

THE SCOTTISH FORESTRY TRUST



ANNUAL REPORT
1999 - 2000

SELECTED ITEMS FROM THIS YEAR'S REPORT



During the year the Scottish Forestry Trust was welcomed as a new member of the Forestry Research Coordination Committee. FRCC includes the various research organisations with an interest in or responsibility for forestry research in UK.



Initial informal discussions took place during the year on the concept of promoting greater UK industry collaboration through co-location at a landmark forest industries building at Ingliston.



Professor William Burch, Hixon Professor of Natural Resource Management, Yale University was appointed to a *John Eadie Memorial Fellowship*. During next year, Professor Burch will look critically at current British practice in social and community forestry.



The project to identify the locations of natural (autochthonous) populations of the main Scottish native tree species has been completed and a report is being prepared as a SFT Publication. A database which includes fuller ecological information, some photographs, and Geographic Information System, to facilitate population searches, has been prepared on a CD-ROM.



£87,737 was provided this year in grant aid to support a range of research and educational projects. Slight delays in signing contracts and work programmes caused the total to fall below the £100,000 budgeted.



Over £30,000 of the grant aid was provided to projects concerned with assessing log quality or gaining a better understanding of timber quality.



The total funds of the Trust at 31st March 2000 were £2,878,512. This represents an increase in the market value of the investment portfolio of £220,923 over the past twelve months.



The full report of the audited accounts is now published separately; copies are available from the Trust on request.

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THE SCOTTISH FORESTRY TRUST AND ITS OBJECTIVES

The Scottish Forestry Trust is a charitable trust, which was established in 1983 to promote education, training and research in forestry and silviculture.

The Trustees have determined that, for the time being, the Trust's major contribution should be towards funding research projects, although, as opportunities arise, educational and training projects are also supported. A small proportion of the budget is set aside for publications and travel.

The Trust's primary objective is to support private sector forestry by contributing to the scientific, technical and economic information it requires to enable it to develop its role in UK forestry. Forestry is defined as the forestry industry as a whole, including its contribution to landscape, recreation, wildlife and the environment.

Projects in all of the sciences, which bear upon forestry are supported by the Trust. High priority is given to proposals, which address industry needs related to policy formation and execution, and to broad management questions. In general terms, preference is given to studies of a more applied nature where the benefits are more immediately available to the industry. Notwithstanding that, fundamental work, whose potential to resolve outstanding problems, or reveal new opportunities and possibilities is thought to be high, is also supported.

TRUSTEES, OFFICIALS and ADVISERS 1999-2000

Chairman	Sir D W N Landale KCVO	
	A F Bloomfield OBE (to 31/12/99)	
	J R Firn*	* Member, Projects and Research Committee
	J Kissock (from 31/12/99)	** Chairman, Projects and Research Committee
	Dr D C Malcolm OBE**	
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ACKNOWLEDGEMENTS

The Chairman and Trustees wish to acknowledge with gratitude the generosity of the following donor to the Trust's funds:

£100 to £1,000

Callendar Charitable Trust

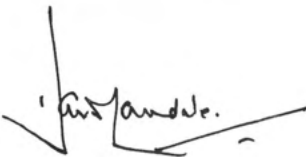
CHAIRMAN'S FOREWORD

A major initiative taken by the Trust this year has been to start exploring the interest of the main forest industry organisations in the concept of coming together into a new forest industries building, which would demonstrate home-grown timber and wood products. Preliminary informal discussions have taken place with several organisations including exploring the possibility of the building being sited at Ingliston. The vision is that of a single shared facility to create an effective, efficient and visible focus for UK's forest industries, whilst allowing each organisation to retain its independence and confidentiality. The Trust's role has been to prepare and circulate a development prospectus; further progress will depend on the interest and commitment shown by key organisations.

During the year the Scottish Forestry Trust was invited to join the Forestry Research Coordination Committee. An important role of the Committee is to advise sponsors and contractors on research requirements and to encourage the financing of identified needs. Membership of FRCC should provide the Trust with better, advanced information on research needs and result in more effective use of the limited resources it has available for supporting forestry research in Britain.

The *John Eadie Memorial Fellowship* was set up in 1998 with the aim of providing British forestry with expertise not readily available here. Applicants of high professional standing, enthusiasm and ability to communicate their knowledge are sought and are required to spend three months in Britain. In 1998, Professor Waring, University of Oregon, USA and Dr Mason, University of Canterbury, NZ were awarded Fellowships. Both provided expertise in mathematical modelling and their advice, ideas and expertise were appreciated by fellow research workers to the benefit of British forestry. The *John Eadie Memorial Fellowship* is awarded every second year. Professor Burch, Yale University is the next fellow and he will look at current British practice in social and community forestry during the following twelve months. This country has seen a tremendous increase in numbers of community forestry programmes in recent years. Professor Burch is being asked to suggest ways to enhance and sustain these programmes.

Last year the format of the Annual Report was changed to A4 size with greater use of colour, photographs and graphs. The audited accounts were published separately. These changes in reporting have been well received and we feel the increased costs are justified, so will be continued.

A handwritten signature in black ink, appearing to read 'David Landale', with a stylized flourish at the end.

Sir David Landale KCVO

TRUSTEES' REPORT

The primary objective of the Scottish Forestry Trust is to support research, education and training in forestry, and the Board of Trustees has the sole power to make decisions for the Trust. Trustees are appointed for their experience, expertise and objectivity and provide a good balance of appropriate skills on the Board. Full meetings of the Trustees are held three times per year and the Projects and Research Committee, which evaluates applications for grant aid, meets a month before the full Trustees' meeting. Trustees give freely of their time. In the case of the Chairman and members of the Projects and Research Committee, this is in excess of 10 days per person each year. The Director is responsible directly to the Chairman for the day-to-day organisation and management of the Trust's business. A professional investment management company, Stewart Ivory & Co. Ltd, advises the Trustees on the investment portfolio. The accounts are audited annually. A legal adviser regularly attends the Trustees' meetings.

A Statement of Trustees' responsibilities for financial statements is presented later in this report and in the separate printed set of the audited accounts, copies of which are available on request. The financial statements prepared comply with the requirements of the Trust Deed and the Charities Accounts (Scotland) Regulations 1992. The auditors observe that the financial statements give a true and fair account of the Trust's affairs at 31 March 2000.

