional estate (and later state) foresters without the former
costly requirement to study overseas before entering colonial forestry service. Technical-level training at agricultural colleges and later Forestry Commission Forestry Schools reduced the former dependence on uncertificated apprenticeship training on the private estates. Research played a key role in informing species choice, ground preparation, establishment and silvics.

- The increasing role of the State in galvanising and resourcing plantation forestry on both the National Forest Estate and the private estates (the latter through grant-aid and tax reliefs). It is unlikely that a purely private-sector/ commercially-driven forestry sector would have been able to invest in such a large-scale expansion of plantation forestry and enabling activities (e.g. research, infrastructure development, promotion of downstream processing business). The establishment of the Forestry Commission created a single organisation with ‘critical-mass’, transforming domestic forestry employment from an ‘aristocratic’ to a ‘technocratic’ model, although perhaps creating an ‘over-regimented and over-compliant culture’ thereby.

- The rapid expansion of the forest plantation resource at the expense largely of sporting (deer and grouse) and agricultural (upland livestock) land uses. Between 1909 and 1949, forest cover in Scotland expanded by 37%, from ~355kha to ~485kha (Anderson, 1967). Of this, roughly two-thirds was undertaken by the Forestry Commission after 1919, with the remainder on private estates (some being regeneration of derelict plantations). During the decade 1949 to 1959, there was a further ~120kha of afforestation on the public forests alone. This expansion increasingly resorted to poorer upland sites types requiring more intensive site preparation and restricting the choice of suitable species and silvicultural systems used.

- In contrast to the period after 1955, when spruce achieved dominance, there was a greater emphasis on species diversity in afforestation and on ecological matching of tree species to suit the site, rather than on mechanised site modification. Traditional estate forestry had favoured use of ‘gentlemen’s mixtures’ including Norway spruce, larch, Scots pine, oak and beech that met combined objectives of timber production, game cover and landscape amenity. Plant collecting efforts in North America and Asia after 1830 increased the palette of species available and these were increasingly demonstrated in arboreta and forest gardens. Mark Anderson’s famous book ‘The Selection of Tree Species’ guided species-site matching.

- There was a tension throughout this period between adherents of more traditional regimes of Scottish estate silviculture, which emphasised earlier and heavier thinning in mixed stands, and those who drew their inspiration from the German ‘scientific forestry’ school, which emphasised retention of higher stocking densities in regular spruce-dominated stands. The former approach took greater account of issues of wind stability and sporting value, and was to some extent the fore-runner of modern-day concepts of resilient, continuous-cover working. However it was the more regular ‘no/low thin’ approach that became predominant after 1955.

**KEY PERSONNEL**

Development of Scottish plantation forestry during the 20th century has had a strong dependence on a fairly small cohort of key personnel, who have made major contributions. Key groupings are:

- Early ‘aristocratic’ private estate pioneers, who were influential in the campaign to promote greater government attention to forestry and forestry education in Scotland. Many had an established track record in pursuing experimental forestry in upland areas. These included Lord Lovat of Beaufort, Lord Novar (Munro-Ferguson), Sir John Ramsden of Ardverikie, Sir John Stirling Maxwell of Corrour, Sir George Campbell of Crarae and Younger of Benmore.
Leading academic foresters and researchers at the Scottish universities, and, later, within the research branch of the Forestry Commission. Most notable among these is Mark Loudon Anderson, Professor of Forestry at Edinburgh after WW2 and leading author and proponent of species diversity and alternative silvicultural systems in Scottish plantation forestry. Also his predecessors at Edinburgh, such as Colonel Bailey, and Aberdeen University forestry Professors Steven and Matthews in the post-war decades. After 1955 emphasis focuses on work by leading Forestry Commission researchers such as J.A.B. MacDonald and John Zehetmayr.

