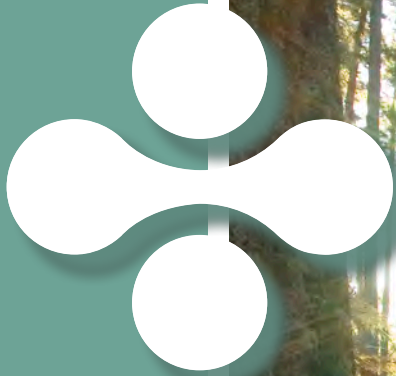




Scion Annual Report 2011





Scion Annual Report 2011

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Scion

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Contents

Contents	3
Chair & Chief Executive report	4
Corporate governance	6
Maximise the quality, speed and impact of Scion’s science	7
Commercial forestry.....	7
Solid wood processing and products	9
Wood fibre, biopolymer and bio-chemical products.....	10
Risk and adaptation.....	12
Licence to operate.....	14
Bioenergy	15
Scion Capability Funding	17
Invest in our people, culture, systems and infrastructure	21
Building international networks.....	21
Good Employer and Equal Employment Opportunities Reporting	24
Managing facilities	26
Financial Performance	28
Directors’ Report	29
Principal Activities.....	29
Summary of Group Financial Results to 30 June 2011	29
Remuneration and Compensation.....	30
Dividend	30
Directors’ Profiles.....	31
Changes in Directors	32
Directors’ Interests.....	32
Directors’ Remuneration.....	32
Use of Company Information	32
The State of the Company’s Affairs.....	33
Auditor	33
Directors’ Indemnity and Insurance.....	33
Statement of Responsibility	34
Performance Targets	35
Audit Report	37
Financial Statements	40
Board of Directors	72
Registered Office	73

Chair & Chief Executive report

Mr Tony Nowell and Dr Warren Parker

Defining changes have been made at Scion over the past 12 months in response to the Crown Research Institute (CRI) Taskforce recommendations and the institute's new Statement of Core Purpose. Scion's strategy has been refreshed and its direction set out in a new five-year Statement of Corporate Intent (SCI), with its execution led by a new Chief Executive. Collectively, these changes have ushered in a positive new environment for the institute's science and its delivery to the forest industry.

Statement of Core Purpose and preparation of Statement of Corporate Intent

Scion's Statement of Core Purpose, approved by Cabinet in October 2010, states that the role of the institute is *"to drive innovation and growth from New Zealand's forestry, wood product and wood-derived materials and other biomaterial sectors, to create economic value and contribute to other beneficial environmental and social outcomes for New Zealand."*

The strategic review and development of the SCI in line with this directive involved extensive consultation with the full spectrum of Scion's stakeholders – industry, Maori, government agencies and staff. Members of the executive and the Board met with more than 80 representatives across the forest industry supply chain to identify their science and technology priorities. Stakeholder views were sought on how Scion can enhance its engagement with them and increase the speed of technology transfer.

This consultation gives us confidence that our new science and innovation framework captures the industry's requirements in a balanced way – both in terms of applied and strategic research, and between established and emerging sectors.

The forest industry is a strong driver of future economic growth

The macro global drivers for the forest industry are positive. World population growth, natural resource limits, the imperative to respond to climate change, and the rapid development of economies such as India and China, provide positive long-term demand for New Zealand forests and the products and services coming from them.

For example, the rapidly escalating global need for renewable and low environmental impact chemicals, materials and energy is stimulating strong interest in

woody biomass substitutes for petroleum-based products. And, limits on the use of water, and changes to global standards for packaging and consumer products are also generating impetus in bioproduct and bioenergy research.

Furthermore, the Emissions Trading Scheme (ETS) is encouraging the replanting of harvested forest stands and ensuring some new plantings. This effect should ensure some expansion in the area of New Zealand's plantation forests over the next decade. The storage of carbon in forests is a large element in New Zealand being able to meet its Kyoto commitments.

With these drivers in mind, Scion's assessment is that with focused effort, and well targeted research and development, New Zealand forest industry exports of \$3.9 billion in 2010 can at least double, and onshore economy activity treble by 2025. However, the circumstances for onshore processors, especially for solid and engineered wood, have been very difficult over the past 12 months due to the very subdued housing and construction market, high log prices and rapid appreciation of the New Zealand dollar. This situation points to the need for on-going product and process innovation and the expansion of export markets, all areas in which Scion is well equipped to provide support to processing firms.

Solid financial performance despite slow economic recovery

The cautious and slow recovery of the New Zealand economy impacted Scion's financial performance with revenues of \$43.4m being \$3.0m behind budget (7%). However, strong cost containment enabled an operating profit of \$2.9m (budget \$2.6m) to be achieved. Extraordinary restructuring costs to right size and align Scion's capabilities, amounted to \$0.5m (budget \$0.2m). A pre-restructuring return on equity of 8.8% (budget 6.5%) was realised. The institute's balance sheet remains strong with positive operating cashflows of \$3.2m and cash reserves of \$6.8m at 30 June. These reserves are committed to a large, multi-year reinvestment programme to upgrade Scion's infrastructure, strengthen its technology translation expertise and prepare both staff and culture for a customer-orientated, outward facing future.

A productive year for our science and technology

Our science team achievements included:

- Launching Rotorua District Council's pilot plant for processing biosolid waste into useful chemical products (see page 14).

- Releasing the parasitoid wasp, *Cotesia urabae*, in Auckland as a biological control agent against the gumleaf skeletoniser caterpillar (see page 12).
- Enabling forest growers to model growth and yield of Douglas-fir, New Zealand's second largest commercial tree species (see page 7).

The investment made by Scion and its partners in biomaterials over recent years bore fruit with the licensing of wood plastic pellet technology to Sonae Industria, a Portuguese multi-national company. This technology enables high performance wood plastic composites to be produced with long wood fibre reinforcement, providing an economical, consistent natural fibre resource for use in manufacturing.

Other technology licensing and sales included:

- Commercialising a microwave moisture sensor for wood processing in partnership with Falcon Engineering (see page 9); and
- Signing an exclusive license for Modified Zeolite Technology, which provides a novel means to improve water quality in surface or waste waters, to Blue Pacific Minerals in Tokoroa (see page 14).

After extensive public consultation, Scion gained approval to proceed with a field trial to test genetically modified radiata pine. This work will be carried out at the institute's Rotorua campus to rigorously evaluate the benefits, costs and risks of this technology within the physical environment over the next eight years.

Future direction built on strengthened engagement with industry and iwi

Looking to the future, Scion is determined to grow the quality of its engagement and value to the forest industry. The ability to direct core funding (some \$17.7m) from 2011-12 will considerably aid in this task. Building enduring partnerships with Maori is especially important given their significant (\$2b asset value in 2010) and growing interests in forestry. The aspiration to conclude Treaty Settlements by 2014 will give further impetus to the return of Crown forest (and other) land to iwi. To support this aspiration, Scion will be establishing a rangatira group to advise the Board before the end of the current calendar year.

The Christchurch (and Japanese) earthquake tragedy visibly confirmed the resilience of wood-dominant buildings. The city's rebuild therefore provides the opportunity to increase the use of solid and engineered wood, especially in commercial buildings. Scion will be working closely with the industry, government agencies and other research providers to

ensure new wood product innovations, in many cases already used extensively offshore, are able to be used in the rebuild.

Increasing world oil prices, conflict and political insecurity in major oil producing regions, the impact of the ETS and continued improvements in bioenergy technologies are reigniting interest from New Zealand firms in biofuels and energy from trees. New Zealand's wood and pulp processing plants are already significant generators of energy from wood residues. There are good prospects for Scion to strengthen its leadership in renewable energy research by working with these firms, and evaluating the adoption of 'drop in' biofuels for New Zealand's transport industry.

Staff achievements

Congratulations are extended to staff members who received special honours this year. Ian Suckling received the Appita Oertel Nadelbaum Distinguished Service Award for his contributions to the pulp and paper industry. Dave Cown was bestowed the Distinguished Service Award from the International Union of Forest Research Organisations (IUFRO) for his achievements in forestry science.

Executive and Board changes

This has been a very busy year for the Board and executive team. Former Chief Executive Tom Richardson was farewelled in September to take up a new role as CEO of AgResearch. Tom is thanked for the many contributions he made over an 18-year career at Scion. The Board also acknowledges Chelydra Percy for the sterling job she did as Acting CEO until Warren Parker's arrival in early March.

The Board and executive especially acknowledge the resilience and commitment of Scion's Canterbury-based staff following the September earthquake, and the associated series of large, seriously disruptive aftershocks. They made an extraordinary effort to maintain project and other work for the institute.

The Board also thanks Michael Ludbrook for his diligent service to Scion as a Board member and Chairman of the Audit and Risk Committee, and wishes him well as he takes up the role of Chairman of Industrial Research Limited. The Director Judith Stanway is welcomed to the Scion Board.

Finally, the Board extends its sincere thanks to the hard working Scion executive and staff, who have all contributed magnificently to the development of a dynamic and exciting new environment for CRIs.

Corporate governance

Scion's Board of Directors is appointed by its shareholding Ministers, the Minister of Research Science and Technology, and the Minister of Finance. All members of the Board are independent. The responsibility of the Board is to guide and monitor the business of Scion and its subsidiaries including:

- adopting policies of corporate conduct (including risk management and delegations of authority) and ensuring that systems and procedures are in place to carry out those policies;
- reviewing and approving Scion's Statement of Corporate Intent;
- adopting annual operating and capital plans and budgets;
- monitoring performance against key objectives and budgets on a monthly basis;
- evaluating the performance of the Chief Executive; and
- evaluating the effectiveness of the Board.

The Board operates in accordance with Scion's Constitution. It has eight directors who meet 11 times over the year. The Chief Executive, Chief Financial Officer and Company Secretary attend all meetings. The Board may retain independent advisers, including independent legal counsel or other experts, as it deems appropriate.

The Board has two standing committees, the Audit and Risk Committee and the Remuneration and Organisation Committee.

The function of the Audit and Risk Committee is to assist the Board in discharging its responsibilities regarding financial reporting, regulatory conformance and matters of risk management. The committee is the liaison point for internal and external auditors, assesses the performance of financial management, reviews audit findings, the annual financial statements and interim financial information, and has oversight of compliance with statutory responsibilities.

The function of the Remuneration and Organisation Committee is to assist the Board in the establishment of remuneration and organisation policies and practices, and to assist the Board in discharging its responsibilities relating to the appointment, remuneration setting and review of Scion's Chief Executive. The committee also approves the appointment and remuneration of senior executives.

Each committee is composed of no less than three members of the Board, appointed by the Board from time to time. While the Chairman of the Board is an ex-officio member of each committee and has full voting rights, he may not be Chairman of the Audit and Risk Committee.

The Chief Executive and Company Secretary attend all committee meetings and all Directors are entitled to attend all committee meetings. Each committee establishes annual work plans and undertakes an annual review of its objectives and responsibilities, and its terms of reference. Each committee also makes regular reports to the Board.

The Board's risk management policy and procedures involve formal reporting by management of the most significant risks Scion is exposed to, and the Board regularly monitors management of those risks. There is also regular monitoring and reporting on actions against recommendations made by external auditors.

Maximise the quality, speed and impact of Scion's science

Commercial forestry

Maximise the value and productivity of commercial forestry

Mapping New Zealand's wood density

Density is a key property determining the stiffness and suitability of wood for end use so growers need to understand how it can be influenced. Scion scientists have produced a map of New Zealand that shows the wood density of radiata pine that can be expected on any given site in the country. Taking this tool to the next step, Scion has developed a growth model that can predict log density by site, with adjustments for age and stocking.

The information produced by this model is based on the most comprehensive dataset of wood density ever compiled in New Zealand from field measurements collected over many decades. Developed through the Future Forests Research (FFR) programme, the project is partly funded by the Radiata Pine Breeding Company. As wood density is driven by temperature, silvicultural regime and genetics, the knowledge gained in this study will help to guide tree breeding programmes and planting decisions on specific sites. Wood density is also a key factor in how much carbon is stored by a forest stand, making the model potentially useful as a carbon prediction and valuation tool.

Further to the work focusing on radiata pine, a model for predicting the wood density of Douglas-fir has been developed for the Ministry of Agriculture and Forestry (MAF). This model will be used to assist with calculating carbon yield tables for the Emissions Trading Scheme.

Douglas-fir growth and yield forecasting

Predicting the growth and yield of Douglas-fir has become easier for growers of New Zealand's second most popular commercial species. A growth model for Douglas-fir, known as the 500 Index, has been incorporated into Forecaster, a widely used software package that enables growers to manage their forests more effectively and to increase economic returns. This development, undertaken as part of FFR, makes Forecaster a powerful planning tool for both radiata pine and Douglas-fir.

During the 2010/11 year, ownership of the ATLAS Forecaster software was transferred to FFR. Scion and FFR have developed a joint business plan for the

continued development of Forecaster and its utility in the forest industry.

Improved genetics for Douglas-fir growers

Genetically improved Douglas-fir seed from New Zealand is available to growers for the first time. Seed orchards, established by Scion in partnership with the Douglas-fir Cooperative, (which now sits within FFR) have produced their first commercial seed crop this year. Both orchards, from Canterbury and central Otago, will provide New Zealand growers with improved genetic stock from selected local progeny. The seed orchards were established in 2005 to fast-track the supply of treestocks that produce high-stiffness wood.

"The seed orchard is a good example of how industry and researchers can work together to achieve a valuable outcome for forest growers. Tree breeding programmes always take a long time so the seed orchard was aimed at speeding up our access to improved stock. This was our vintage year. We obtained 8kg of seed and we expect considerably higher volumes to follow. This is a good result, taking only six years from the initial selections to commercial seed production."