Review of Project Portfolio

The portfolio comprised a broad range of topics - twenty individual projects covering log and timber quality, harvesting, timber supply, conservation and habitat management, grey squirrel control, carbon sequestration, forest pathology, and sustainability of the environment. The list of projects is provided under the sections, "Projects Completed This Year", "Ongoing Projects being Funded", and a table of Grant Aid expenditure on page 21.

Much of the grant aid this year has supported projects concerned with log and timber quality (35%) as these are of major concern to the British forestry industry. The main conclusion of a study looking at the effect of bark stripping of Sitka spruce stems by red deer was that the economic impact was much less than expected. Another study, partly funded by the Trust, has proposed a *Stem Straightness Scoring System* to assess log quality of standing Sitka spruce; the relationship between quality assessment and product out-turn was included in the project. Results from a small separate project suggest that the *stem straightness score* at mid-rotation is likely to be similar to that at harvest age. One ongoing project is looking at product quality from birch logs collected from stands throughout Britain and another project is comparing the timber properties of the juvenile core of "genetically improved" and "unimproved" Sitka spruce. The Trust provided financial support for a design competition and weekend workshop for students on using Scottish hardwoods followed by a conference at New Lanark on *Using Scottish Hardwoods*.

There is a major problem in finding markets for small and medium sized hardwood timber. This needs new investment, which in turn requires reliable forecasts of how much hardwood timber will, or could, be available. The Trust supported a project to write up an Oxford MSc thesis, which looks at options for providing reliable forecasts and to help predict supplies.

As highlighted in last year's Annual Report, the Trust initiated and directly managed a project to identify the locations of natural (autochthonous) populations of the main Scottish native tree species. This has been completed and a SFT Publication is being prepared. A database, which includes some ecological information, photographs, and Geographic Information System, to facilitate population searches, has been prepared on CD-ROM.

Another project completed during the year was on the quantification of rates of carbon sequestration of a Sitka Spruce stand of yield class 16. Plantations may offer additional commercial value as tradable carbon offsets in future.

Three additional examples of the wide range of projects supported are included in "Ongoing Projects" – *Development of a Contraceptive Vaccine for Grey Squirrel* and *Optimal Management Strategies for Capercaillie in Forest Plantations*. Another, doctoral, study on *Damping-Off Oomycetes in Natural Regeneration of Scots Pine* has demonstrated the presence of pathogenicity of the fine root pathogens; however under the environmental conditions at the sites no severe disease symptoms are being observed.

Financial Review

The full report of the audited accounts prepared by the Trust's Accountants and Auditors, Brown Campbell & Company, has been printed separately and copies are available on request. In the latter part of this report some information has been extracted from that report and presented graphically.

The total assets of the Trust increased by £220,923 to £2,878,512. The Accounts show an income of almost £110,000. The income from investments increased slightly (approximately £12,000) from the previous year, but bank interest and donations were substantially less, so the overall income was about £9,000 less.

Over the year there was a net deficit of income over expenditure of £32,925 compared with a deficit of £50,575 the previous year. These deficits were anticipated as they result from the decision of the Board of Trustees in December 1997 to increase the projects budget to 4% of the market value of the investment portfolio. The market value of the investment portfolio has been taken conservatively as £2.5 million. The income from dividends, bank interest, and tax reclaims was not expected to cover that level of expenditure. It was appreciated that this expenditure would decrease the rate of growth of the capital fund to possibly 2% plus inflation. The administration costs of running the Trust, including professional and investment management fees, increased by £2,142, but this includes £1,292 on publicity and £800 for changing the format and printing last year's Annual Report. Expenditure on projects this year amounted to £87,737 but when the Trustees met in early April an additional £16,000 was authorised as some projects had suffered minor delays. Thus the target expenditure on projects of approximately £100,000 was achieved.

As mentioned in the Foreword, the Trustees agreed to provide Scottish Forestry Trust's support to the concept of the main forest industry organisations coming together into a new forest industries building. Financial support will be limited to setting up a new Company Limited by Guarantee (cost estimate <£300) and possibly providing an initial contribution up to £15,000 as an unsecured loan towards the concept development, design and feasibility confirmation costs. The Trustees have received legal advice that financial support for this concept is within the objectives of the Trust, but they wish to emphasise that they do not see the Trust being the lead body in realising that concept.

MAJOR PROJECTS COMPLETED THIS YEAR

Log Quality Assessment in Sitka Spruce

E. Macdonald, S. Mochan, J. Barrette, and T. Connolly (Forest Research)

In recent years there have been concerns that much of the Sitka spruce timber coming onto the market is of too low a quality to provide material for the construction market. The Trust participated in funding a project strongly supported by the Forestry Commission, private forestry companies and the UK Forest Products Association to standardise a method of assessing log quality in standing trees. The assessments involved defining sampling methods for the tree crops and relating the log quality assessment to product outturn at time of harvesting.

Field trials involving three observers, and comparing visual assessments to those carried out with aids to measurement, resulted in selecting a visual seven point scoring system. Between 60 and 100 trees, depending on stand conditions, are recommended to provide an acceptable mean and distribution of straightness scores for a stand to assess stem straightness of those trees which will produce sawlogs. Further trials in stands of varying log quality confirmed that the scoring system differentiated between stands of different log quality and clearly distinguished between those of high and low quality. On the basis of this study a protocol for use of the assessment method at the stand level has been prepared. The definition of quality grades, according to an estimate of straight log lengths in the bottom 6m, is seen as a useful way of presenting straightness score data at the stand level.

This assessment method was then applied to some 160 stands under private or Forestry Commission ownership in south Scotland. No differences were found between similar stands under Forestry Commission and private ownership and for similar stands across south Scotland. Factors associated with decreasing straightness scores were greater spacing, higher yield class, increases in elevation and windiness of the site. The more recently planted stands showed lower scores. Thinning increased straightness score.

Detailed stem analysis of ten trees from four different spacing plots on one site weakly supported the theory that stem straightness scores assigned in mid-rotation will generally be the same as those applied to the same trees prior to harvesting. The quality class of 75% of the trees was unchanged over a ten-year period when the trees aged from 29 to 39 years. Further work is required to confirm this result. A workshop and publications are planned.

Timber Degrade in Sitka Spruce (*Picea sitchensis*) due to Bark Stripping.