Prominent Forestry Commission staff who were instrumental in guiding the development of the late 20th century model of industrial plantation forestry. While earlier FC Chairmen tended to be drawn from the ranks of the private forestry landowners (Lovat and Stirling-Maxwell), pre-eminence moved progressively to those with a professional training. A leading example was Sir Roy Robinson, who led the Commission through the critical period from the 1930s until the 1950s, when the key decision to major on ‘mechanised Sitka’ was made.

EXEMPLAR LOCATIONS
Development of plantation forestry in Scotland during the century between the 1850s and the 1950s was characterised and inspired by the establishment of a range of what were effectively de facto forestry demonstration sites, regularly visited on forestry excursions and reported in the forestry journals, and many of which still exist. These can again be grouped into a number of categories:

Arboreta and forest gardens at which the performance of alternative introduced species could be compared under standardised growing conditions. Mid-Victorian examples such as Murthly and Scone emphasised single-specimen arboreta on favourable, lowland sites with a strong amenity objective. With trial species plantings at Benmore from the 1860s onwards and later by Sir George Campbell at Crarae in the 1930s, the focus shifted to plot-wise comparison of species under more typical upland forestry growing conditions. From the 1950s, the Forestry Commission increasingly ‘took up the reins’ from the private sector in terms of species testing, establishing Scottish forest gardens at Kilmun and Lael and numerous field trials.

Illus 1 The Loch Ossian plantings, Corrour Estate
• “Early adopter” examples on the private estates where experimental species selection and establishment practice were demonstrated. The best known example is Sir John Stirling Maxwell’s experimental plantings from 1890 on upland peats at Corrour Estate, Rannoch (Illus 1). These allowed the comparison of a wide range of introduced tree species under challenging site conditions and also saw pioneering development of methods for site preparation. Other notable locations included earlier afforestation at nearby Ardverikie (Illus 2) and at Novar Estate. The Forestry Commission experimental reserve at Lon Mor (Inchnacardoch Forest) (Illus 3) carried out comparable experimental afforestation work from the mid-1920s under various researchers.

Illus 2 (L) Original plantings of fir at Ardverikie with subsequent regeneration
Illus 3 (R) FC upland species trial at Lon Mor, planted 1920s

• Pre-WW2 Forestry Commission forests within which a diversity of tree species had been established under the ‘Andersonian’ philosophy of species-site ecological matching, leading to the creation of attractive plantations with considerable small-scale variation. These were often in areas of considerable landscape significance where clearfell-restock working was less attractive, and some have formed the basis of later experimental silvicultural practice. Prominent retained examples include Achray (Stirlingshire), Inverliever (Argyll), Craigvinean (Perthshire), Inchnacardoch, Glen Urquhart and Ratagan (Inverness-shire), Monaughty (Moray), Clashindarroch (Aberdeenshire), Glentress (Borders) (Illus 4) and Cairn Edward (Galloway). Of particular note are Anderson’s silvicultural transformation trials at Glentress and Faskally.

PUBLIC INTEREST IN FORESTRY POST-WAR
It was after the Second World War, particularly after 1960, that the rate of increase of Sitka spruce planting in Scotland speeded up: in number of trees, area covered, and proportion of all trees planted. It became the overwhelmingly dominant plantation species. It was also a time when the ‘general public’ took considerable interest in the countryside. Attitudes to the landscape and wildlife had previously been led by romantic writers, philosophers and landowners. However, people from many backgrounds now voiced their views about the countryside, forestry and specifically Sitka spruce. This coincided with post-war education of more young people to a higher level, more than adequate food, the breakdown of social barriers, increased TV and car ownership and travel. A greater proportion of the population now had the knowledge and desire to participate in decisions about the rural landscape.
WHY SCOTLAND AND WHY SITKA SPRUCE

The varied state forests planted after the First World War were not mature enough to provide the envisaged strategic supply when the Second World War started. Private landowners again saw their woodlands felled on behalf of the nation: 40% of them. There was little afforestation during the six war years (eg Richards 2003). The UK and Ireland still had the lowest percentage area of woodland in Europe.