Phil de la Mare – Regional Manager, Ernslaw One

Online cypress planning tool

Forest growers and investors require planning tools to support planting decisions in different parts of New Zealand. A web-based tool has been developed through Scion to assess the growth and return on the two main cypress species grown in New Zealand, *Cupressus macrocarpa* and *C. lusitanica*. The cypress calculator, developed under FFR, is the latest in a range of growth models aimed at encouraging the expansion of diverse species in plantation forests.

Fast tracking forest resource assessment

Tree growth models developed by Scion, and used heavily by the industry, are based on vast amounts of growth data. These data have been accumulated over the last 50 years through measurements taken from 30,000 permanent sample plots located in forests throughout New Zealand. Scion aims to compile similar volumes of data relating to wood properties, but in considerably less time. A novel destructive sampling method has now been mechanised and automated to enable rapid and cost-effective assessment of wood properties. The four wood quality characteristics targeted by this method are density,

spiral grain, chemical composition and microfibril angle.

Data being collected from this programme will form the basis of future growth and quality models that can contribute to decision-making across the whole forestry value chain, not just growing trees. Methods for collecting these data are being refined under an FFR programme.

Improving soil management

Understanding growth and productivity potential across New Zealand is an important aspect of optimising land use and ensuring sustainable forest management. Over the past year Scion scientists have developed a provisional map describing soil carbon:nitrogen (C:N) ratios from an extensive national dataset.

This achievement is an important breakthrough as C:N ratio is an excellent indicator of site fertility. Applications for this “productivity surface” are likely to be many and varied within both forestry and agriculture. This study was funded by MAF under the Sustainable Land Management Mitigation and Adaptation to Climate Change programme.

Scion also completed a multi-year project with Nga Whenua Oranga this year, which involved soil and land use capability assessments at the farm scale. The aim of this project was to support the aspirations of the Maori landowners by transferring the knowledge generated in a manner that they could understand and use in their land management decision-making.

ERMA approval to continue genetic modification research

Making trees grow better and faster is key to improving forest productivity, and genetics play a defining role in achieving this goal. A major milestone was reached in the 2010/11 year for progressing research in genetic modification toward advanced tree improvement.

Scion submitted its application to the Environmental Risk Management Authority (ERMA) for a new field trial to be established in Rotorua. The application, which was presented and scrutinised at a public hearing, attracted support from forest and biotech industry representatives, and local iwi. Supporters argued that research into this technology should continue in order for New Zealand to maintain future options as a competitive primary producer. ERMA approved the field trial application in December 2010.

The approved field trial in containment, commencing in July 2011, will test genetic modification for traits

that could increase the value and usability of wood. Under the ERMA-approved conditions, the trees can be grown to eight years of age, so long as they do not flower. This duration will enable researchers to safely gain meaningful data on aspects of wood quality, including density and pulpability.

This research will build on previous field trial studies designed to assess the environmental impacts of genetically engineered organisms on microbial populations and insect biodiversity. Recently published results showed no effects, either positive or negative, resulting from the genetically modified trees.

Scion has worked closely with the Environmental Risk Management Authority (now the Environmental Protection Authority) and MAF to determine control standards for the new field trial and ensure adequate compliance systems are in place. Throughout the application and planning process, Scion has been proactive in making information available to the public through the media, its website and public meetings.

More efficient pine propagation

The primary means to deploying superior tree genetics is a biotechnology known as conifer somatic embryogenesis (SE). In 2010/11 Scion made significant progress in developing new SE protocols that improve the success rate of propagation.

Four main stages (culture initiation, multiplication, maturation and germination) are completed for SE before germinating embryos are available for nursery propagation. A major limitation of the technology has been a very low initiation rate of cell cultures. Scion’s new SE protocols have lifted cell line capture from 11% to an average of 70%.

When the subsequent SE stages are similarly refined, the New Zealand forest industry will have a powerful tool for the commercial deployment of superior clones. This research, achieved with financial support from the Radiata Pine Breeding Company and external collaborators, has been published in the *New Zealand Journal of Forestry Science*.

Advanced remote sensing for forestry

Improving forest productivity is a priority for Scion and the industry, and effective resource monitoring is a vital aspect of achieving this goal. Forestry companies are increasingly interested in using LiDAR (Light Detection And Ranging) for management purposes. Scion scientists are exploring how forest managers can reap the benefits of LiDAR while remaining realistic about its limitations. A project, funded through FFR and Scion’s capability fund, has revealed exciting possibilities.

Over the past financial year, Scion's research has demonstrated that this technology provides opportunities for calculating tree heights, tree counts and maps showing within-stand variation in carbon stocks, stem volume and basal area. Conclusions from various studies suggest that, used correctly, LiDAR could enable a step change in forest mapping, inventory and information management. Scion has joined the industry LiDAR cluster group to promote the wider use of this technology in management applications.

In a separate but related project funded by the Ministry for the Environment, Scion has been exploring the feasibility of using LiDAR to estimate carbon stocks. In 2010/11, Scion confirmed that methods developed in the previous year for measuring Kyoto forest (i.e. post-1989 plantations) can also be applied to pre-1990 planted forest. In this project, Scion was also able to define the relationship between LiDAR metrics, leaf area index and carbon sequestration rates. These results will enable carbon stock change predictions to be made on a national level using remote sensing technologies, offering considerable cost savings in data collection.

Commercial potential of native species

It has long been assumed that native species were too slow-growing to be suitable for commercial forestry. Research conducted at Scion suggests otherwise. Analysis shows that kauri in plantations is significantly more productive than within natural stands.

At age 50, kauri plantations will have, on average, 12 times more volume than second-growth stands at the same age. These trees are predicted to have 20 times more volume at the same age on good quality sites where some management and silviculture is applied. These gains could make kauri an economically viable timber species, comparable with Douglas-fir in terms of growth rates and wood stiffness. These results point to an exciting opportunity for kauri, particularly within the context of carbon forestry.

A closer look at carbon forestry

Carbon forestry is a much more attractive proposition than livestock farming on poorer hill country according to a collaborative study led by Scion for Waikato Regional Council. The study examined three aspects: the opportunity for the land owner, the opportunity for the Waikato Regional Council, and investment structures for carbon forestry. The study provided a summary of economic and investment information for landowners as part of Waikato Regional Council's carbon strategy to support positive land use change.

Results demonstrate that landowners could expect positive cash flows from carbon within five years,

given good management of sites and species. Carbon forestry can be used to build resilience into farm incomes, and form a significant asset that may help with succession of land ownership.

Counting costs of disease

Dothistroma needle blight has been the focus of considerable research effort in the past because it is one of the most serious diseases affecting growth of radiata pine. Last year the economic effect of Dothistroma needle blight was estimated with reasonable certainty for the first time. The cost to the industry was found to be \$19.8 million per year, due to lost revenue from reduced tree growth and the cost of chemical treatments.

Solid wood processing and products

Improve the competitiveness of the solid wood processing industry

Tools for improved timber processing

The ability for sawmillers to rapidly grade and segregate timber creates huge savings in wood processing costs. A new microwave-based grading technology developed jointly by Scion and Taranaki-based firm, Falcon Engineering, gives accurate moisture content readings on every piece of timber that passes through the mill. This information is useful for structuring loads into kilns so wet wood can be dried more uniformly and energy can be conserved on drier loads. Industrial trials for the moisture sensor have proven successful in the 2010/11 year and Falcon Engineering is now marketing the tool.

The long-standing partnership between Scion and Falcon Engineering also gave rise to the A-grader, an acoustic instrument for measuring wood stiffness. This technology has already proven its worth in many New Zealand and overseas sawmills. Further developments of the A-grader during the 2010/11 year have resulted in a successful "Mark 2" prototype, which includes the ability to measure stiffness more accurately along the entire length of a sawn board.

Upgrading standards for timber-framed houses

The design standard for light timber framed houses in New Zealand is NZS 3604. Scion had significant input into an amendment to this standard, released in the 2010/11 year. The amendment reflected changes to the timber resource in New Zealand, as well as the methods used to grade that timber.

Wood drying goes under the microscope

Drying is a vital step in the wood manufacturing process that can substantially affect the value and performance of end products. Doctoral research completed by two Scion scientists provides fundamentally important knowledge for improving wood drying practices.

Dr Stefan Hill completed his PhD in Chemistry through Victoria University under Professor Sir Paul Callaghan. His project focused on analysing the fundamental interaction between wood strength and water using synchrotron based X-ray diffraction and nuclear magnetic resonance (NMR) studies. He found that water molecules in the cellulose, hemicellulose, and lignin polymers of cell walls have an important structural and mechanical role in the dynamics of the cell wall. These functions also explain the role of water in changing the properties of wood when it is used as building material or in composite products. This research will help in understanding the best way of drying wood and for predicting properties of wood in standing trees.

Dr Hamish Pearson received a PhD from Waikato University. His thesis was on the material properties and stress modelling of wood under high temperature, high humidity and force. Wood is a complex biological material that can distort during moisture exchange as a result of internal stresses. Hamish's research has enabled greater understanding of wood distortion by obtaining fundamental material property data for radiata pine at varying moisture contents and high temperatures. His study included the design of complex equipment to undertake experiments and combined the results into a 3D stress model. This work has been applauded as a much needed original contribution to wood science.

Savings achieved in mills

Wood processors can recover significant savings by adopting the findings of wood drying research undertaken for the industry consortium Solid Wood Innovation (SWI). Over the past year, Scion has completed a range of trials with successful outcomes for SWI stakeholders.

“One of the key R&D outcomes sought for the timber sector is an overall reduction in processing costs via increased efficiency, productivity and decreased consumption of process energy and water. The results from the in-mill research trials supported by SWI have demonstrated that substantial reductions in processing times and energy and water consumption are readily attainable with no impact on product yield and quality.”

Chris Lafferty - Research and Development Manager, Forest and Wood Products Australia

Green technology for wood modification

Wood modification technologies enable softwoods to be used in new and exciting ways. A technology developed by Scion provides a novel way of giving plantation softwoods more stability, durability and hardness. It also allows colour change and options for forming shapes not easily achieved by wood. Over the past financial year, this process has undergone successful scale up trials using an industrial plant, representing an important milestone towards commercialisation. The green technology uses super-critical CO₂ to rapidly remove water from the wood, change its properties and deliver extractives products.

Discovering value in juvenile wood

Juvenile wood formed in young trees is a problem in fast-growing plantation species that are harvested at a young age. This wood is generally viewed by growers and processors as a low-value product of inferior quality in solid wood applications. Scion has entered a collaborative research programme with the VTI Institute of Wood Technology and Wood Biology in Hamburg to explore the cell wall characteristics of juvenile wood in radiata pine and Douglas-fir. This characterisation is a vital step in optimising the utilisation of juvenile wood in a range of manufacturing options. The International Mobility Fund (German-New Zealand) exchange programme brings together complementary skills and microscopy expertise to address an issue that is common to forest growers in both countries.

Wood fibre, biopolymer and biochemical products

Expand opportunities in the wood fibre, biopolymer and biochemical industries

Commercialisation breakthrough for wood-plastic composites

A new wood plastic pellet technology developed by Scion has the potential to revolutionise the composition of plastics worldwide. Scion has negotiated a licensing agreement with Portuguese-based wood processing company, Sonae Industria, for the manufacture and sale of the wood plastic pellet technology. The agreement gives the Sonae Industria Group an exclusive licence to commercialise the technology in Europe.

Scion developed and patented this technology under its biofibre research programme funded by the former Foundation of Research Science and Technology (now Ministry of Science and Innovation). The technology enables production of wood plastic composites with

long wood fibre reinforcement. This process provides an economical, consistent, natural fibre resource in high-density pellet or dice form. These pellets are easily fed into conventional extruders and injection moulders and processed as biobased fibre reinforced plastics.

The main advantage of these new wood plastic pellets is the strength they give to traditional polymers. So much so, that Sonae Industria has named the technology's product "WoodForce". Applications for the technology are wide-ranging and could include decking, fencing, pallets, furniture, automotive parts, appliance housings, computer peripherals and many common applications for plastics and fibreglass products.

While the first commercial applications of the technology are likely to appear in Europe, the intellectual property is retained in New Zealand with Scion having filed international patent applications for the technology. In addition to the licensing deal for Europe, Sonae Industria has the right to negotiate with Scion for other regions except for Australasia, Japan and Korea.

"Scion is clearly a leader in research involving sustainably-derived biomaterials. Together with our expertise in both wood processing and commercialisation, we make a unique and powerful team."

Christophe Chambonnet (CMSO – Chief Marketing & Sales Officer), Sonae Indústria.

Bioplastics build momentum

Global trends to use renewable resources and reduce environmental footprints are driving rapid growth in bioplastics. In 2010/11 Scion completed a roadmap for bioplastics that reviews international trends and developments and identified areas of major opportunity for New Zealand. The resulting research plan is designed to ensure New Zealand manufacturers, packaging producers and product marketers can benefit from bioplastic innovations and access a local centre of leading expertise.

Successful industrial trials for biofoam

An environmentally friendly alternative to polystyrene took a step closer to commercialisation over the 2010/11 year. The biofoam product known as expanded polylactic acid (E-PLA) has been developed by Scion for the Biopolymer Network Ltd (BPN), with input from BPN's other research contractors. Over the past year, industrial trials were conducted by major polystyrene moulding manufacturers in New Zealand, Europe and the United States. Results from these trials show that the award-winning technology could replace polystyrene in a range of applications.