D. Welch and D. Scott (Institute of Terrestrial Ecology, Banchory).

The impact of bark stripping recorded over a 20-year period in stands of Sitka spruce in Glenbranter Forest was assessed from its effects on economic value and timber quality. This was done by stand valuation and by visual grading and strength testing of sample trees. Nine sites with 1105 trees present were examined for damage. The valuer correctly perceived the broad pattern of bark-stripping damage and identified the site known to have incurred most wounding. In the 28-29 year old stand, slightly more (14% v 12%) bark stripping was estimated than had taken place, while in the 34-39 year old stand less bark stripping (13% v 17%) was estimated than recorded over the 20 years. The valuer estimated that the site net value on average had been reduced by 10% by the bark stripping. The sites with greatest losses (£2.1 and £2.3/tonne of harvested crop) had a substantial number of green-log trees with serious wounds.

The sample trees felled comprised 20 with wounding area > 180cm², 32 logs with wounding area < 150cm², and 28 undamaged logs. About half of the bark stripped logs did not have any stain or rot visible when sawn open, and only 5 of the 52 logs had serious staining. Rot was extensive only in one tree that had

suffered an exceptionally large wound. It was estimated that only 6 of the 33 bark stripped green and red logs would have been rejected for structural use. Larger wounds had somewhat weaker timber in the sapwood zone than had small wounds. For intermediate and heartwood, differences between wound wood and other wood were not significant.

Financial losses were calculated based on the rejection rate of logs for structural uses, judged by visual grading after sawing up and on strength tests. Net stand values were estimated to be reduced by 2% for 28-29 year old stands and 3% for 34-39 year old. Both of these were substantially less than the reductions of 9% and 11% respectively estimated for these two age classes in the standing tree evaluations.

The authors are being encouraged to publish the results of this work in a forestry journal.

Broadleaved Timber Production Forecasting in Britain.

J. Haworth and S. N. Prior (Oxford Forestry Institute, University of Oxford).

Markets for small to medium sized hardwood timber are urgently required, but depend on new investments in processing plants. Fundamental to attracting such investment is a reliable forecast of how much hardwood timber will – or could – be available. Two past attempts to forecast hardwood timber production in Britain have necessarily involved major assumptions. It is recognised in both these forecasts that there was insufficient information about most of the factors affecting the decision to fell. The current Forestry Commission inventory of forests will improve the accuracy of area data and some information on growth rates. For a resource where the factors affecting the decision to fell have at least as much bearing on the actual production as the physical availability of the resource itself, the information obtainable from the grants and licences scheme should be used. The production of a short term forecast using the Forestry Commission's Woodland Grant Scheme database to predict felling areas is proposed. Modifications to data collected are suggested to enable such a forecast to be produced.

Two manuscripts have been submitted for publication in forestry journals

Long Term CO₂ Sequestration by Sitka Spruce.

P. Jarvis, R. Clement and J. Moncrieff (IERM, University of Edinburgh).

In the carbon cycle, forests are at the interface between the atmosphere and soil. Trees store carbon as they grow but forests also transfer carbon from the atmosphere to the soil. In the northern and temperate boreal forests, up to ten times as much carbon is stored in the soil as in the trees. Changes in the tree/soil carbon can be obtained by measuring the net gain or loss of carbon using an eddy covariance technique of net carbon fluxes.

Carbon flux measurements were recorded at Griffin Forest near Aberfeldy for three years; the Sitka spruce crop, established in 1981 to 1983, is yield class 16. The net annual sequestration of carbon by this area of forest was 6.4, 6.2 and 6.1 t C ha⁻¹ in 1997, 1998, and 1999 respectively. Differences in the inter-annual amounts appear to be due to different weather patterns in September and October. The annual net CO₂ exchange of ca 6 t C ha⁻¹ is at the top end of fluxes measured over 15 sites in Europe and is only equalled or exceeded by two, more southerly, sites. It is important to demonstrate that the maritime climate in Britain is responsible for high rates of net exchange of CO₂ between the atmosphere and our forests. This net exchange takes into account both uptake by the trees and losses from the soil. This three-year study has provided a sound base line for carbon sequestration by a reasonably typical Sitka spruce stand in central Scotland.

This information is particularly valuable in relation to the Kyoto Protocol in which most countries have agreed to restrict emissions of specified greenhouse gases to assigned amounts. Such plantations in future

may therefore have additional commercial value as tradable carbon offsets. If trading of industrial CO₂ emissions takes off, each 1 hectare of typical Sitka spruce that sequesters 6 t C ha⁻¹ over a 10-year period (current rates paid in US and Australia are \$10-20 per tonne C ha⁻¹) would earn 600 to 1200 dollars.

Locations of Populations of Scottish Native Trees

S. McG Wilson, D. C. Malcolm and D. A. Rook (Scottish Forestry Trust).

This project set out to locate and describe at least 40 natural populations of the following species - Scots pine, silver and downy birches, sessile and pedunculate oaks, ash, alder, aspen, wych elm, wild and bird cherries, rowan, hazel, holly, and juniper. They were selected to represent the range of bio-climatic conditions under which the individual native tree species occur in Scotland. Where possible, populations were identified which contained at least 30 mature, unrelated individuals.

The published literature was reviewed; potential holders of unpublished records or knowledge of such populations were contacted and regional tours of inspection made. Selection of populations was based on location, condition and ecology, without reference to phenotypic timber form. The database of approximately 1,100 populations includes ecological information collected in the field and in some cases extracted from existing map and survey records. A Geographical Information System has been included to facilitate searches for populations in specific areas by displaying the information in a spatial form. The database identifies populations by site numbers and grid references, but no information on ownership. Where the owner's permission has not been obtained, specific references to those sites have been omitted.

The Trust is preparing for publication a detailed report listing locations of the populations with descriptions and discussions of the populations with a review of pertinent literature. The database is currently held solely by the Trust but copies on CD-ROM will be made available to the Forestry Commission, Scottish Natural Heritage and the Royal Botanic Garden, Edinburgh. These organisations could have most use for that information and may be able to deal with enquiries. To our knowledge there is no other comparable "register" of native reproductive material sources available and the report and database should prove to be invaluable to those interested in the conservation of native Scottish tree species.

The published report will be available from The Scottish Forestry Trust price £12.50.