Felled woodlands, most of them in Scotland, now had to be replaced and augmented. Policy makers envisaged a fast and large-scale expansion of afforestation. A strategic supply was deemed no longer necessary due to the anticipated transience of future wars. Instead, afforestation was to be a means of reducing huge timber imports, a contribution to employment in rural areas and assistance to the economy. Secretaries of State for Scotland were happy to accept the challenge and the finances required. Upland Wales also participated, England and Northern Ireland least.

For historical reasons, only 42 tree species (excluding six rare endemic Sorbus spp.) are native to the UK. Few of these could be grown and cropped successfully on the now-degraded soils of north and west Scotland. Continental European trees, such as Norway spruce did not suit the oceanic climate.

From early plantation experiments with 24 conifer and 30 broadleaf species (eg. Stirling-Maxwell 1929), foresters knew Sitka spruce would grow in Scotland’s oceanic climate and on a wide variety of infertile soils where only low-yielding Lodgepole pine was a real alternative at the time. Some Sitka spruce provenances could withstand considerable exposure. Phosphate fertiliser could take it out of ‘check’ and it produced quality pulp and saw logs.

Sitka spruce was regarded as the only tree (native or introduced) which could grow satisfactorily as a first crop on Scotland’s marginal uplands – agricultural land had been forbidden for use in state afforestation since before 1919. But governments had decreed that marginal land be ploughed-up for food production.
during the war – and remain in farming afterwards. Scottish foresters therefore had no choice but to grow new forests on land even worse than marginal, indeed ‘unplantable’ with trees. Its stock carrying-capacity was 1 small sheep per 3 to 4 acres (1.2-1.6 ha): such land would also require the least outlay by the Treasury!

The Forestry Commission was expected to afforest the most abysmal land in the UK for growing trees: at 800 to 1500 ft (240 to 460 m) altitude, on soils of acid peat, podsols and gleys, receiving up to 80 inches (2030 mm) of annual rainfall, exposed to strong winds and low temperatures.

‘At that time the Commission was desperate to acquire land to meet the large planting programme and it was not a question of what we will take, but what can we lay our hands on. Whitelee at high elevation on deep peat was in many ways a stab in the dark and a lot of people in the FC doubted if it would be successful. (Peter Innes, FC Chief Acquisitions Officer, ‘Why Whitelee? Buying Land for the New Forest’ p.79 in Tittensor 2009.)

THE ACHIEVEMENTS OF FORESTRY AND SITKA SPRUCE

When land was acquired, farmers removed their sheep flocks and it was fenced. Brown and blue hares, rabbits, black grouse and wild goats, which damaged young trees, were killed by Forestry Commission trappers (Tittensor 1979 and personal experience). Scottish foresters and mechanics together developed tractors and ploughs which could be used on dangerously unstable peat. Acquired land was ploughed into ridge-and-furrow for drainage and tree-planting. Experiments showed this was the best way to obviate beating-up.

From 1960 to 2000 AD, an amazing increase in the percentage of Scotland covered with trees – from 6% to 17% – was accomplished by practical and research foresters, squad workers and machinery firms. Sitka spruce was a large proportion of this 11% increase: in 2004 it contributed 47% to the national forest estate. Sitka spruce succeeded beyond all expectations.
AMENITY PERCEPTIONS OF SITKA SPRUCE

However, as the first post-war acquisitions grew into forests, the public and countryside lovers voiced their vehement dislike. Young plantations were seen as ‘uniform dark green blankets’ on wild moorland (Illus 5). Their outer fences and prickly foliage were abhorred as preventing entry. Their internal darkness was criticised. The apparent ecological sterility of maturing plantations was compared unfavourably with better-understood broadleaved woodlands. Visual changes in beloved ‘open’ upland landscapes were felt keenly.