The industrial-scale trials, together with performance tests, showed that the E-PLA can be moulded on existing processing equipment without the need for major modifications. The range of shapes and mouldings achieved in these trials demonstrate the versatility of this technology for applications ranging from commodity packaging to underfloor insulation blocks, and even automotive parts. The E-PLA foam products, as well as being renewably resourced, are likely to be readily composted according to international standards, if desired.

During the 2010/11 year, Scion completed a life cycle assessment for BPN which showed that the E-PLA has a carbon footprint at least 26% less than polystyrene.

New light on composites

An extraordinary lamp design by celebrated artist and furniture maker, David Trubridge, has drawn attention to the possibilities offered by new biomaterials. His lamp is constructed from a composite material developed specifically for this project using bioplastic (polylactic acid) and harakeke fibre (New Zealand flax). The new material, developed in a partnership between Scion and BPN, demonstrates the beauty and pliability of bioplastics combined with natural fibres. The lamp design, named Tipu, stands two metres in diameter. It was unveiled at the prestigious Hawke's Bay Invitational Art Exhibition and sold on the first night.

Bark used in marine paint

Materials extracted from pine bark show promise in new technologies for paint and adhesive products. Derivatives from this hardy natural substance have been used in marine paints that are being developed by Scion in collaboration with a New Zealand paint manufacturer. In the 2010/11 year, field trials were completed by the manufacturer using additives produced by Scion. The new bio-based marine antifouling agents tested favourably against the company's current formulations, and this completes a critical step towards commercialisation.

Finnish collaboration opens up lignin potential

The improved utilisation of co-products, such as lignin, is essential for the economic viability of the softwood-to-biofuels value chain (see page 15). Lignin extracted as a co-product of biorefinery processes, can be converted into renewable replacements for, or alternatives to, current petroleum-based products used in resins, adhesives and plastics.

In 2010/11 Scion has made significant progress in lignin utilisation through a collaborative research programme with the VTT Technical Research Centre of

Finland. The first results to arise from this collaboration were jointly published in *Bioresources*, an international journal for lignocellulosic sciences. The research described in this paper allows Scion to use enzymes provided by VTT to modify the surface properties of lignin so it becomes easier to blend with other substances. This important outcome has been made possible through sharing skills and expertise between the two organisations.

There is growing worldwide interest in developing biorefinery technologies. Improved understanding of this major industrial shift was the goal of a workshop run in October 2010 as part of the Knowledge Based Bio Economy – European Union (EU) twinning programme. Scion produced a report summarising the activity and outcomes of the first joint EU-Australia-Canada-New Zealand workshop on biotechnology for biorefineries and bio-based materials, which was accepted by the Ministry of Science and Innovation (MSI). Scion represented New Zealand and co-led the mission with MSI.

Plastics from corn residues

Exciting new opportunities are opening up in North America, driven by New Zealand technology company, LignoTech Developments Ltd. Their focus is on transforming under-utilised residues that are arising in increasing volume from bioethanol plants into new functional additives for plastics and bioplastics. Key to the LignoTech process are patented technologies for steam explosion, which they are developing in partnership with Scion. These commercially focused projects are aimed at fully understanding the steam exploded residues and their functional attributes in plastics processing and associated moulded products.

Risk and adaptation

Improve New Zealand's preparedness for biosecurity incursions, fire and climate change

Biological control of urban forest pest

An unwanted caterpillar that defoliates trees and stings people is under attack from a new biological control agent released by Scion in January 2011. The gumleaf skeletoniser (*Uraba lugens*) is an Australian moth that has become an invasive pest in Auckland, Waikato, Coromandel, Bay of Plenty and Napier. In the past year, gumleaf skeletoniser was located in Nelson, which is the first record of this pest in the South Island.

A newly introduced parasitoid wasp, *Cotesia urabae*, was released by Scion in Auckland as a biological control agent for gumleaf skeletoniser. Biological

control has been a very effective and safe means of managing other eucalypt pests in New Zealand, reducing the need for chemical insecticides.

The wasp, which specifically targets the pest and lays eggs inside the caterpillar's body, was sourced from Tasmania (in collaboration with the University of Tasmania/Tasmanian Institute of Agricultural Research). Since the release, several cocoons of the wasp have been found in the field, indicating that the agent is establishing in its new environment. The successful release of the wasp was the outcome of a four-year biological control project, supported by MAF's Sustainable Farming Fund.

"Trees that provide shade and have become part of the Auckland landscape have suffered and died over the past 10 years. Until now we have relied on expensive treatments such as injecting trees and the removal of infested foliage. At best this has proved a stop gap measure. We are hopeful that biological control will help manage this pest."

Ian Maxwell - Manager of Parks, Sport and Recreation, Auckland Council

Science support for pest eradication

For pesticide applications aimed at pest eradication there is no margin for error. The treatment must effectively reach the target organism in all affected areas, while minimising costs and unwanted environmental and social impacts. Research by Scion assists operational managers with the complex decisions associated with pest incursions, building on the valuable experience gained in past eradication campaigns.

A key factor in meeting operational targets lies in the aircraft calibration procedure. In 2010/11 Scion developed new protocols for aircraft calibration that will improve the chance of success in future eradication campaigns. The calibration process is designed to ensure that the specified pesticide dose is efficiently distributed across the target area at minimum cost. The new calibration protocol is available to MAF for use in future incursion responses. This important outcome, which was funded through the Better Border Biosecurity collaboration, was achieved by analysing actual data from the salt marsh mosquito eradication programme in Hawkes Bay in 2008.

A joint approach to pest management

New Zealand's widely recognised biosecurity expertise is contributing to a pest control programme aimed at managing and containing a horticultural pest in California. Light brown apple moth (*Epiphyas postvittana*) has been present in New Zealand since the early 20th century and is a managed pest in this

country. Not so in California. Scientists at Scion and Plant & Food Research are working with the United States Department of Agriculture Animal and Plant Health Inspection Service on a cooperative programme to trial pheromone application for mating disruption as an alternative to spraying pesticides.

In the 2010/11 year, a trial was completed in a New Zealand vineyard to test the effectiveness of new pheromone products and delivery methods. Over 45,000 moths were trapped during the course of this trial, providing large amounts of data for analysis. Scion contributed to the design and execution of the trial and provided specialised expertise in assessing and modelling aerial concentrations of pheromone, to help identify the most successful approach. This research, which has been carried out as part of the Better Border Biosecurity programme, builds valuable knowledge on the use of mating disruption as a tool for incursion response and pest management in New Zealand.

Adaptations for healthy forests

Predicting the likely impacts of climate change on plantation forests is seen as important step towards risk management and adaptation. A large research programme funded by MAF aims to model the effects of changes in environmental conditions on tree growth, and impacts caused by changing wind, fire and disease risks. Improved understanding of environmental drivers will ultimately help managers to make informed decisions on future siting of plantation species or management of existing species.

Helping New Zealand rural fire agencies to understand changing risks was the focus of two major fire climatology analyses completed during 2010/11. One provided an improved description of current fire climate severity across the country which will be used to support the definition of boundaries for proposed enlarged rural fire districts. The second analysis, conducted as part of a MAF-funded Sustainable Land Management Mitigation and Adaptation to Climate Change project, provides updated estimates of the effects of climate change on future fire danger. The study confirmed the potential for increased fire risk in eastern areas where fire risk is already elevated.

Fires resulting from arson and carelessness by recreationists, tourists, lifestylers and farmers present a significant risk to New Zealand's rural landscapes. Conclusions from a social research project, completed during 2010/11, identified options for mitigating human-caused fires. This information is seen as useful by the Department of Conservation, Federated Farmers, and local government agencies responsible for managing fire risk.

Trends in Douglas-fir health

Swiss needle cast is the main disease of Douglas-fir in New Zealand so information on managing the disease is valuable to forest growers. Scion and Oregon State University have completed a collaborative study focused on relating climate factors to disease severity and foliage retention.

Researchers used historic data from a nationwide set of trials to quantify the disease severity and foliage loss caused by this disease. Results have confirmed that Douglas-fir is healthier and more productive in much of the South Island and at higher elevations in the North Island, where winter and spring temperatures are cooler. Further research looking at genetic influences identified good opportunities for breeding resistance of Swiss needle cast into North Island Douglas-fir plantations.

Insights into worker safety and productivity

A doctoral study completed by Scion researcher Richard Parker provides a unique glimpse into the work patterns of people in dangerous occupations. The human factors researcher developed new ways of measuring workers' activities using wearable video cameras and sensors. This technology enables researchers to gather data about what workers are doing, where they are doing it, and how hard they are working at the time (i.e. heart rate). This technology was combined with reflective interviews that provide an in-depth understanding of why workers approach tasks in the way they do. This research has provided valuable insights into the work of tree fellers and rural fire fighters that will improve productivity and help to prevent injuries in these high-risk activities.

"We now have the means to look more closely at tasks, the work content and the associated hazards than we have been able to in the past. The challenge is now for industry to capitalise on this world class research. For example, by studying workers with different levels of expertise, training programs could be modified addressing differences between a trained and experienced worker."

Glen Mackie – Policy Analyst, Forest Owners Association

Licence to operate

Ensure the New Zealand forest industry's licence to operate domestically and internationally and enhance environmental performance

New waste conversion technology

The Minister for the Environment Hon Dr Nick Smith opened a pilot plant in Rotorua that will test an innovative process for converting biosolid wastes into valuable chemical products. The pilot plant uses thermal deconstruction to “cook” the biosolids (sewage sludge) and break them down into re-useable chemicals and other by-products. These chemicals can be used for fertilisers or in the production of bioplastics and biofuels.

This technology arises from a research project involving Scion and the Rotorua District Council, who joined forces in 2008 to develop a new approach to the management of organic waste. The pilot plant will initially operate for 12 months. Depending on the results, the next stage will be to construct a demonstration plant, sized to handle all of the biosolids from Rotorua's Wastewater Treatment Plant.

Rotorua District Council sees the potential of the technology to not only improve its waste disposal processes but to provide a revenue source from the converted waste. Rotorua has approximately 8,500 tonnes of biosolid waste going to landfill every year at a current cost of approximately \$920,000. This project has the potential to further reduce all organic waste sources going to landfill.

The technology was originally developed through a programme funded by the Foundation for Research, Science and Technology (now the Ministry of Science and Innovation). In 2010 the Ministry for the Environment committed to an investment of up to \$1 million over two years, under its Waste Minimisation Fund, to support further development of the technology.

“Biosolids or sewage sludge generated by sewage treatment is a big problem for councils around the country due to the large volume and hazardous nature of this waste. That's why this thermal oxidation technology developed by Scion is extremely important to help reduce organic waste going to landfill as well as cutting our greenhouse gas emissions.”

Hon Dr Nick Smith – Minister for the Environment.

Expanding scope for lake restoration

Improving lake water quality is a challenge for most regions of New Zealand. Successful lake trials of a modified mineral (zeolite), developed by Scion, Blue

Pacific Minerals and the Bay of Plenty Regional Council to reduce nutrient impacts, have led to commercial expansion of the product. During the 2010/11 year, Scion negotiated an exclusive licensing agreement for modified zeolite with Blue Pacific Minerals. The Tokoroa-based manufacturer is now working to scale up production to provide suitable volumes for lake treatment applications by the Bay of Plenty Regional Council. The product is being marketed as Aqual-P.

In February 2011, the Regional Council used Aqual-P to treat an algal bloom threat in Okawa Bay on Lake Rotoiti. Council staff and residents observed a rapid improvement in water quality and the algal bloom did not become a serious health issue.

Reducing fumigation at ports

Enhancing market access while reducing the use of methyl bromide as a fumigant for exported goods is the focus of a group known as Stakeholders in Methyl Bromide Reduction (STIMBR). Scion supported STIMBR in its successful funding application to the Primary Growth Partnership to support increased research in this important area. Scion is a large contributor to this project with research aimed at reducing fumigant release to the atmosphere, developing alternative chemicals and non-fumigant approaches to risk management.

An early outcome of related research has reduced fumigant use by demonstrating that fumigated goods do not necessarily require re-treating if they are delayed at the port, provided critical parameters are accounted when making decisions. At present, if goods are fumigated and left for 36 hours they must be retreated at significant expense. As a result of Scion's recommendations on critical parameters, MAF has modified its requirements and reduced the need for additional treatment.

Achieving compliance in herbicide use

Weed control is the single biggest establishment cost in New Zealand plantation forests. Without it, new forest plantings struggle to get started. Therefore, retaining cost-effective weed control is a major challenge to the plantation forestry sector due to compliance issues associated with Forest Stewardship Council (FSC) certification.

To support the industry's commitment to addressing herbicide issues, Scion completed an in-depth review of chemical and non-chemical weed control regimes. Results showed that the use of weed mats, manual, and mechanical control would be too costly and, also, unsuitable for many sites in New Zealand. The study concluded that it would not be economically viable for forest growers to avoid the use of herbicides

altogether and points to the importance of developing cost-effective compliant herbicide, and non-chemical, options for growers. This analysis has been published in the *Canadian Journal of Forestry Science*.

This research was undertaken as part of a collaborative research programme, known as "Undermining Weeds". In 2010/11, MSI identified this research as a good example of a contract that is delivering tangible benefits across the agriculture and forestry sectors. MSI has invested in the four year project to limit the spread of damaging weeds and mitigate their impact using environmentally sustainable controls. The research combines scientific expertise from AgResearch, Scion, Landcare Research and Plant Protection Chemistry NZ Limited.