Using Scottish Hardwoods: Design Competition and Conference

D. Nelson (Forestry Commission, Edinburgh)

The Scottish Forestry Trust was one of the supporters of a competition for students in which they were invited to participate in a weekend workshop at the Scottish Borders Woodschool along with skilled craftsmen and the competition judges. A Hardwood Conference to broaden the understanding of the potential use of Scottish hardwood timber in construction and joinery and the sourcing of that timber was held in New Lanark in March. Both events were successful in providing information and generating greater interest in our hardwoods.

ONGOING PROJECTS BEING FUNDED

Effects of Mechanised Forest Harvesting on Soil Physical Properties: This PhD study being carried out at Lancaster University is examining the degree and nature of disturbance of surface water gleys and peatland soils which are considered to be at medium and high risk respectively. Preliminary results indicate that the deep peat appeared to withstand high levels of machine traffic, possibly as a direct result of a well maintained brash mat and the elastic properties of the organic soil itself. The response of the mineral soil appears more complex.

Damping Off Pathogens in Natural Regeneration of Scots Pine: PhD study at the University of Aberdeen, which is examining the roles of the damping off pathogens across northern Scotland. Both modern molecular techniques and more established traditional methods are being used to isolate and identify the potential pathogens. Biological control and pH trials have been established to observe the potential control of the fungi and observe relationships between the fungi, host and soil chemistry.

Environmental Impact Assessment Application in the UK Forest Sector: The aim of this PhD study at the University of Wales, Bangor is to investigate Environmental Impact Assessments in the forest sector and to recommend procedures to aid decision making. Almost all Environmental Statements lack sufficient baseline data, clear predictions of the future effect of the proposal and a mechanism through which the significance of impacts can be determined. Further work is being carried out to resolve the problems surrounding the audit of impacts.

Immuno-Contraception of Grey Squirrels: Immuno-contraception is considered the best option for grey squirrel control in the future. The principle behind this approach is to induce a specific immune response in female grey squirrels. The Trust is included in a partnership of funders who are financing this project with the Forestry Commission taking the lead.

The Role of Winter Desiccation and Frost in Determining Stem Form in Silver Birch Provenances: The first stage of this project, namely a study of frost hardiness status, carried out at the Northern Research Station, Forest Research has been completed. The results indicate that stems of birch seedlings are unlikely to be damaged by frost in winter, but are at risk in spring. There was a suggestion that eastern seed origins flush earlier than western when grown at a common site in eastern Scotland. The second phase of this project, in now being carried out at the University of Edinburgh. Native sources and "improved" birch seedlings will be exposed to different desiccating conditions during winter to quantify water losses and morphological and anatomical changes in stems.

Management Strategies for Capercaillie in Commercial Forests: In recent years there has been a decline in numbers of capercaillie in Scottish forests. Timber harvesting through its effect on stand structure, food supply and other aspects of habitat quality undoubtedly has a significant impact. This PhD project at Aberdeen University aims to define the optimal relationship between timber production and capercaillie conservation in commercial forests. A *Habitat Suitability Index* has been devised and is being evaluated in Glenmore Forest. Predictive models of timber revenues, habitat quality and population abundance for a range of forest management scenarios will be developed and interlinked.

A Study into the Suitability of Birch for Processing: The Trust is part funding this project being led by TRADA. This project is looking at the suitability of birch for manufacturing specific sawn products (flooring, glulam and furniture framing). Birch logs have been harvested from sites throughout Britain. Preliminary results on conversion rates and grade recovery at the sawmill and laboratory tests indicate that home

grown birch has a quality not dissimilar from what is available in other countries. The project will produce information on birch timber quality and availability to be disseminated to potential user groups.

Effect of Growth Rate on Wood Properties of Genetically Improved Sitka Spruce with Special Reference to the Juvenile Core: There is insufficient knowledge of how Sitka spruce genetic improvement, particularly in terms of growth potential, is influencing wood properties. This PhD study at the University of Aberdeen will compare wood properties of “fast growing” and “slow growing” progenies and with “unimproved” genotypes. This study should also provide a better understanding of the properties of juvenile wood of Sitka spruce.

***Peridermium pini* in North East Scotland:** *P. pini* causes a stem rust in Scots pine leading to losses in timber quality and yield. The disease is important in north east Scotland and Thetford. This project at Aberdeen University plans to map the distribution of *P. pini* in Scots pine in that region and apply Geographical Information Systems to analyse its distribution in relation to site factors and current management practices.

The Effect of Kiln Drying on the Carbon:Nitrogen Ratio of Sitka Spruce Timber: Kiln drying of timber has been shown to result in enrichment of the surface of timber with water soluble carbohydrates and nitrogenous compounds. Under moist conditions this could be suitable for fungal colonisation. The objective of this small project at the University of Abertay-Dundee is to determine the carbon, nitrogen and protein content of Sitka spruce sapwood at different stages through a kiln drying schedule.



William Bodles, a PhD student at Aberdeen University, using molecular methods to identify soil inhabiting pathogens of Scots pine.

COMPLETED PROJECTS

Report Number indicating year, Title, Contractor, Brief Statement and Report Availability

R00/1: A Process Model Analysis of Environmental Limitations on the Growth of Sitka Spruce Plantations in Great Britain (Professor R H Waring, 1998 *John Eadie Fellow*) A simplified physiologically-based model was used to assess growth limitations imposed by various site factors across Britain. Variation in solar radiation associated with topography accounted for nearly half the differences observed in growth. Soil fertility significantly limited growth on a number of sites. This modelling analysis suggests that improved forecasts of Sitka spruce plantation growth throughout Britain could be obtained with better estimates of solar radiation and canopy nitrogen content than with more conventional sets of measurements. Manuscript published in *Forestry*.

R00/2: Creation of Decision-Support Tools for Plantation Establishment (Dr E G Mason, 1998 *John Eadie Fellow*). During Dr Mason's tenure of the Fellowship at Forest Research, he adapted a model for *Pinus radiata* in NZ to examine responses of Sitka spruce to establishment treatments using data from experiments in the Borders/Kielder region. Initial results are encouraging but further work is required. Dr Mason also advised Forestry Commission staff on the potential of an establishment decision-support system to assist forest managers to access the best information before deciding on how to establish crops. Work by Forestry Commission staff is continuing on both projects.