The worst land for trees happened to be some of the best land for hill walking (moorland), for amenity (wilderness), and of high value for nature conservation (blanket bogs and basin mires). The apparent loss of open ‘wild’ and ‘natural’ uplands was felt even more acutely when country lovers realised that taxpayers contributed to these green blankets. But,

‘As mentioned before, it is only when men feel secure and well fed that they can philosophize about the importance of wild life; the sight of an uncommon animal or plant will thrill those who do not have to worry unduly about necessities. (Thomas, A. S., ‘The Follies of Conservation’, 1975)

Criticism of ‘conifers’, particularly Sitka spruce, continued. The forestry profession, thinking it had been fulfilling a dire national need, was taken aback. It responded by opening-up large compartments into smaller mosaics, and edging plantations with ‘amenity’ species to hide the ‘culprit’ (Illus 6, 7 and 8). Foresters appeared to be ashamed of Sitka spruce and seemed to buckle under the public onslaught rather than defending their professional judgements.

In 1988, disagreements reached a climax, the government felt threatened by the powerful ‘green’ movement, so tax incentives for forestry were reduced. Private landowners all over the UK cut back on Sitka spruce planting, whilst grants towards planting broadleaved trees were enhanced. Sitka spruce dominance waned.

PERCEPTIONS OF ECOLOGY

It was widely assumed that, as Sitka spruce plantations lacked a vernal display of flowers, they were floristically sterile. There were no base-line ecological surveys or detailed scientific analysis to refer to, because (it was assumed) there was nothing worthwhile to survey.

Even ecologists confused the look of plantations with their wildlife content and functioning. I (RT) had been told when an undergraduate,

‘When an ecologist enters a wood she sees not only what is there but what is happening there.’
In other words, ecology concerns processes as well as appearance. Considering that Sitka spruce and other plantations contributed so much to expanding the total woodland cover, to 17% in Scotland, their ecology was unfortunately neglected. Ecologists’ contemporary interests focussed on woodland history. It had been decided that ‘anciency’, ‘naturalness’ and ‘native species’ were important factors for both study and evaluation. Sitka spruce plantations were not ancient, natural or native! A chance for long-term ecological, taxonomic and social studies at the start of a new rural phenomenon was missed.

Without base-line survey, the success of ‘improving their value for conservation’, ‘increasing their biodiversity’, and indeed any other type of conservation management, cannot be gauged. ‘Improving’ implies knowing the pre-existing state against which to measure.

Most landscape and natural history books ignored conifer plantations. Even Michael Proctor’s ‘Vegetation of Britain and Ireland’ (2013) gives only one page to the ‘Flora of Conifer Plantations’ despite their huge contribution to the expansion of total woodland cover since the early 20th century. But he felt positive about the ‘apparent increase’ in non-vascular plants found during recent BSBI studies.

However, ornithologist William Condry (1960, 1974) made a study of bird succession during the decade after moorland was ploughed and conifers planted in Wales. Other ornithological studies followed, but bird-watchers are used to working in undervalued areas.

Naturalists and squad workers observed and documented floristic and faunal changes in Whitelee Forest, Ayrshire (e.g. Douglass 2004), including new peat growth after stock exclusion by fencing. It was not until the century end and new millennium that Sitka spruce plantations became the subject of mainstream ecological research (e.g. Picozzi et al 1996; Quine & Humphrey 2009). Even so, Sitka spruce is often subsumed within ‘conifer’, so that specific and Scottish knowledge remains fragmentary.

**NATURE CONSERVATION PERCEPTIONS**

Unfortunately, ‘Conservation’ had become muddled with ‘Ecology.’ Although a nature conservationist is concerned particularly about the age and origin of woodland, an ecologist is interested in a wide range of variables. A collection of trees is of ecological interest, whatever its age and origin. All woodlands have composition, structure, energy flow, processes in progress, and so are worthy of analysis.