Measuring footprints on the environment

Environmental issues have assumed an escalating importance for government, businesses and consumers alike. Life Cycle Assessment (LCA) is the pre-eminent technique to quantify environmental issues like carbon footprints. In the 2010/11 year Scion completed an LCA of the new Arts and Media building at Nelson Marlborough Institute of Technology (NMIT). The multi-storied building is a world first for both its timber earthquake resistance design and its unique laminated veneer lumber (LVL) primary structure. The purpose of the LCA was to compare the energy consumption and the carbon footprint of the NMIT building over its complete life cycle, spanning 60-100 years. Results of the LCA demonstrated that the existing timber structure reduced greenhouse gas emissions around 8% compared with concrete and steel constructions using the same design.

During the year, Scion undertook several other LCA projects to determine the footprints of LVL, wood-ethanol, diesel, kraft pulp and tissue paper. These LCA studies are providing insights concerning environmental efficiency and can be used to evaluate technologies in the associated supply chain.

Calculator for sustainable design

In a world where environmentally friendly building systems are increasingly in demand, it is necessary to understand the impact of all building components. A web-based calculator based on LCA data has been developed by Scion to support the design of wall systems in homes that are environmentally friendly and economical. The Australasian data sets that have now been added to the calculator have customised it for local conditions.

A prototype of the upgraded calculator was promoted by the Gypsum Board Manufacturers of Australasia as part of the Building Products Innovation Council's (BPIC) life cycle inventory database in Australia.

Completion of the wall calculator allows more building elements to be incorporated (e.g. windows, floors, roofs). Scion has received strong support from BPIC to strengthen trans-Tasman collaboration to extend the database further and include primary industry data.

Footprinting primary industries

Research aimed at measuring the environmental footprint of primary industries will be greatly improved by water footprinting methodologies developed by Scion over the past year (see page 19 on Capability Fund projects). This new capability has been used to help with AgResearch's red meat water footprint work, to inform ISO standards development and to produce a screening study of new lignin utilisation options in pulp and paper processing.

The focus on primary industry footprints has been further enhanced through research undertaken for the New Zealand Life Cycle Management Centre. Scion has continued to work with Massey University, AgResearch, Landcare Research, and Plant and Food Research to operate the centre, which aims to build New Zealand's capability in life cycle management. A crucial collaboration this year was an initiative funded jointly by MAF and Zespri to compile data sets in a way that conforms to the international life cycle database.

Bioenergy

Increase New Zealand's energy security through the expanded utilisation of forest biomass for energy

Biofuels from forests

In New Zealand, forests offer a significant opportunity for large-scale production of biofuels to replace fossil fuels. A pre-treatment process for radiata pine has been developed by Scion to improve the enzymatic conversion of softwood into sugars. These sugars can be used as feedstocks for the production of biofuels such as bioethanol, biobutanol and hydrocarbons. In pilot-scale trials, Scion has achieved a 79% recovery of fermentable sugars from the pre-treated softwood. The first sugar syrup arising from this process is undergoing trials in the United Kingdom with a partner who has a proprietary microbe producing biobutanol.

This research is being carried out as part of the New Zealand Lignocellulosic Biofuel Initiative. The aim of this multi-agency programme is to demonstrate that biofuels and lignin co-products can be produced from softwoods in a cost-effective and environmentally sustainable manner. Research at laboratory and pilot-scale is being used to model the economics of a 90 million litre per year commercial bioethanol facility in New Zealand. The partners in this programme include

Beca AMEC and the United States Department of Energy Joint Bioenergy Initiative.

Government recognition for forestry biofuel option

A report published by the Parliamentary Commissioner for the Environment recognised the opportunities for forest-derived biofuels identified by Scion in the Bioenergy Options for New Zealand project completed in 2009/10. Results from this project demonstrated that woody biomass from plantation forests offers the only renewable resource of sufficient potential volume to supply biofuels on a national scale. Scion's analysis of wood supply using geographical information systems (GIS) forms one of the major appendices to the Parliamentary Commissioner's report.

Torrefaction creates biofuel opportunity

A thermal treatment technology called torrefaction has been adapted by Scion to create a light, energy dense fuel product from radiata pine that has a range of potential applications in industry. Torrefaction removes water and wood volatiles to produce a solid, dry material that has about a third less mass while retaining 90% of its energy content, thereby reducing transportation costs and overcoming supply and storage problems associated with wet firewood and wood pellets.

Scion's focus on torrefaction of New Zealand's radiata pine reflects growing world-wide research interest in this technology. Torrefied biomass can be used in large-scale coal-fired power stations or in smaller coal-fired heat plants as a replacement to burning coal – thereby reducing CO₂ emissions. It can also be condensed into pellets and used in home heating like existing wood pellets (albeit with a much higher energy density).

Scion Capability Funding

Each year, the Minister of Research, Science and Innovation provides each Crown Research Institute with funding, referred to as Capability Funding “to support the distinctive role of the Crown Research Institute to maintain the strategic organisational and scientific capabilities required for the provision of public good science and related activities in New Zealand.”

In the 2010/11 year Scion received \$4.26 million for Capability Funding. Investments made were to:

- develop capability aligned to major strategic developments within Scion;
- seed capability growth in discrete areas that support other activities; and
- enable small projects aimed at supporting individuals aligned to organisational goals, where no other support was available.

Harvesting

Harvesting incurs about 40-50% of all forest production costs. It is also a labour intensive and physically demanding activity. Scion has supported harvesting research since 2007 through Capability Funding where it was, for a time, New Zealand’s only research activity in this vital area of forest production. Since then Future Forests Research (FFR) has developed a programme and now receives support through the Ministry of Agriculture and Forestry’s (MAF) Primary Growth Partnership (PGP) fund. Scion has reduced its investment in this area as the FFR programme has developed.

The FFR programme develops new machines and systems to harvest trees on steep country. Scion is supporting this programme through a study on novel concepts for moving machines through the forest. Scion also focuses on human factors research in workforce scheduling and environmental aspects of harvesting, particularly riparian management (where it has aligned to a PhD programme). Scion is receiving growing support from industry to provide information about avoiding stream contamination associated with harvesting operations.

Looking ahead: The programme on environmental aspects of harvesting will continue in the 2011/12 year under the new Core Funding (superseding the Capability Fund) and with growing support from the industry, regional councils and land owners.

Genetics and propagation

Scion has long supported industry-driven activities to develop improved radiata pine, which represents 90% of New Zealand’s commercial forests. Non radiata species, including indigenous species, are of increasing significance to improve material and biological diversity for New Zealand. Scion needs an effective capability in genetics and propagation to translate its tree development research into viable solutions.

Outcomes this year include the support of an international scientist to enhance leadership across the tree development programme and improve alignment with related activities in molecular tree breeding, quantitative genetics and propagation. This capability has provided a clearer definition of industry requirements and identified where Scion’s future activities must focus. For example, before increased use of indigenous species can occur on any scale, the risks associated with propagation and growth of these species must be reduced. This programme has gone a long way to achieving this aim with six indigenous species (kauri, silver beech, totara, kahikatea, miro and rimu) now able to be propagated through tissue culture techniques. In addition, promising protocols for the propagation of cypress species have been developed.

Looking ahead: This programme will continue into the 2011/12 year with Core Funding investment. It will be integrated with other programmes focused on molecular techniques and molecular discovery to streamline tree improvement developments for commercial use and to strengthen national capability in expanding the use of indigenous species.

Molecular biodiscovery

Capability in identifying, isolating and characterising suitable genes based on sequence databases provides valuable information for tree improvement programmes. Over the past year, Capability Funding has enabled the isolation of genes in radiata pine associated with the production of terpenes. The techniques developed in achieving this result have direct application in improving tree disease resistance, and developing important chemicals for various applications within the plant (e.g. in biorefineries).

Looking ahead: This programme will be supported through Core Funding and become part of a broader tree development programme. Many of the genes developed in the programme have direct application to key targets for Scion in the 2011/12 year, such as

producing trees for chemicals (thereby aligning with lignin and bioplastics research).

LiDAR - Light Detection and Ranging

Increased accuracy in forest inventory enables substantial improvements in forest management and productivity. LiDAR can be used to support traditional inventory applications (e.g. measuring standing volume) and to provide other benefits such as measuring carbon stocks, tree architecture and biodiversity. The aim of this small project was to build Scion's capability in LiDAR application and explore its commercial value to the New Zealand forest industry.

Scion now has the capability to support on-going work for industry in this area. International collaborations have been developed to enhance this capability.

Looking ahead: Capability in the use of LiDAR will now be incorporated into ongoing programmes in forest inventory, forest productivity improvement and ecosystem services.

Dutch elm disease

Researchers world-wide are looking at new methods for the sustainable control of tree diseases. In New Zealand, Dutch elm disease is being used by Scion as a test system for biological control methods using viruses. The aim of Scion's research project is to introduce a virus into New Zealand's pathogen population to reduce the pathogen's virulence. If successful, the virus will reduce the number of dead elms and slow disease spread to other parts of the country. In the absence of a control programme, the disease would be expected to wipe out over 90% of elms in New Zealand, as it has in other parts of the world.

Work completed in this project has significantly increased Scion's capability in virology and biological control using mycoviruses. The capabilities have enabled Scion to undertake the science required to support an ERMA application for a pathogen relating to Dutch elm disease. This work also paves the way to use biological control for other disease problems in New Zealand's native and plantation forests.

Looking ahead: This work will be incorporated into Scion's core biosecurity programmes and will ultimately support disease management plans by regional councils.

Sustainable economics

The direct and indirect value of forestry to New Zealand can be substantially increased by taking advantage of environmental services they generate such as carbon sequestration, recreational uses,

increased biodiversity, erosion control and improved water quality. The aim of this project was to identify ways that forest owners can realise returns from these non-timber values, including meeting the requirements for non tangible product attributes such as Forest Stewardship Council.

Although carbon is now a reasonably well quantified value within forestry, other forest qualities such as land and water management, or recreational uses are not easily quantified. The University of Washington has developed a system called ECOSEL which matches willing sellers of environmental services with willing buyers. Through this mechanism the purpose or management regime of a forest can be defined. This system was evaluated this year in a mock auction and has indicated that it could be a viable way to monetise such services. In an aligned study at a recreational park it was demonstrated that users place high value on the biodiversity, ambience, aesthetics and kinship services provided by a forest.

Looking ahead: This work will now be incorporated into Scion's larger ecosystem services programme.

Native forests on marginal land

Indigenous wood cover is an important land use option for many parts of New Zealand, where land is steep, not easily accessible and has limited utility. Such land could exceed 1.7 million hectares in New Zealand, providing a substantial opportunity to increase indigenous biodiversity and carbon sequestration.

The focus of this project is to develop the capability to enable large-scale and cost-effective establishment of indigenous species, exploring approaches such as direct seeding and facilitating natural reversion processes. Using kanuka, totara and beech as test species Scion has demonstrated that greater establishment success occurs through seeding alongside existing woody cover, or on microsites where competition from grasses is less intense. Overall, however, Scion's work in this area indicates that there is no easy way to achieve expansion of native forests on such land.

Looking ahead: Support from a MAF sustainable land management grant will enable this work to continue, with growing support from Department of Conservation, regional councils and land owners. Scion is optimistic that sufficient knowledge will be gained to allow indigenous forestry options to be included in comprehensive land use decisions.

Lignin

With lignin representing some 25% of the mass of a tree, its successful utilisation as a high value product could considerably improve the profitability of wood processing. The objectives of this project are to manipulate lignin as a renewable resource and establish its credentials as a high value chemical, substituting for some petrochemicals. Applications include the use of lignin as a plastic or component part of new bioplastics, as an additive to other materials to improve fire retardancy, or in production of new high-performance fibres.

This project has been instrumental in establishing an international partnership for Scion with the VTT-led Lignival initiative and the European Cooperation in Science and Technology Action in biotechnology for biorefineries. It has strengthened Scion's capabilities in enzyme applications, bio-discovery, lignin modification and bioplastics development.

Looking ahead: This project will be supported by Core Funding and integrated into Scion's biochemical (including bioplastics) programmes.

Renewable energy

Woody biomass is New Zealand's largest residual biomass resource. It currently supplies about 7% of New Zealand's energy needs and has the potential to substantially increase this contribution. The challenge, as with all geographically dispersed resources, is the ability to cost-effectively supply an energy plant with sufficient volume and quality of wood resource. This programme has focused on building capability aligned to: improving process and supply chain efficiency; utilising exergy approaches to permit analysis of energy production options; and developing knowledge of energy densification techniques (such as torrefaction) to enable greater use of wood for energy.

A GIS-based biomass supply model developed by Scion has been adopted by end users to investigate resource options for potential processing scenarios. The exergy work has identified that biochemical approaches to energy production are more energetically efficient than thermo-chemical approaches. It has also shown that combining such conversion approaches with geothermal energy makes a possible step change improvement in overall process efficiency and economic viability.

Looking ahead: This work will continue under Core Funding and will be integrated into a larger programme exploring energy options using woody biomass.

Water footprinting

Even in a water rich country such as New Zealand, water use and its stewardship are becoming increasingly topical. Water is an important requirement for wood processing and the forestry sector, and lack of access to water will prevent industry expansion. High quality stewardship of water and other resources is also an important consideration in sustaining any company's licence to operate, either formally (resource management) or informally (market acceptance).

Scion has expanded its Life Cycle Management (LCM) capability to include water footprinting so the appropriate use and management of water resources for production systems can be analysed. Scion has evaluated and applied water footprinting methodologies to tissue paper manufacturing and ethanol production from wood (both being water intensive operations). A method has also been established to include new impact categories around water footprinting in the software systems typically used for LCM interpretation. This work enables Scion to use both volumetric and impact approaches in water footprint assessments.