R00/3: The Potential for Extending Forest Cover in Grampian (R Lorrain-Smith, M Bell, D Rees and A Davis). This study examined the potential transfer of land from agriculture to forestry in the Grampian Region. Land will only be transferred to forestry if it is profitable compared to agriculture. This project involved gathering information on all land types. Gross margins for agriculture were calculated and comparable data for forestry were prepared for the most profitable conifer species. Removing all grants and subsidies favours forestry sometimes very substantially. Reducing forestry costs, e.g. by farmers doing their own work, appeared to make a big difference to the area of land under pressure to change to forestry. Including final felling seems to favour forestry, but this would depend on the strength of the desire for early returns. Report available from the Trust priced £5.50.

R00/4: David Douglas Bi-Centenary Trail at Dawyck Botanic Garden (Royal Botanic Garden, Edinburgh). To commemorate the legacy of David Douglas in introducing so many important forest species into this country, the Scottish Forestry Trust helped to sponsor a trail at Dawyck, Peeblesshire. This trail, which has information and "quiz" boards as well as a leaflet, outlines his adventures and his legacy. It is proving very popular, and educational, to children and adults at that botanic garden.

R00/5: Selection of Phenotypically Superior Oaks for Use in an Improvement Programme (Oxford Forestry Institute). Trees have been selected for an oak genetic improvement programme (*Quercus robur* and *Q. petraea*) based on criteria to maximise recoverable timber volume and quality. Trees with larger vessel size were selected against as previous research had indicated they were more prone to shake. Larger vessel size appeared most closely associated with Dutch origins. Seed will be collected from the selected mother trees to establish breeding seedling orchards. Manuscript published in *Quarterly Journal of Forestry*.

R00/6: Forestry: An Economic Development Opportunity for North Scotland (Timber Growers Association and Forestry Contracting Association). A one day seminar and workshop was held at Nairn on 30th September 1999. The main topics discussed were roundwood marketing, economic development and transport development.

R00/7: Control of *Heterobasidion annosum* in Sitka Spruce (A Brown, Forest Research). Ms Brown was

partially funded by the Trust to assist in a forest pathology experiment on "Rotstop" to control *H. annosum* at the Danish Forest and Landscape Research Institute in May 1999. The trials are continuing.

R99/1: Book "Tall Trees and Small Woods" (Dr W E S Mutch). This book addresses the need for more accessible information and better understanding of woodland management for people who are not fully familiar with all the technical aspects of forestry. Available from book shops price £20.

R99/2 Flowering and Seed Production of Aspen in Scotland (Dr R Worrell). Aspen flowers infrequently in Scotland, however in 1996 aspen flowered and set seed profusely. Results published in *Forestry*.

R98/1: An Investigation into the Stability of Irregular Forests Using a Wind Tunnel. (Forest Research and Oxford University). Study used a wind tunnel, scaled trees and mathematical modelling. Results indicate that irregular forests are more windfirm than uniform forests. Unpublished report available.

R98/2: Silvicultural Systems of Lower Saxony and the Netherlands. (Ms J. Dunne). The recipient of this award looked at silvicultural systems and techniques employed in Germany and the Netherlands to transform 19th century pine plantations on heathland soils to more diverse forests. Transformation of forests to continuous cover management was seen to be a lengthy process, during which time all the benefits will not occur. A short unpublished report is available.

R98/3: Ecological Site Classification for British Woodlands. (Forest Research and University of Edinburgh). pH and nutrient-nitrogen availability were identified as the most important components of the soil nutrient regime. Ground flora composition and humus type were particularly valuable in deriving soil nutrient regimes. Results of study have been published in *Scottish Forestry*

R98/4: The Effect of Nursing Mixtures on Stem Form, Crown Size and Wood Quality of Sitka Spruce. (Department of Forestry, University of Aberdeen). Both hybrid and Japanese larch promoted a high rate of growth in Sitka spruce that was equal or greater than that of the annually fertilised pure spruce. By comparison lodgepole pine promoted relatively slow but even growth in the spruce throughout the life of the stand. Lodgepole pine is better able to control growth and branching habit in Sitka spruce, particularly during the critical period immediately following canopy closure with the prospect of better quality sawlogs. Some results published in *Forest Ecology and Resource Management*.

R98/5: Tree Trunk Educational Resources. (Forestry Commission). Programme of educational information related to community woodlands, multipurpose forests, native woodlands and uses of timber was prepared and pilot trials were successfully carried out by formal education and environmental groups.

R98/6: Timber Frame 2000. (Building Research Establishment and TRADA Technology). The Trust provided financial support to supply home grown softwood to construct and test a six storey timber frame building - constructed in a large airship hangar at Cardington to allow a range of tests to be carried out. This project is ongoing. Performance data are being collected as well as the building being used to demonstrate technical aspects to architects and the construction industry.

R98/7: Availability Forecast for the Principal British Hardwoods. (Timber Growers Association). Desk-based project to forecast 20-year availability of the principal British hardwoods. No meaningful and reliable production forecasts by 5 or 10 year periods could be produced for the next 20 years on the information available as broadleaves are subject to widely different management objectives. This report has emphasised the gap in information on the quality of the broadleaved resource. Report is available from the Trust priced £5.50.

R97/1: Fungal Spoilage of Kiln Dried Sitka Spruce at Scottish Sawmills. (Department of Forestry,

University of Aberdeen). Disfiguring sapwood stain can be a problem in kiln dried spruce timber. It is caused by the pigmented sporulating structures of the fungus *Ophiostoma piceae*. The study examined the conditions favouring development of the fungus and highlighted improvements in procedures. The results are contained in a PhD thesis. A short report is available from the Trust and results have been published in *Forestry & British Timber*, and *Material und Organismen*.

R97/2: Cashel - Forestry for a Thousand Years. (Royal Scottish Forestry Society Forest Trust). The Scottish Forestry Trust made a single payment of £35,000 to help establish a native woodland on the eastern shore of Loch Lomond. This project is attracting considerable attention as access, recreation, education and conservation are encouraged with a background demonstration of best forestry practices.

R96/1: Tolerance of Scots Pine to Low Root Temperatures. (Northern Research Station, Forestry Commission). Differences between provenances (four native, a current commercial seed identity and a Swedish seed origin) were observed in susceptibility to frost damage to roots. No differences in tolerance to waterlogging of native provenances were detected. There were however substantial differences observed in the basic morphological and physiological attributes between the origins. The main results have been published in forestry journals. A report is available from the Trust.