The word ‘Biodiversity’ came into the language for its usefulness in describing and grading a habitat for conservation, including plantations. Biodiversity has been emphasised at the expense of other ecological criteria, so that Sitka spruce plantations, with low apparent biodiversity were disparaged.

Ocean scientists have demonstrated that non-biodiverse locations can demonstrate exceptional interest if ‘a broader suite of metrics’ is used to integrate ecological information (eg. Tittensor 2013). Bird and mammal biologists have also been more adventurous with their studies of ecological functions.

Loss of the previous, apparently ‘natural’ moorland and mires by afforestation was perceived as detrimental. Archaeologists, palaeo-environmentalists, historians and historical ecologists gradually supplied evidence showing that moorlands and peat bogs, like plantations, were not natural, had an anthropogenic origin and have been changed through millennia (eg. Simmons 2003; Tipping et al 2007).

**PERCEPTIONS OF TIME**

The human life-span, not the real pace of plant succession or evolution, seems to determine our perceptions of change. The public and conservationists were disappointed when Sitka spruce plantations did not develop obvious biodiversity quickly. But ecological processes will take place even in plant-fell-restock woodlands. Fauna and flora can adapt to many time-scales.
There was a felt-need to ‘manage’ Sitka spruce plantations to produce realities coinciding with pleasant pictures in our mind’s eye and coloured by our history and culture. Foresters meanwhile tried to produce both the goods we need as well as the mind-pictures we desire!

**CHANGES IN SILVICULTURE AT THE END OF THE TWENTIETH CENTURY**

In the last decade of the twentieth century, the Forestry Commission responded to the barrage of criticism, but without evaluating it. The importance of Sitka spruce to people’s everyday needs and its potential contribution to biodiversity and amenity were not explained to the public. Instead landscape and nature conservation consultants provided advice to the Forestry Commission, which started painting those desired mind’s-eye pictures.

Ecological research to test the hypothesis that Sitka spruce plantations are ecologically sterile compared with other woodland types, gradually increased. But they were still being ‘beautified’, ‘bio-diversified’ and ‘opened-up’ mainly on the basis of value judgements. Conservation, heritage and recreation paradigms, as well as silviculture, now led forestry.

Foresters felt embarrassed, not proud of Sitka spruce forests. Its proportion in new and restocked forests was deliberately reduced and it was hidden behind different edgings, while a few ‘iconic’ wildlife species, such as (re-introduced) red squirrels, were promoted.

In the new century, forestry, an industry with a long-term financial return, is being changed yet again to take account of new concerns like climate change and new diseases. A wider range of ecological studies is at last being undertaken. Nature conservation ‘improvement’ valuation can, nevertheless, muddle measurements of ecological metrics.

Scotland currently uses Sitka spruce for cellulose pulp; building construction; particle-boards; joinery; fence posts; rails; planks; rustic items; pallets; agricultural boxes; biomass chips; electricity generation (wood-fired); cross-laminated construction units; bark; sawdust; and other items.

**LESSONS FOR THE FUTURE**

Establishment of first-rotation plantation forest resources should be seen as one stage in the process of forest restoration to degraded lands. That is a process that many territories, from boreal to tropical, are likely to pursue over the next century. It is one where Scotland has much valuable experience to impart. Although Scottish plantation forestry practice took a particular path after the mid-1950s (favouring reliance on Sitka spruce afforestation), the earlier period of plantation forestry development from 1854 to 1954 offers many valuable lessons for the future. Not least it has left us with a ‘field archive’ of forest gardens, species trials, experimental plantings and silviculturally diverse plantations that can form the basis of future practice. With increasing challenges from woodfuel demand, public recreational aspiration, climate change and emerging pests and diseases, there is a pressing requirement for resilient plantation forestry solutions. The more diverse approaches to species selection and silviculture preferred prior to the mid-1950s may have much to recommend them in that context, as certainly does their emphasis on forestry education.

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