Looking ahead: This project has established Scion's capabilities in water footprinting to the extent that Scion can now undertake analysis and use this capability in our licence to operate/environmental work streams.

Biodegradation

Biodegradation is the breakdown of a material into benign end-products using naturally occurring processes. With the national push to reduce pressure on land-fills and improve sustainability, the ability for products (especially packaging) to naturally degrade after their use is of increasing financial value to producers and consumers. An obvious question associated with many products is "How long will it take to break down or bio-degrade?"

This question is an intrinsic consideration in the new material and product development programmes undertaken by Scion. Capability Funding has been applied to develop competence in this area, leading to the construction of a biodegradation facility at Scion, the first of its kind in New Zealand. Complete life cycle assessments and biodegradation studies have been undertaken for a packaging material and a bioplastic product. This work has generated greater knowledge of the sustainability criteria of these products and supported enhanced product development.

Looking ahead: This new capability at Scion has enhanced working interactions with international entities such as CSIRO and many end users such as the

plastics companies, bioplastics associations and packaging industry. It will now become embedded within Scion's core material development projects.

Bioplastics

Plastics derived from renewable resources (bioplastics) are of increasing international interest as those derived from petrochemicals increase in cost and are less attractive to global consumers. Scion is developing capability in the production and integrated conversion of new functional bioplastics for packaging and plastic products. This project, now in its second year, also enables Scion to more effectively work with international science programmes while ensuring relevance to New Zealand and locally sourced resources.

Scion has developed new bioplastics from woody materials at a scale that permits meaningful material evaluations. New polymers and techniques have been developed that support other projects across Scion such as the development of new composites and packaging materials. Through this work and associated collaborations, Scion is now recognised as an active member of the international research community in bioplastics development.

Looking ahead: A bioplastics roadmap has been developed that integrates all the related activities across Scion into a single large coherent programme of activities. This will continue to be underpinned by Core Funding in the 2011/12 year.

Multi-phase metabolomics for microbes

Metabolomics is an approach that analyses the products of metabolism in a biological system. This analysis assists in identifying the functional roles of genes in response to changes in the cellular environment. A comprehensive understanding of metabolomics is important for Scion to develop its industrial and environmental biotechnology platforms. The aim of this project was to develop analytical and technological capabilities for a multi-phase (i.e. solid, liquid and gaseous) metabolite profiling platform using metabolomic and titrimetric off-gas analyses and mass spectrometry as tools for metabolite monitoring and identification.

Using model systems, Scion has shown that different analytical tools allow extensive profiles to be described, providing a complete organism or metabolomic pathway. The techniques and capability developed in this project have strengthened Scion's national and international partnerships. The titrimetric off-gas analysis analyser (TOGA) developed through this research is now being commercialised and two have been sold this financial year, one in New Zealand and the other in Canada.

Looking ahead: The capability developed in this area will now be integrated into Scion's biotechnology programmes, including biochemical, biofuel, biopolymer and wood processing research.

Land use optimisation

New Zealand has a major opportunity to better utilise marginal land for growing forests that provide commercial revenue (timber or carbon), amenity values, or environmental protection. Starting in 2009/10, Scion has been developing capability to support better land use decision making. This project has included development of a uniform approach to carbon accounting which is now being used across Scion's decision support systems for forests and land-use. It has enabled technologies for web-based knowledge transfer and evaluating the impact of distributed processing in New Zealand. It also enabled the development of expertise in database infrastructure and spatial data management.

This project interfaces with the native forest regeneration project and supported the development of an integrating framework for robust decision making systems. It has also provided the underpinning capability to support a number of government and commercial projects on the sustainable use of land.

Looking ahead: The capabilities and techniques developed will be formally integrated into a focused programme addressing land-use decision making.

Invest in our people, culture, systems and infrastructure

Building international networks

The New Zealand forest industry operates in global markets. To remain competitive it must access and adapt the latest technologies and secure intellectual property in emerging market areas as quickly as possible. Scion plays essential roles in connecting and linking firms and in forming large multi-disciplinary teams to discover new solutions.

National and international collaborations are required to assemble teams with sufficient scale, experience and resources to tackle these big challenges and opportunities. Scion demonstrates real strength in leveraging international networks to build these collaborations, enabling knowledge sharing and capability building for the benefit of New Zealand. Highlights of the 2010/11 year include:

- Scion took part in a biofuels and bioenergy mission to Canada led by New Zealand Trade and Enterprise. The mission included visits to research organisations and universities undertaking biofuels development, and companies with demonstration scale biofuels and bioenergy plants. This participation is positioning New Zealand to participate in international research sciences for rapidly expanding bioenergy.
- Group Manager Bioproduct Development Elspeth MacRae was appointed as Deputy Coordinator for IUFRO's Task Force on Bioenergy from Forest Biomass, which met for the first time in March 2011. Senior scientist Dr Eckehard Brockerhoff was appointed as Coordinator of Research Group 7.03 (Forest entomology) and the Deputy coordinator of Division 7 (Forest Health). Elspeth also serves on the steering group for a pan-European strategic COST action on the future for forestry and forest products and services, and represented New Zealand at the European annual review of forest products and services COST actions. In all of these fora, Scion has significant influence on New Zealand's behalf.
- Transferring research between the European Union, Australia and New Zealand is enabling greater global understanding of forestry and climate change. These collaborations are enabled by the European Union International Research Staff Exchange Scheme (IRSES), under the "TRANZFOR" programme. During the 2010/11 year Scion participated in 18 scientist exchanges.

Among the seven scientists who visited Scion was Dr Hugh Evans, who is the head of Forest Research in Wales. The strengthening relationship between Dr Evans and Scion has resulted in his appointment to Scion's newly formed Science Advisory Panel.

Recognising high performance

The development of meaningful solutions to complex problems requires the focus of strong science teams comprising talented individuals. Over the 2010/11 year, 14 Scion staff were recognised through a range of awards and scholarships. Highlights of these awards include:

- Fibre processing scientist Ian Suckling was recognised for his on-going contribution to Appita – the technical association that represents the Australian and New Zealand Pulp and Paper Industry. Ian was presented with the Appita Oertel Nadelbaum Distinguished Service Award for 2010.
- Senior scientist Dave Cown received a Distinguished Service Award from the International Union of Forest Research Organisations (IUFRO) for his contribution to forestry sciences spanning over 40 years.
- Cathy Hargreaves, a scientist in Scion's tree breeding and propagation team, received a funding award under the 2011 Dumont d'Urville Science and Technology Programme. The award has enabled Cathy to advance her research focusing on novel technologies to propagate conifers through international collaborations with researchers at two French forest research organisations (INRA and FCBA). The funding will facilitate the reciprocal visits of two Scion scientists and one from each of the French institutes over the next two years.

Outreach and communication

Direct engagement with key stakeholders enables Scion to provide leadership in developing new opportunities and accelerates the uptake of new knowledge and technology. During 2010/11, Scion engaged with a range of industry, science and community groups to achieve the following impacts:

- Strong interest in bioplastic and packaging opportunities is building among local producers through networks being developed by Scion. A

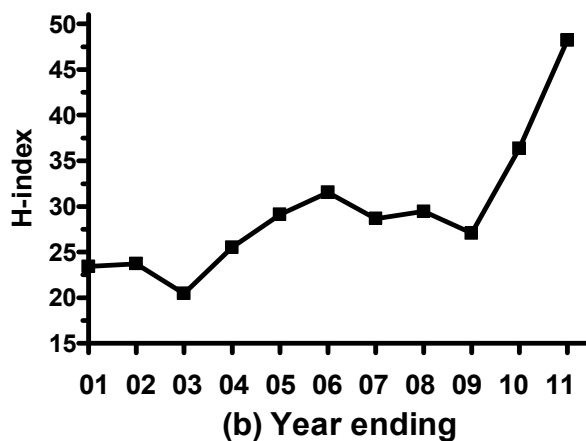
workshop held by Scion in August 2011, attracted over 70 external registrants from manufacturing companies and service providers, generating greater awareness in bioplastics research and development. As a result of this workshop, Scion was invited to deliver a series of lectures focusing on biopolymers for the Plastics Centre of Excellence at the University of Auckland.

- The development of next generation liquid biofuels and co-products was the focus of Scion's inaugural Biofuels Science Symposium in December 2010, supported by the Ministry of Science and Innovation and the Ministry of Foreign Affairs and Trade through the Science Promotion Fund. The purpose of the symposium was to bring together science experts from New Zealand and overseas to strengthen collaborative networks in biofuel development. This event led to the establishment of a group called the Advanced Biofuels Research Network aimed at maximising collaboration between New Zealand research providers.
- Information presented by Scion staff at a forest productivity workshop strongly influenced the direction of the New Zealand Forest Owners Association research strategy, which is a key document that embodies the forest industry's vision for future development. The workshop, which was run by Future Forests Research (FFR) at Scion, was attended by representatives from industry and staff from the Ministry of Science and Innovation (MSI).
- As the world seeks solutions to growing waste management issues, a key aspect of achieving sustainable outcomes is to involve communities in the decisions affecting their resources. A public engagement model focusing on biowaste management in Kaikoura is proving to be an exemplar for achieving community-led outcomes, underpinned by science. The community is working directly with scientists to explore options for using stockpiled biosolids to enhance soil nutrients in various land management applications. The research collaborators involved in this project are Scion, Environmental Science and Research, Te Runanga o Kaikoura, Wheua.biz, Landcare Research, Cawthron Institute, Plant and Food Research and Lincoln University.

Publications

Scion seeks to provide high-quality science that meets user needs in the short- and long-term. This outcome can be demonstrated through high-quality science publications that enhance Scion's international

reputation and visibility as a research institute. Over the 2010/11 year Scion showed significant improvement in the average number and success of peer-reviewed publications in high-rating journals, as shown in the figure below.



During 2010/11 Scion scientists produced 117 papers in peer-reviewed publications. Following are the top five papers measured by H-index, which is an international index for measuring the impact of a published scientific or scholarly work:

- Marcus, S.E., Blake, A.W., Benians, T.A.S., Lee, K.J.D., Poyser, C., Donaldson, L.A., Leroux, O., Rogowski, A., Petersen, H.L., Boraston, A., Gilbert, H.J., Willats, W.G.T., Know, J.P. (2010) Restricted access of proteins to mannan polysaccharides in intact plant cell walls. *The Plant Journal* 64, 191-203.
- Strong, P.J., Gapes, D.J., McDonald, B.M. (2011) Combined thermochemical and fermentative destruction of municipal biosolids: a comparison between thermal hydrolysis and wet oxidative pre-treatment. *Bioresource Technology* 102, 5520-5527; 5533-5540.
- Soheli, M., Jack, M. (2010) Efficiency improvements by geothermal heat integration in a lignocellulosic biorefinery. *Bioresource Technology* 101, 9342-9347.
- Torr, K.M., van de Pas, D.J., Cazeils, E.F.Y., Suckling, I.D. (2010) Mild hydrolysis of in-situ and isolated *Pinus radiata* lignins. *Bioresource Technology* 102, 7608-7611.
- Watt, M.S., Bloomberg, M., Finch-Savage, W.E. (2011) Development of a hydrothermal time model that accurately characterises how thermo-

inhibition regulates seed germination. *Plant Cell and Environment* 34, 870-876.

Developing Maori scientists

A partnership between Scion and Nga Pae o te Maramatanga has created a valuable opportunity for Maori science students to gain work experience, while assisting Scion with projects at the interface of Maori knowledge and science. Three students worked at Scion for 10 weeks during the 2010/11 year.

Marina Hetaraka (Ngati Whatua, Te Uri o Hau, Tainui) assisted with a project focusing on cultural values in well-managed forests and land use planning of marginal lands. She recently began a Masters degree at Otago University. Anastasia Rickard (Ngati Pikiāo, Ngati Te Takinga, Ngati Porou, Ngati Koata) worked on a project to develop a model riparian area in the Rotorua area to meet a range of community, cultural and environmental aspirations. Anastasia is studying towards a Bachelor of Science degree, also with Otago University. Jamaine Fraser (Pae Tahī, Tainui) is completing a Masters Degree in Design with Massey University in which he is creating a display range of bioproducts.

In a separate programme, Maori Massey Masters student Christina Marshall (Ngai Apatu) is working with Scion on a two-year project to research the genetic diversity of totara. The research involves identifying DNA markers to differentiate the four different species of totara in New Zealand. The project involves significant Maori consultation as the totara is a taonga species. Scion staff and Christina have worked on the consultation process together.

Sponsorship and corporate social responsibility

Scion provides sponsorship for community and staff activities, with a particular focus on opportunities to promote science. During 2010/11, Scion sponsored 30 events covering a range of activities from local sporting events to providing awards and scholarships. Sponsorship highlights of the year include:

- International Year of Forests – 2011 has been declared International Year of Forests by the United Nations General Assembly. Scion has supported a range of local and national activities to promote public awareness of the multiple benefits arising from forests.
- Timber Design Awards – 2011 marked the 12th year that Scion has sponsored awards at the University of Auckland School of Architecture and Planning. Winners for three awards selected for their innovative use of timber in design were Bachelor of Architecture students, Ran Xu, Shiqi Lin and Ray Lee.

- Suffrage Centennial Scholarship – Scion awarded the 2010 Suffrage Scholarship to Rotorua Girls High School student Alivea Smith. Alivea received \$2000 towards her university studies and a contract for summer vacation work.
- Christchurch Agricultural and Pastoral Association (A&P) show – Christchurch enjoyed a record turnout at their annual A&P show despite disruptions caused by the September earthquake. Scion's stand, which was aimed at raising the profile of science and advising on career opportunities, attracted high public interest and was awarded the Best Indoor Trade Site at the show.