R96/2: Socio-Economic Factors Influencing the Decision to Market Timber in the Private Sector. (John Clegg & Co, and Firn, Crichton Roberts Ltd). This study was part of a multi-sponsored marketing project *A Strategic Review of Private Sector Roundwood Marketing in Britain*. Main conclusion was that woodland owners could benefit from being more fully supported in technical and marketing skills. Improvements in marketing structures and services are likely to encourage greater quantities of timber onto the market. A report is available from the Trust.

R96/3: Conservation of Scottish Forestry Soil. (Institute of Freshwater Ecology, NERC). Fourteen soil types grouped within the peat and mineral soil categories were identified as potentially susceptible to erosion if cultivation and drainage are required prior to afforestation. Organic content is the single most important factor controlling the degree of resistance to mineral soil erosion. This study has helped in understanding the mechanics of erodibility of forest soils and in underpinning the theoretical basis of the Forests and Water Guidelines. A report is available from the Trust.

R95/1: Habitat and Diet of Capercaillie in a Commercial Plantation in Central Scotland. (Institute of Terrestrial Ecology, NERC). The role of Sitka spruce in the diet of Capercaillie living in woodland where half of the woodland is Sitka spruce with larch was examined. A report is available from the Trust.

R95/2: Control of Variation in Density in Sitka Spruce. (School of Agricultural and Forest Sciences, University of Wales, Bangor). This study examined the underlying causes of variation in wood density with particular reference to the silvicultural control of critical strength properties. A report is available from the Trust.

R95/3: The Future Location of Forestry in England and Wales, with Especial Attention to the Transfer of Lowland Agricultural Land. (Forestry Industry Council of Great Britain). The work describes a system developed to identify, at a national level, the extent, location and type of land likely to be available for profitable transfer from farming to forestry. A report entitled "The Potential for Extending Forest Cover in the Lowlands of England and Wales" is available price £5.50.

R94/1: An Investigation into the Influence of Site Quality on the Productivity of a Range of Major Tree Species. (Macaulay Land Use Research Institute and Forestry Commission Research Division). This study examined the productivity of Douglas fir, Japanese larch and Scots pine on better quality sites. Site/yield models allowing the prediction of General Yield Class were prepared. A report is available from the Trust.

R94/2: Net CO₂ Uptake of Scottish Forests. (Institute Ecology and Resource Management, University of Edinburgh). The study described the development and testing of a system for the measurement of CO₂ exchange by forest stands.

R93/1: Molecular Methods for the Detection and Identification of *Heterobasidion annosum*. (University of Abertay). Study investigated immunology methods in live trees and harvested wood. A report summarising the progress made is available from the Trust.

R93/2: Private Forestry Policy in Western Europe. (Author: A J Grayson). The implementation of policy and the role of financial incentives in Britain, Western Europe and some other countries including Australia and Russia is discussed against the background of descriptions of the historical and social context of forestry, its legislative, policy and administrative framework, and the taxation and grants regimes employed in the individual countries. Book published by CAB International, Wallingford, Oxon, OX10 8DE.

R92/1: The Development of a Transformation from Uniform Plantations to an Irregularly Structured Forest. (Institute of Ecology and Resource Management, University of Edinburgh). An enumeration survey 40 years into a 60-year transformation from uniform plantations to an all-aged forest of mixed species on an upland site at Glentress in the Tweed Valley. A report is available.

R92/2: The Mechanism of Increased Nitrogen Uptake by Spruce in Mixed Species Stands. (Department of Plant and Soil Science, University of Aberdeen). A study of the mechanisms by which the "extra" nitrogen which results in improved growth of spruce when grown in mixture with Scots pine, lodgepole pine or larch on poor peats and heathlands becomes available. A report is available.

R92/3: "Shake" in Oak. (Oxford Forestry Institute, Oxford University). A study of the defect, including the relationships of oak leaf flushing and autumn shedding to early wood vessel size and a predisposition to "shake", the role of mechanical stresses in the condition, and an evaluation of its economic consequences. A report is available.

R92/4: Survey of Squirrels in Britain. (Timber Growers UK). Results of a questionnaire distributed among private woodland owners to determine the current status of both red and grey squirrels, grey squirrel control, and grey squirrel damage. Designed to be complementary to the Forestry Commission's Annual Squirrel Survey of its forests, and to be combined with it to obtain a more comprehensive assessment. Report available from TGA.

R91/1: The Commercial Potential of Birch in Scotland. (The Forestry Industry Council of Great Britain). An investigation, made by commissioning a collection of essays, into the potential economic, silvicultural and ecological benefits of native birch in Scotland. A symposium based on the material in the essays was held in May 1991. Copies available, price £5, from the Trust.

R91/2: The Ecology of the Great Spruce Bark Beetle (*Dendroctonus micans*) and its Predator, *Rhizophagus grandis*. (Research Division, Forestry Commission). This work contributed to a wider Forestry Commission programme on the development of a monitoring system for *R. grandis* and on the nature of tree resistance to attack by *D. micans*. A report is available.

R91/3: Development of a Computer Programme for Forecasting Conifer Wood Production in the United Kingdom. (Forestry Industry Council of Great Britain). Computer programme developed to assess impact of different planting rates on future wood supplies, capable of accommodating differences in species growth rates, treatments and rotation lengths, and of differentiating wood production into a range of top end diameter size classes.

R91/4: The Forestry Industry and the Greenhouse Effect. (Department of Economics, University College London). A study of economic aspects of the role of forestry in addressing the greenhouse effect, which looked at policies aimed at reducing carbon emissions, and which developed principles on which carbon taxes and credits might be based. Preliminary estimates are made of both taxes and credits. A published report is available.

R91/5: Designated Areas in Scotland. A publication which includes descriptive accounts of the main designated areas in Scotland together with maps of their locations at a scale of 1:750,000. Published by the Scottish Forestry Trust from material prepared by the Institute of Terrestrial Ecology. Price of publication £7.95 obtainable from the Trust.

R90/1: Yield Class and Windthrow Hazard Characteristics of Forestry in the Grampian Region. (Macaulay Land Use Research Institute). A study of the use of predictive models developed at M.L.U.R.I. in the production of information on the forestry potential of the region, and presented in the form of maps of yield class and windthrow hazard. A report discusses the methods and provides a commentary on the maps.

R90/2: The Influence of Wide Spacing of Trees on the Interception of Radiation and the Growth of Trees and Pasture. (Department of Forestry and Natural Resources, University of Edinburgh). A study of light interception by the tree canopy and by pasture grasses, and its relationship to the growth of both components when combined in agroforestry (silvopastoral) systems. A short report is available.