Conferences provide a valuable forum for building networks and exchanging knowledge within and between the science and end user communities. In the past year Scion has provided sponsorship for the following symposia involving a range of key stakeholders:

- Queenstown Molecular Biology 2010 – New technologies for a new economy;
- Whenua Conference 2010 – Sustainable futures with Maori land;
- New Zealand Acoustical Society Symposium 2010;
- New Zealand Association of Resource Management 2010;
- Forestwood 2010 – New Zealand Forest Owners Association and Wood Processors Association Annual Conference;
- New Zealand Ecological Society Conference 2010;
- New Zealand Freshwater Sciences Society 2010;
- NZ Bio 2011;
- Lakeswater Quality Society 2011 – Fix a lake and grow a city;
- Processing and Fabrication of Advanced Materials XIX;
- Forest Industry Engineering Association Residues to Revenues 2011 – Turning bioenergy potential into profit;
- Australian and New Zealand Pulp and Paper Industry (Appita) Annual Conference 2011;
- International Research Group of Wood Protection (IRG) 2011;
- Australia and New Zealand Institutes of Forestry Conference 2011– Pacific forestry – growing a forestry future;
- Plastics New Zealand Conference 2011.

Science in the Park

Strawberry DNA, plastic rockets and icecream were used to bring science alive for the community at Scion's biennial open day. Thousands of people from the Bay of Plenty and beyond enjoyed a sunny day of

science-related fun at “Science in the Park” in March 2011.

A total of 2,786 visitors were counted at the free community event that aimed to create a greater local awareness of Scion and its activities. People were able to see how Scion’s science and technology directly benefits their community and themselves.

Over 100 Scion staff worked to create 33 displays and activities in the programme including two tours. The mix provided a good interactive showcase of science and technology in a family-friendly way. Representatives from Rotorua District Council, Bay of Plenty Regional Council and Zespri joined staff to demonstrate joint projects.



Good Employer and Equal Employment Opportunities Reporting

Scion’s strategic goal “Invest in our people, culture, systems and infrastructure” is underpinned by programmes and practices that address:

- Good and safe working conditions and equal opportunities;
- Impartial selection of suitably qualified persons for appointment;
- Recognition of aims and aspirations, employment requirements and the need for involvement of Maori employees;
- Opportunities for enhancement of the abilities of individual employees;
- Recognition of aims and aspirations, employment requirements and the cultural differences of ethnic or minority groups;
- Recognition of the employment requirements of women; and
- Recognition of the employment requirements of persons with disabilities.

Farewell to a valued staff member



Dr Mick Hedley (1944-2011) was a major contributor to the critically important field of wood preservation science. Mick’s work was instrumental in the development of the ability to treat pine with preservatives so that it can be used in environments such as framing for houses, decking, fencing, landscaping or for poles and piles. He has left an enduring legacy for the New Zealand wood industry and the international science community.

Safe and healthy environment

Scion’s Health and Safety Representative Committee supports proactive workplace inspections, wellness, hazard identification, induction completion, incident reporting and injury prevention.

Scion participates in the Accident Compensation Corporation’s Workplace Safe Management Practices Audit Programme at Secondary Accreditation level and

has initiated a progressive Health and Safety Plan to obtain Tertiary Accreditation during 2012. Initiatives implemented in the past year include newly formatted reporting and target setting, revised training programmes, hazard reviews and preparation for the development of a new Human Resources Information System supporting a single, database for hazard management.

Personal responsibility is promoted through inclusion of health and safety objectives in all position descriptions and personal performance plans. A new quarterly safety award recognises excellent demonstrations of best practice health and safety.

The table below shows figures relating to health and safety matters over the past year. Three serious harm accidents were reported and cleared by the Department of Labour - two as a result of human error with no liability was identified on Scion's part.

Serious Harm	Incidents/ Injuries	Near Misses	Return to Work Plans	Potential Hazard	Lost Work Days
3	40	19	2	17	19.25

Recruitment, selection and induction

Scion is committed to equality of opportunity and rejects discrimination on any grounds for all employees (whether they be current or prospective employees). Robust recruitment and selection systems are in place to ensure an impartial, transparent process focussed on selecting the best person for the job.

During the 2010/11 year, 12 permanent staff were recruited. Two of these were from South Africa, and one from Scandinavia. Highlights included the recruitment of a new Chief Executive, and the welcome return to Scion of Dr John Moore, a New Zealander who has been working at Napier University in Edinburgh for the last five years.

A new induction programme has been launched to support the rapid settling in of new recruits. This includes a formal welcome (or whakatau). Feedback has been positive, with the whakatau seen as a particular highlight. The whakatau provides new employees exposure to Maori protocols, which are an important dimension in Scion's updated plan to work in partnership with iwi to support sustainable economic development of their natural assets. Hosted by the executive team, the whakatau is also an excellent opportunity for managers and new employees to get to know one another.

Leadership, accountability and culture

Scion has implemented a leadership mindset development programme aimed at executive managers and high performing, high potential (HHP) employees. Fifty-five employees selected for the HHP cohort now have individual development plans that support their career development as well as giving priority access to development opportunities such as Radical Collaboration, Facilitating Complex Meetings and one-on-one coaching.

There was no better example of Scion's demonstration of Leadership, Accountability and Culture than the organisation's response following the Christchurch earthquake on 22 February 2011. Scion quickly established an Emergency Response Team that could effectively meet the needs of the 28 staff based in Christchurch. Once individual safety was established a daily telephone conference call became a strong link that enabled direction, coordinated support services, ensured team engagement and maintained cultural unity for the team.

Employee development, promotion and exit

The development needs of all employees are formally identified during the organisation's twice yearly performance review process. Scion employees are able to access career development support from the following options: Radical Collaboration; Facilitating Complex Meetings; Getting Organised; Presentation Skills; Report Writing; Working Sustainably with Maori Organisations; Belbin Team Roles; and the Myers Briggs Type Indicator.

A number of employees have also been sponsored to obtain external qualifications. Five Scion staff completed PhDs on the following topics during the 2010/11 year:

- Dr Stefan Hill – Water in *Pinus radiata* wood secondary cell walls: An investigation using nuclear magnetic resonance and synchrotron x-ray diffraction. (Victoria University of Wellington);
- Dr Richard Parker - Technological advances in the analysis of work in dangerous environments: tree felling and rural fire fighting. (Massey University);
- Dr Hamish Pearson - Material properties and stress modelling of radiata pine at high temperature. (University of Waikato);
- Dr Jeff Seadon – Integrated waste management (University of Auckland);
- Dr Mohammed Sohel - Thermodynamic Modelling and Simulation for High Efficiency Design and Operation of Geothermal Power Plants. (University of Canterbury).

Remuneration, recognition and conditions

Scion's remuneration system links pay and performance. The 2008 Collective Employment Agreement (CEA) specifies the association between annual remuneration changes and employee performance.

Employee recognition at Scion is formally awarded by long service awards, service recognition leave, and Emeritus Status award for recognition of services rendered to retiring staff. Monetary awards were made to five staff for 20 year service awards and four for 30 years. One staff member, Tom Lamason achieved 50 years service. As Scion's longest serving employee, Tom (pictured below), was honoured at a special function in recognition of his outstanding commitment, meticulous work and exceptionally positive attitude.



Flexibility and work design

Flexible work arrangements and work-life balance are integral to the Scion employment value proposition. During the past year eight employees reduced working hours, and four employees increased working hours. Of the 76 employees who work part-time, 22 are male and 54 female. Two employees took extended leave without pay and 10 took extended parental leave (without pay).

A Scion long serving, HPHP employee, Cathy Hargreaves was featured in a Rotorua Daily Post article espousing the work life balance that is possible at Scion. She describes Scion as a "fantastic and outstandingly compassionate employer who allows her to work flexible hours and also helps her achieve a balanced lifestyle."

Harassment and bullying prevention

Scion has zero tolerance to harassment and bullying and responds promptly to all accusations of harassment and bullying. Measuring collaborative behaviours in the annual performance review has

enabled Scion to address early indicators of unacceptable behaviour that may lead to harassment and bullying. During 2010/11 no harassment or bullying claims were made.

Scion's learning and development plan includes provision of both in-house and external coaching services to assist with the resolution of issues faced by employees and managers. The Radical Collaboration training programme provides employees with new tools and safe language for assessing their own behavioural contribution to conflict and also the courage to ask for help at an early stage.

Scion employees are supported with any workplace or personal concerns through a free and confidential Workplace Support Services now rebranded as VITAE (on site) and Employee Assistance Programme Services (offsite). As at 30 May 2011, 25 employees had used the Employee Assistance Programme and 306 interactions had occurred with VITAE.

Workplace profile

As at 30 June 2011

- Total permanent employee complement of 338 - 184 males and 154 females;
- Maori represent 6% of permanent employees;
- 4% of employees are recorded as disclosing a disability;
- 26% of employees are in the under 40-years age group, 35% are in the 40 to 49 years age group, and 39% in the 50 years and over age group; and
- 30% of employees are recorded as disclosing a nationality other than New Zealander or Maori, and represent 28 nationalities.

Managing facilities

Infrastructure investment

High-quality facilities and science equipment are critical to a science organisation's success. Scion has embarked on an ambitious programme to upgrade its facilities and equipment over the next five years. During the 2010/11 year, Scion made the following investments:

- A new confocal microscope was installed in July 2010 as an upgrade for its 13-year-old predecessor. The Leica TCS SP5 II was the first instrument of this particular configuration in the world at the time of purchase. The new instrument has enormously expanded science capability compared to the old microscope with both UV and visible light imaging, the ability to

measure fluorescence spectra, and the ability to study molecules in various ways.

- A new facility was established to monitor the biodegradation process of bioplastic materials under controlled conditions. The facility, which is the first of its kind in New Zealand, simulates the conditions experienced in industrial composting plants. It measures the CO₂ given off over time by decomposing materials, which is the key indicator of biodegradation by microbes. The data obtained from this facility is valuable for research into formulation development and for measuring material compliance with international compostability / biodegradation standards.
- An upgraded NMR (nuclear magnetic resonance spectrometer) has been purchased to enable the structural analysis of solid materials.

Environmental performance

Sustainability is a guiding principle for all Scion's activities and is also viewed as a normal part of business best practice. In keeping with these values, Scion aims for continuous improvement in the management of facilities and operations to reduce waste and resource consumption. Three years of data collection enable progress to be measured against the environmental indicators articulated in the company's Sustainability Policy.

As a result of recycling, Scion has continued to reduce the amount of waste to landfill. Overall volumes have reduced by at least 50% since 2004 when an estimated 19m³/FTE was landfilled. In the past two years an average of 1470kg per annum of organic waste was diverted from landfill to on-site vermicomposting. Scion's ability to manage and monitor waste on site was improved during the year through a change in waste management suppliers.

Over the past year, recycling capacity has increased to accept greater volumes and a wider range of products. Previously discarded polystyrene petri dishes are now collected for direct conversion into new products such as coat hangers. A metals recycling bin has also been installed on site to take away larger pieces of scrap metal that previously went to landfill.

Staff have continued to focus on energy, waste and consumables reduction over the past year. Reductions in gas usage, along with reduced national and international staff travel, have resulted in a significant reduction in Scion's overall carbon footprint.

Scion has recently become a member of Enviro-Mark and is now working toward bronze certification within their environmental management framework.

Financial Performance

Directors' Report

Principal Activities

New Zealand Forest Research Institute Limited (trading as Scion) is a company registered under the Companies Act 1993. Our principal activity is to conduct research in accordance with the purpose and principles specified in Sections 4 and 5 of the Crown Research Institutes Act 1992 (the Act). Scion has met all the obligations under the Act for the year ended 30 June 2011.

Scion is a commercially focused science and technology company, delivering solutions to both commercial and Crown clients. The principal research facility is located in Rotorua.

Scion has two wholly-owned subsidiaries, Atlas Technology Limited and Te Papa Tipu Properties Limited, and is a shareholder in three associate companies – 25% ownership of Frontline Biosecurity Limited, 20% ownership of Beacon Pathway Limited, and 33.33% ownership of Biopolymer Network Limited. Scion is also a member of the research consortium WQI Limited with a 6.02% shareholding.

- Te Papa Tipu Properties Limited owns the Group's land assets.
- Atlas Technology Limited is a non-operating shelf company.
- Frontline Biosecurity Limited is an incorporated joint venture, the purpose of which is to collaborate in the research and development, and commercialisation of a heat disinfestation process and other biosecurity processes. This company is no longer operating.
- Biopolymer Network Limited is an incorporated joint venture whose purpose is to create technologies for advancing the utilisation of renewable biobased materials in industrial applications.
- Beacon Pathway Limited is a consortium with five shareholders and carries out research in the area of sustainability in the built environment. This company is in the process of being disestablished.
- WQI Ltd is a consortium with 25 shareholders and carries out research focused on wood quality, appearance and stability that can affect the performance of the wood, and to develop effective segregation methods and technologies that allow the industry to gain maximum value from their timber resource.

Summary of Group Financial Results to 30 June 2011

	2011	2010
	\$000	\$000
Operating revenue	43,353	43,493
Surplus before taxation	2,330	3,240
Taxation expense	513	4,218
Net surplus attributable to the shareholders	1,817	(978)
Equity		
Issued and paid up capital	17,516	17,516
Retained earnings	8,373	6,556
Reserve	54	48
Total equity	25,943	24,120

Scion's strategy focuses on delivering science and technologies in the following key areas:

- Commercial forestry
- Wood products and processing
- Wood fibre, biopolymer and biochemical industries
- Risk and adaptation
- Licence to operate
- Bioenergy

The Statement of Corporate Intent maps out the strategic framework for Scion to achieve outcomes aligned to its Statement of Core Purpose, and the New Zealand Government’s overarching objective for Crown Research Institutes to lead the country’s economic transformation.

Scion’s science and commercial focus is strongly aligned with the opportunities being presented locally, nationally and globally, and when brought together, will continue to enable Scion to provide leadership on issues of local, national and global significance.

Remuneration and Compensation

Remuneration and compensation included performance awards, superannuation benefits, and KiwiSaver subsidy. Some other benefits were not quantified and are therefore excluded, including staff parking, home telephone, and membership of relevant professional societies.

Bands		Number in Each Band
\$250,000	– \$259,999	1
\$230,000	– \$239,999	1
\$220,000	– \$229,999	2
\$210,000	– \$219,999	1
\$200,000	– \$209,999	1
\$180,000	– \$189,999	2
\$170,000	– \$179,999	2
\$160,000	– \$169,999	1
\$150,000	– \$159,999	1
\$140,000	– \$149,999	2
\$130,000	– \$139,999	6
\$120,000	– \$129,999	8
\$110,000	– \$119,999	9
\$100,000	– \$109,999	14

During the year ended 30 June 2011, \$241,952k was paid to 10 employees in relation to cessation of employment with Scion (2010: \$58k to three employees).

Dividend

No dividend was recommended for the year ended 30 June 2011 (2010: \$1,109k).

Directors' Profiles

Mr Anthony (Tony) Nowell (Chairman) is a professional company Director and Founding Director of Valadenz Limited, a trade and export development company. Previously he was the CEO of Zespri International, and positions he held before then included Managing Director of Griffin's Food Limited and Regional Vice President of Sara Lee Asia. Mr Nowell brings extensive experience in governance and international trade and development to the Board. He is currently Chair of Wellington Drive Technologies Limited and New Zealand Food Innovation (Manukau) Limited, Deputy Chair of Leadership New Zealand and a board member of Food Standards Australia New Zealand and the Export Advisory Board of Business New Zealand. Mr Nowell also represents New Zealand on the APEC Business Advisory Council (ABAC) and has previously Chaired the New Zealand Food and Beverage Taskforce and the New Zealand Packaging Accord Governing Board.

Ms Alison Andrew (Deputy Chair) has held leadership positions in industries that include chemicals, dairy, paper and forest products, and oil and energy. She has deep experience in operating businesses, growing businesses and turning businesses around. Based in Auckland she is the General Manager of Orica Chemnet NZ, a role she took on in October 2009 after almost two years as CEO of Lexicon Systems Ltd, an Australasian marketing and advertising company. Previously she held a number of senior executive positions at Fonterra Co-operative and Fletcher Challenge. She has an MBA and BE (Hons) in chemicals and materials.

Mr Peter Berg, ONZM, (Director) – is President of the New Zealand Forest Owners Association Inc., Deputy Chairman of Tane's Tree Trust, a Board member of Forest Industry Training and Education Council (FITEC) the New Zealand forest industry training organisation, a member of the Auckland Conservation Board, Chairman of Pentarch Forest Products Limited, Chairman of Berg Forests Limited, on the Board of the Wood Council of New Zealand (WoodCo) Inc. and New Zealand section Chair of the Commonwealth Forestry Association. Previously Mr Berg held various Chief Executive and other senior positions in the forestry sector and public service both in New Zealand and offshore. Mr Berg holds a BSc and BForSc (Aberdeen) and is a member of the New Zealand Farm Forestry Association and Fellow of the New Zealand Institute of Forestry, where he was recognised as Forester of the Year 2006. In 2010 Mr Berg received the Kirk Medal from the New Zealand Institute of Forestry.

Mr Sheldon Drummond (Director) – has served on the New Zealand Forest Owners Association Executive for three terms. He is the General Manager Forests for Juken New Zealand Ltd as well as sister company First Light Mushroom Ltd. Sheldon has a good appreciation of radiata processing and marketing as well as forest management in New Zealand and worldwide. He was instrumental in the establishment of the Government's Wood Processing Strategy and the subsequent benefits such as rural roading and labour and skills strategies which have assisted East Coast and Northland forestry during recent years. Mr Drummond is a long standing member of the Eastland Wood Council and maintains a keen participation in local and national forest issues. He has sound contacts and relationships throughout the industry and Government.

Mr Chris Karama Insley, Te Whanau a Apanui and Ngati Porou (Director) – has extensive experience in plantation forest management in New Zealand and has spent time living and working in the US and Canada. He is highly active in working nationally with Maori to develop scalable sustainable economic development strategies in response to climate change and, is actively working with Iwi to develop medium to long term strategies that will engage the best research, innovation and technology capabilities available to enable these programs. He is active doing similar work with other indigenous peoples of the world. He is a Director on Ngati Porou Seafoods Limited, and has a Bachelor of Business Studies, Post-Graduate Diplomas in Marketing and Logistics and Business Research and an MBA from Waikato Management School. As well he has completed executive development programmes in international finance and global strategy at Harvard Business School.

Mr Michael Ludbrook (Director) – is a Chartered Accountant and experienced chief executive, management consultant and chair/director. Mr Ludbrook gained his experience as a chief executive in the heavy commercial vehicle product development, manufacturing and distribution industry in Australia and during the deregulation of the New Zealand electricity and healthcare industries. In addition to his management consulting practice, Mr Ludbrook is a director of Aerocool Limited, Norfolk Investments Limited, Norfolk Southern Cross Limited, Maritime New Zealand, Da Vinci Robotic Limited, Te Papa Tipu Properties Limited, Norfolk Ventures Limited, and has been involved in other governance roles including Chair of the Waikato District Health Board.

Dr Brian Rhoades (Director) is a business adviser and professional director with extensive management and governance experience. Dr Rhoades started his career as a lecturer in mechanical engineering at the University of Canterbury, moved into manufacturing and company management with the AHI/Carter Holt Harvey Group, and is a former Chief Executive of Sealord Products Ltd. He has served on the boards of a broad range of listed and unlisted companies and not-for-profit organisations; and is currently Chairman of the Forest Industries Training and Education Council, Ngai Tahu Seafood Ltd, Polytechnics International New Zealand Ltd, and Brian L Rhoades and Associates Ltd. Dr Rhoades holds BE (Hons) and PhD degrees in Mechanical Engineering and is a Fellow of IPENZ and the Institute of Directors.

Mrs Judith Stanway (Director), a qualified accountant, is the Managing Partner of BDO Rotorua Ltd and until recently was the Chair of BDO New Zealand Ltd, a New Zealand wide Chartered Accountancy and Business Advisory firm. Judith is a Fellow of the NZ Institute of Directors and a Director of the Charities Commission, Te Papa Tipu Properties Ltd and a number of private companies. She has also chaired the Lakes District Health Board and been a director of Te Puia. Judith lives in Rotorua, has worked with the forestry sector for many years and has wide experience in tourism and with charitable organisations.

Changes in Directors

Mr Michael Ludbrook's term on the Board concluded on 30 June 2011.

Directors' Interests

Any business the company has transacted with organisations in which a Director has an association has been carried out on a commercial "arms-length" basis.

Directors' Remuneration

	Scion 30 June 2011	Te Papa Tipu Properties 30 June 2011	Total 30 June 2011
Tony Nowell	58,000		58,000
Alison Andrew	38,000		38,000
Peter Berg	30,500		30,500
Sheldon Drummond	28,500		28,500
Chris Insley	28,500		28,500
Michael Ludbrook	30,500	8,000	38,500
Brian Rhoades	28,500		28,500
Judith Stanway	28,500		28,500
External Director			
John Kahukiwa		1,000	1,000
Total	271,000	9,000	280,000

Use of Company Information

During the year no notices were received from members of the Board requesting to use Scion information received in their capacity as Directors which would not otherwise have been available to them. Additions to the Interests Register are noted in the profiles above.

The State of the Company's Affairs

A commentary on the year's performance is outlined in the Chairman's and Chief Executive's Report and in the opinion of the Directors, the state of the company's affairs continues to be satisfactory and the outlook bright.

Auditor

In accordance with Section 21 of the Crown Research Institutes Act 1992, the Office of the Auditor General is Auditor for the Company and, pursuant to Section 29 of the Public Finance Act 1977, has appointed Ernst & Young to undertake the audit on its behalf.

Directors' Indemnity and Insurance

Scion has insured all Directors and the Directors of its subsidiaries against liabilities to other parties (except to Scion or a related party of Scion) that may arise from their position as Directors. The insurance does not cover liabilities that may arise from criminal actions.



For and on behalf of the Board

A Nowell

Chairman

30 August 2011

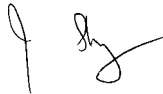
Statement of Responsibility

The following statement from the Board is made in accordance with Section 155 of the Crown Entities Act 2004:

1. The Board is responsible for the preparation of the annual financial statements and the judgements used in these.
2. The Board is responsible for establishing and maintaining a system of internal control designed to provide reasonable assurance as to the integrity and reliability of the financial reporting.
3. In the opinion of the Board, the annual financial statements for the year ended 30 June 2011 fairly reflect the financial position and operations of the New Zealand Forest Research Institute Limited.



A Nowell
Chairman



J Stanway
Director

30 August 2011

Performance Targets

Scion's performance against the targets contained in the 2010–2013 Statement of Corporate Intent was:

	Actual 2010	Actual 2011	Budget 2011
Revenue (\$000)	43,493	43,353	46,196
EBIT Margin (EBIT % of Revenue)	7.07%	6.0%	5.3%
Return on average equity	-3.9%	7.3%	6.0%
Return on average total assets	-3.3%	4.2%	3.9%
Equity ratio	68.3%	67.6%	73.7%
Quick ratio:1	1.49	1.64	1.27
Gearing	0.0%	0.0%	0.0%
Free cash flow to average total assets	9.3%	8.6%	10.1%

EBIT = Earnings before net interest, tax and restructuring costs

EBIT Margin = EBIT ÷ revenue

Return on Average Equity = Net profit after tax ÷ Average shareholders funds

Return on Assets = Net profit after tax less net interest ÷ Average total assets

Equity Ratio = Average shareholders funds ÷ Average total assets

Quick Ratio = Current assets less Inventories ÷ Current liabilities

Gearing = Interest bearing liabilities less cash ÷ Interest bearing liabilities less cash plus shareholders funds

Free cash flow to average total assets = Cash flow from Operations ÷ Average total assets

Non-financial Performance Measures	Actual 2010	Actual 2011	Budget 2011
Science FTEs	216	203	222
Science Support FTEs	48	55	49
Other FTEs	57	55	63
Total FTEs	321	313	334
Revenue per FTE (\$)	135,492	138,508	138,311
Research Application Metrics			
Commissioned reports to users	360	389	350
Presentations on technical information and research results	253	336	300
Publications on technical information and research results	81	153	150
Peer reviewed articles	86	117	130
New or improved processes, products, or services	2	4	5
Keynote and plenary presentations	7	7	15
Requests for information from databases and collections:			
– National Forestry Library	11,180	11,421	8,500
– National Wood Performance Archive	165	170	165
– National Forest Health Database	57	65	150
– National Forest Herbarium and Database	396	495	350
– Permanent Sample Plot Database	480	400	450
Patents Granted ¹			
– In New Zealand	1	2	5
– Overseas	0	1	3
Number of licensing arrangements	4	4	6
Joint Ventures or formal associations ²	11	14	12

¹ These do not include patents granted to entities which have contracted Scion to carry out specific research on their behalf.

² Target reflects joint ventures, shareholding entities, and significant formal associations relating to the creation of IP and dissemination of results.

Non-financial Performance Measures (cont)	Actual 2010	Actual 2011	Budget 2011
Corporate Social Responsibility	Report	Report	Report
Environment Responsibility	Report	Report	Report
Maori Relationships			
Consultation with Maori	Report	Report	Report
Maori internships	2	2	3
R&D proposals involving Maori	9	0	9
Benefit to NZ	Report	Report	Report
Good Employer	Report	Report	Report

Audit Report

INDEPENDENT AUDITOR'S REPORT**TO THE READERS OF
NEW ZEALAND FOREST RESEARCH INSTITUTE LIMITED AND GROUP'S
FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011**

The Auditor-General is the auditor of New Zealand Forest Research Institute Limited (the company) and group. The Auditor-General has appointed me, Simon Brotherton, using the staff and resources of Ernst & Young, to carry out the audit of the financial statements of the company and group, on her behalf, for the year ended 30 June 2011.

We have audited the financial statements of the company and group on pages 40 to 71, that comprise the statement of financial position as at 30 June 2011, the statement of comprehensive income, statement of changes in equity and statement of cash flows for the year ended on that date and the notes to the financial statements that include accounting policies and other explanatory information.

Opinion on the financial statements

In our opinion the financial statements of the company and group on pages 40 to 71:

- comply with generally accepted accounting practice in New Zealand;
- comply with International Financial Reporting Standards; and
- give a true and fair view of the company and group's:
 - financial position as at 30 June 2011; and
 - financial performance and cash flows for the year ended on that date.

Opinion on other legal requirements

In accordance with the Financial Reporting Act 1993 we report that, in our opinion, proper accounting records have been kept by the company as far as appears from an examination of those records.

Our audit was completed on 30 August 2011. This is the date at which our opinion is expressed.