R89/1: The Impact of Forestry on Output and Employment in the United Kingdom and its Member Countries. (Fraser of Allander Institute, with additional survey material compiled by the Department of Forestry and Natural Resources, University of Edinburgh). The first comprehensive estimate of the impact of forestry on output and employment on the aggregate UK economy and those of its member countries. A report is available.

R88/1: Production Forecasting for Private Sector Scottish Forestry. (Department of Forestry, University of Aberdeen). A survey of the private sector growing stock in Scotland, for the purpose of exploring the apparent discrepancies between the national production forecast produced by the Forestry Commission and estimated actual production by the private sector. A report is available.

R88/2: Current Knowledge and Perceptions of Forestry. (Valin Pollen Ltd and Consensus Research). Study identified forestry's key audiences, their knowledge and perceptions of the forestry industry, and outlined the way in which the communications chain operated to influence opinion. Recommendations are made on a more effective communications strategy. A report is available.

R87/1: The Economic Effects of the "Guidelines for the Management of Broadleaved Woodland". (Timber Growers UK).

R87/2: Stirling Forestry Employment Study. (Firn, Crichton Roberts Ltd).

STATEMENT OF TRUSTEES' RESPONSIBILITIES

Charity law requires the Trustees to prepare financial statements for each financial year which give a true and fair view of the state of affairs of the Scottish Forestry Trust and of its income and expenditure for that period. In preparing those financial statements, the Trustees are required to:

- select suitable accounting policies and then apply them consistently.
- make judgements and estimates that are reasonable and prudent.
- prepare the financial statements on a going concern basis unless it is inappropriate to presume that the Trust will continue in existence.

The Trustees are responsible for keeping proper accounting records, which disclose with reasonable accuracy at any time the financial position of the Trust and to enable them to ensure that the financial statements comply with charities' legislation. They are also responsible for safeguarding the assets of the Trust and hence for taking reasonable steps for the prevention and detection of fraud and other irregularities.

ACCOUNTING POLICIES

The financial statements have been prepared in accordance with applicable accounting standards and the Statement of Recommended Practice, Accounting by Charities.

(a) BASIS OF ACCOUNTING

The financial statements have been prepared under the historical cost convention as modified by the revaluation of investment assets.

(b) DEPRECIATION

Depreciation is provided on the cost or valuation of tangible fixed assets over their estimated useful lives to the organisation. The annual depreciation rates and methods are as follow.
Office equipment 20% pa straight line

(c) TRUST FUNDS

The Scottish Forestry Trust Funds are held to promote education, training and research in forestry and silviculture.

The Trust has a single General Fund, which is split between capital and revenue. Under the Trust Deed, the Trustees are empowered to use both capital and revenue for any of the purposes of the Trust and to accumulate revenue. This is modified by the Trust rules to require the Trustees not to so deplete capital that the Trust cannot act properly as a charitable organisation.

(d) INVESTMENT INCOME

Investment income is the income received during the year together with the related recoverable tax credits thereon.

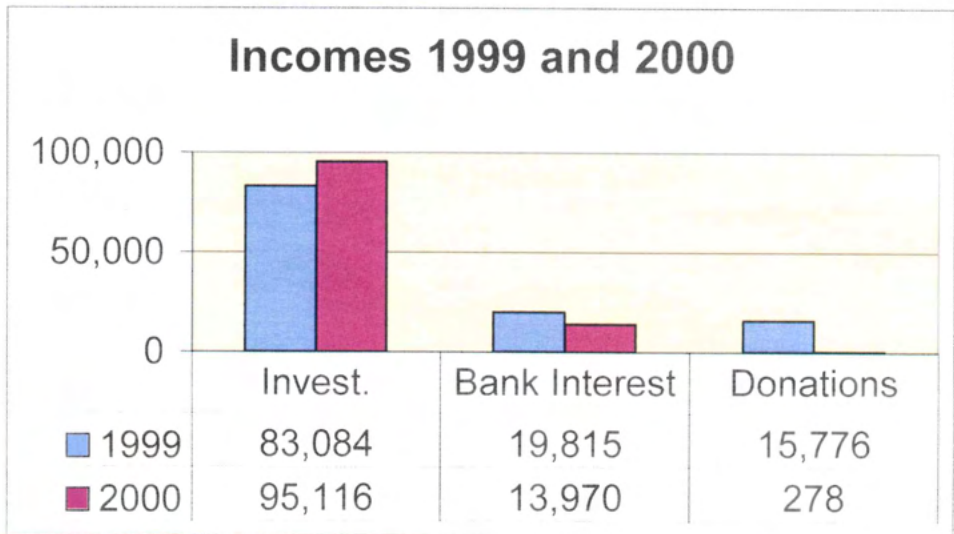
Presentation of Financial Position and Activities

In the following pages the information presented on income, expenditure, and balance sheet has been extracted from the report of the audited accounts prepared by Brown, Campbell and Company for the year ended 31 March 2000.

If you wish to receive a copy of the full report of the audited accounts of the Scottish Forestry Trust 1999-2000, please contact the Trust's office.

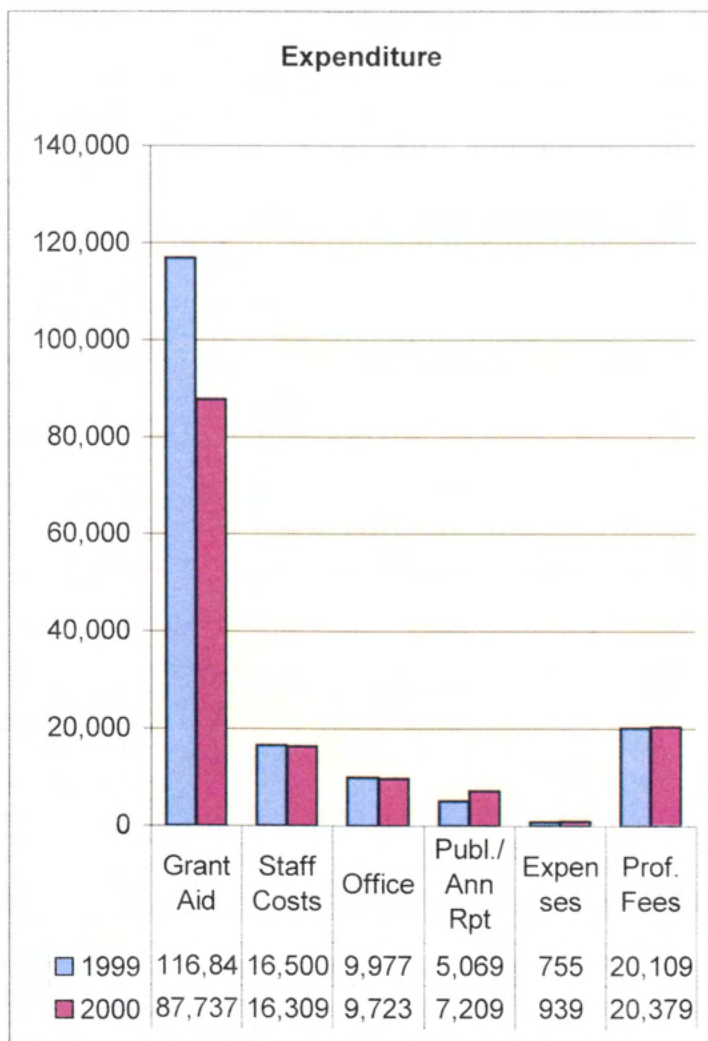
INCOME

	2000	1999
	£	£
Total Income from investment income and recoverable tax credits, bank interest gross, donations and sales of reports.	109,364	118,675



EXPENDITURE

	2000 £	1999 £
Direct Charitable Expenditure	87,737	116,840
Administration & Professional Fees comprising employment costs, trustee expenses, office costs, annual report and publicity, professional fees for investment management, auditing and legal services	54,552	52,410



	2000	1999
	£	£
Net (Deficit)/Surplus	(32,925)	(50,575)
Total Assets Less Current Liabilities	2,878,512	2,657,589
Funds Unrestricted	2,878,512	2,657,589

Contingent Liabilities

The Trust has made commitments to pay grants, conditional on the research continuing and satisfactory reports being received by the Trustees, as follows:

2000-2001:	£107,241
2001-2002:	£57,525
2002-2003:	£40,816

GRANTS and OTHER CHARITABLE EXPENDITURE	2000	1999
	£	£
Tall Trees and Small Woods	-	3,650
The Potential of Extending Forest Cover in Grampian	-	5,477
Effect of Harvesting Machinery on Soil Properties	9,070	4,680
Red Deer and Timber Degrade	5,000	12,000
Environmental Impact Assessment in UK Forest Sector	1,800	2,570
Selection of Phenotypically Superior Oaks	3,753	10,011
Locations of Populations of Scottish Native Trees	8,774	17,536
Flowering and Seeding of Aspen in Scotland	-	750
John Eadie Fellowships: Professor R. Waring + Dr E. Mason	-	12,016
John Eadie Fellowship: other	80	-
Immuno-Contraception of Grey Squirrels	10,000	5,000
Stem Form in Silver Birch Provenances	6,800	6,000
Log Quality Assessment	5,000	5,000
Management Strategies for Capercaillie	5,200	5,200
Broadleaved Timber Forecasting	-	450
Suitability of Birch for Processing	7,500	11,500
David Douglas Bi-Centenary Trail	5,000	5,000
Long Term CO ₂ Sequestration by Sitka Spruce	-	10,000
Using Scottish Hardwoods	5,090	-
TGA Conference, Nairn	500	-
Control of <i>Heterobasidion annosum</i> in Sitka spruce	350	-
Wood Properties of Genetically Improved Sitka Spruce	6,295	-
<i>Peridermium pini</i> in North East Scotland	6,050	-
C:N Ratio of Kiln Dried Sitka Spruce Timber	1,475	-
	87,737	116,840

The Scottish Forestry Trust's financial resources are able to support only some of the very worthwhile applications it receives. The demands for funding are intense. The Trustees would be grateful to receive any contributions in the form of donations or legacies to enhance British forestry through supporting the Trust's activities.

GIFT AID DECLARATION

The Scottish Forestry Trust

Donor's details

Title Mr/Mrs/Miss/Rev/Prof/Dr/Other

Full name (in CAPITALS)

Address (in CAPITALS)

.....

.....

Postcode

I want The Scottish Forestry Trust to treat:

- the enclosed donation of £.....
- the donation(s) of £..... which I made on . . . / . . . / . . .
- all donations I make from the date of this declaration until I notify you otherwise.
- all donations I have made since 6 April 2000, and all donations I make from the date of this declaration until I notify you otherwise.

as Gift Aid declarations

delete as applicable

Donor's signature Date

Notes:

1. You can cancel this declaration at any time by notifying The Scottish Forestry Trust.
2. You must pay an amount of income tax and/or gains tax at least equal to the tax that The Scottish Forestry Trust reclaims on your donations in the tax year (currently 28p for each £1 you give).
3. If in future your circumstances change and you no longer pay tax, and capital gains equal the tax The Scottish Forestry Trust reclaims, you can cancel your declaration (see note 1).
4. If you pay tax at the higher rate you can claim further tax relief in your Self Assessment tax return.
5. If you are unsure whether your donations qualify for Gift Aid tax relief, ask The Scottish Forestry Trust. Or ask your local tax office for leaflet IR113 Gift Aid.
6. Please notify The Scottish Forestry Trust if you change your name or address.

A 3-D sonic anemometer which is part of the equipment used by University of Edinburgh scientists to quantify CO₂ fluxes between a Sitka spruce forest in Perthshire and the atmosphere (page 9/10). The Trust helped fund a project in 1994 at Edinburgh University to develop the system for monitoring CO₂ fluxes. (Photo.: P. Jarvis)



Aspen in Dinnet Oakwood. This is one of the populations of native tree species in the database compiled by the Trust (Photo.: S. Wilson).



Measuring stem straightness in Sitka spruce in a study to assess log quality (Photo: G. Brierley)



Nick Robertson, Edinburgh College of Art being presented with a merit prize for the Hardwood Design Competition by the Deputy Rural Affairs Minister Mr John Home Robertson at the weekend workshop held at the Borders Woodschool. (Photo.: Forestry Commission)

*Marketing of hardwoods is difficult. Three of the projects reported are concerned with improving forecasting supplies and developing markets.
(Photo.: S. Wilson)*



*Predicting product outturns are objectives of several of the current projects being funded by the Trust.
(Photo.: G Brierley).*