The basis of our opinion is explained below. In addition, we outline the responsibilities of the Board of Directors and our responsibilities, and we explain our independence.

Basis of opinion

We carried out our audit in accordance with the Auditor-General's Auditing Standards, which incorporate the International Standards on Auditing (New Zealand). Those standards require that we comply with ethical requirements and plan and carry out our audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

Material misstatements are differences or omissions of amounts and disclosures that would affect a reader's overall understanding of the financial statements. If we had found material misstatements that were not corrected, we would have referred to them in our opinion.

An audit involves carrying out procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on our judgement, including our assessment of risks of material misstatement of the financial statements whether due to fraud or error. In making those risk assessments, we consider internal control relevant to the company and group's preparation of the financial statements that fairly reflect the matters to which they relate. We consider internal control in order to design audit procedures that are appropriate in the circumstances but not for the purpose of expressing an opinion on the effectiveness of the company and group's internal control.

An audit also involves evaluating:

- the appropriateness of accounting policies used and whether they have been consistently applied;
- the reasonableness of the significant accounting estimates and judgements made by the Board of Directors;

- the adequacy of all disclosures in the financial statements; and
- the overall presentation of the financial statements.

We did not examine every transaction, nor do we guarantee complete accuracy of the financial statements. In accordance with the Financial Reporting Act 1993, we report that we have obtained all the information and explanations we have required. We believe we have obtained sufficient and appropriate audit evidence to provide a basis for our audit opinion.

Responsibilities of the Board of Directors

The Board of Directors is responsible for preparing financial statements that:

- comply with generally accepted accounting practice in New Zealand; and
- give a true and fair view of the company and group's financial position, financial performance and cash flows.

The Board of Directors is also responsible for such internal control as it determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

The Board of Directors' responsibilities arise from the Crown Research Institutes Act 1992 and the Financial Reporting Act 1993.

Responsibilities of the Auditor

We are responsible for expressing an independent opinion on the financial statements and reporting that opinion to you based on our audit. Our responsibility arises from section 15 of the Public Audit Act 2001 and the Crown Research Institutes Act 1992.

Independence

When carrying out the audit, we followed the independence requirements of the Auditor-General, which incorporate the independence requirements of the New Zealand Institute of Chartered Accountants.

Other than the audit, we have performed risk assurance related work for the Company.



Simon Brotherton
Ernst & Young
On behalf of the Auditor-General
Auckland, New Zealand

Matters relating to the electronic presentation of the audited financial statements

This audit report relates to the financial statements of New Zealand Forest Research Institute Limited (the company) for the year ended 30 June 2011 included on the company's website. The company's Board of Directors is responsible for the maintenance and integrity of the company's website. We have not been engaged to report on the integrity of the company's website. We accept no responsibility for any changes that may have occurred to the financial statements since they were initially presented on the website.

The audit report refers only to the financial statements named above. It does not provide an opinion on any other information which may have been hyperlinked to or from the financial statements. If readers of this report are concerned with the inherent risks arising from electronic data communication they should refer to the published hard copy of the audited financial statements and related audit report dated 30 August 2011 to confirm the information included in the audited financial statements presented on this website.

Legislation in New Zealand governing the preparation and dissemination of financial information may differ from legislation in other jurisdictions.

Financial Statements

STATEMENT OF COMPREHENSIVE INCOME FOR THE YEAR ENDED 30 JUNE 2011

	Note	ACTUAL	GROUP BUDGET	ACTUAL	PARENT	
		2011 \$000	(unaudited) 2011 \$000	2010 \$000	ACTUAL 2011 \$000	ACTUAL 2010 \$000
Revenue	2 (a)	43,353	46,400	43,493	43,343	50,544
Other Income	2 (b)	315	0	77	315	77
Expenditure	3 (a)	(41,370)	(43,956)	(40,290)	(41,610)	(40,463)
Finance Costs	3 (b)	(19)	0	(45)	(19)	(44)
Share of Profit of Associates	14 (b)	51	0	5	0	0
Profit/(Loss) Before Tax		2,330	2,444	3,240	2,029	10,114
Tax Expense	9	513	777	4,218	438	4,162
Profit/(Loss) after tax attributable to the shareholders of the parent company		1,817	1,667	(978)	1,591	5,952
Other comprehensive income						
Deferred tax on heritage assets	9	6	0	0	6	0
Total comprehensive income/ (loss) for the period attributable to the shareholders of the parent company		1,823	1,667	(978)	1,597	5,952

The accompanying notes form part of these financial statements.

STATEMENT OF CHANGES IN EQUITY
FOR THE YEAR ENDED 30 JUNE 2011

	Ordinary Shares	Asset Re- valuation Reserve	Retained Earnings	Total	Ordinary Shares	Asset Re- valuation Reserve	Retained Earnings	Total
	2011 \$000	2011 \$000	2011 \$000	2011 \$000	2010 \$000	2010 \$000	2010 \$000	2010 \$000
GROUP								
Balance as at 1 July	17,516	48	6,556	24,120	17,516	48	8,643	26,207
Profit for the period	0	0	1,817	1,817	0	0	(978)	(978)
Other comprehensive income	0	6	0	6	0	0	0	0
Total comprehensive income	0	6	1,817	1,823	0	0	(978)	(978)
<i>Transactions with owners in their capacity as owners:</i>								
Shares issued	0	0	0	0	0	0	0	0
Dividends paid	0	0	0	0	0	0	(1,109)	(1,109)
Balance as at 30 June	17,516	54	8,373	25,943	17,516	48	6,556	24,120
PARENT								
Balance as at 1 July	17,516	48	6,056	23,620	17,516	48	1,213	18,777
Profit for the period	0	0	1,591	1,591	0	0	5,952	5,952
Other comprehensive income	0	6	0	6	0	0	0	0
Total comprehensive income	0	6	1,591	1,597	0	0	5,952	5,952
<i>Transactions with owners in their capacity as owners:</i>								
Shares issued	0	0	0	0	0	0	0	0
Dividends paid	0	0	0	0	0	0	(1,109)	(1,109)
Balance as at 30 June	17,516	54	7,647	25,217	17,516	48	6,056	23,620

The accompanying notes form part of these financial statements.

STATEMENT OF FINANCIAL POSITION
AS AT 30 JUNE 2011


		ACTUAL	GROUP BUDGET (unaudited)	ACTUAL	PARENT	
	Note	2011 \$000	2011 \$000	2010 \$000	ACTUAL 2011 \$000	ACTUAL 2010 \$000
Equity						
Share capital	5	17,516	17,516	17,516	17,516	17,516
Retained earnings	5	8,373	10,929	6,556	7,647	6,056
Revaluation reserve	5	54	48	48	54	48
		25,943	28,493	24,120	25,217	23,620
Non Current Liabilities						
Provisions	6	492	525	526	492	526
Defined benefit plan	7(a)	1,204	1,273	1,246	1,204	1,246
Deferred tax liability	9(d)	2,377	(658)	2,394	2,362	2,381
		4,073	1,140	4,166	4,058	4,153
Current Liabilities						
Trade and other payables	8	7,144	7,454	7,201	7,135	7,165
Provisions	6	498	74	142	498	142
Defined benefit plan	7(a)	46	34	68	46	68
Tax payable		0	245	652	0	635
		7,688	7,807	8,063	7,679	8,010
Total Equity and Liabilities		37,704	37,440	36,349	36,954	35,783
Non Current Assets						
Property, plant and equipment	10	23,146	25,958	23,014	21,855	21,704
Biological assets	11	797	482	482	797	482
Intangible assets	12	646	740	438	646	438
Investments in subsidiaries	13	0	0	0	0	0
Investments in associates	14	197	174	146	35	35
		24,786	27,354	24,080	23,333	22,659
Current Assets						
Cash and cash equivalents	15	6,763	4,255	6,580	6,750	6,530
Trade and other receivables	16	5,672	5,621	5,394	6,359	6,299
Tax receivable		177	0	0	206	0
Inventories	17	306	134	219	306	219
Advance to associate	23	0	76	76	0	76
		12,918	10,086	12,269	13,621	13,124
Total Assets		37,704	37,440	36,349	36,954	35,783

The accompanying notes form part of these financial statements.

For and on behalf of the Board, who authorised the issue of these accounts on 30 August 2011.



Chairman



Director

STATEMENT OF CASH FLOWS
FOR THE YEAR ENDED 30 JUNE 2011

		ACTUAL	GROUP BUDGET (unaudited)	ACTUAL	PARENT	
	Note	2011 \$000	2011 \$000	2010 \$000	ACTUAL 2011 \$000	ACTUAL 2010 \$000
Cash Flows from Operating Activities						
Cash was provided from:						
Receipts from customers		42,637	45,903	43,537	42,631	43,525
Interest received		251	201	274	251	274
		42,888	46,104	43,811	42,882	43,799
Cash was applied to:						
Payments to employees		24,779	25,737	24,209	24,779	24,209
Payments to suppliers		13,546	15,726	14,791	13,774	14,990
Interest paid		19	3	45	18	44
Income tax paid		1,351	831	1,329	1,291	1,264
		39,695	42,297	40,374	39,862	40,507
Net cash flows from operating activities	19	3,193	3,807	3,437	3,020	3,292
Cash Flows from Investing Activities						
Cash was provided from:						
Proceeds from loan repayments		76	0	0	76	0
		76	0	0	76	0
Cash was applied to:						
Purchase of property, plant and equipment		2,661	5,727	2,423	2,661	2,435
Purchase of intangibles		425	685	339	425	339
		3,086	6,412	2,762	3,086	2,774
Net cash flows used in investing activities		(3,010)	(6,412)	(2,762)	(3,010)	(2,774)
Cash Flows from Financing Activities						
Cash was provided from:						
Net advances from subsidiaries		0	0	0	210	109
		0	0	0	210	109
Cash was applied to:						
Payment of dividend		0	0	1,109	0	1,109
		0	0	1,109	0	1,109
Net cash flows from financing activities		0	0	(1,109)	210	(1,000)
Net Increase (Decrease) in Cash Held		183	(2,605)	(434)	220	(482)
Add opening cash brought forward		6,580	6,860	7,014	6,530	7,012
Ending Cash Carried Forward	15	6,763	4,255	6,580	6,750	6,530

The accompanying notes form part of these financial statements.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011

1. Statement of Accounting Policies

REPORTING ENTITY

New Zealand Forest Research Institute Limited is a Crown Research Institute registered under the Companies Act 1993. The registered office is Te Papa Tipu Innovation Park, 49 Sala Street, Rotorua. The group consists of New Zealand Forest Research Institute Limited and its subsidiaries.

New Zealand Forest Research Institute Limited (the Company) is a reporting entity for the purposes of the Financial Reporting Act 1993. It is domiciled and incorporated in New Zealand and is wholly owned by the Crown.

The Financial Statements of New Zealand Forest Research Institute Limited for the year were authorised for issue in accordance with a resolution of the directors on the date as set out on the Statement of Financial Position.

The activities of New Zealand Forest Research Institute Limited include a range of research and development programmes aimed at using plant-based renewable resources and waste streams to create new materials, energy sources and environmentally sustainable products and processes.

New Zealand Forest Research Institute Limited trades as Scion and these names have identical meaning in this report.

1.1 Summary of Significant Accounting Policies

a) Basis of Preparation

The financial statements have been prepared in accordance with generally accepted accounting practice in New Zealand (NZ GAAP) and the requirements of the Companies Act 1993 and the Financial Reporting Act 1993. The financial statements have also been prepared on a historical cost basis, except for forestry assets and certain heritage assets that have been measured at fair value.

The financial statements are presented in New Zealand dollars and all values are rounded to the nearest thousand dollars (\$000).

b) Statement of Compliance

The financial statements have been prepared in accordance with NZ GAAP. They comply with New Zealand equivalents to International Financial Reporting Standards, and other applicable Financial Reporting Standards, as appropriate for profit-oriented entities. The financial statements comply with International Financial Reporting Standards (IFRS).

c) Basis of Consolidation

The consolidated financial statements include the parent company and its subsidiaries. All intercompany transactions and unrealised profits and losses between the group of companies are eliminated from the financial statements on consolidation. In the parent company financial statements, investments in subsidiaries are stated at cost less any impairment charges.

d) Associate Companies

These are companies in which the group holds substantial shareholdings but does not have control and in whose commercial and financial policy decisions it participates.

Associate companies have been reflected in the consolidated financial statements on an equity accounting basis which shows the group's share of surpluses in the Consolidated Statement of Comprehensive Income and its share of post acquisition increases or decreases in net assets, in the Consolidated Statement of Financial Position.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011 (CONTINUED)

e) Intangible Assets

Intangible assets acquired separately are capitalised at cost and from a business combination are capitalised at fair value as at the date of acquisition. Following initial recognition, the cost model is applied to the class of intangible assets.

The useful lives of these intangible assets are assessed to be either finite or indefinite.

Where amortisation is charged on assets with finite lives, this expense is recognised in profit and loss.

Intangible assets created within the business are not capitalised and expenditure is charged to profit and loss in the year in which the expenditure is incurred.

Intangible assets are tested for impairment where an indicator of impairment exists, and in the case of indefinite life intangibles, annually, either individually or at the cash generating unit level. Useful lives are also examined on an annual basis and adjustments, where applicable, are made on a prospective basis.

A summary of the policies applied to the group's capitalised intangible assets is as follows:

	Software
Useful lives	Finite
Method used	4 years – Straight line
Type	Acquired
Impairment test/Recoverable amount testing	Amortisation method reviewed at each financial year-end; Reviewed annually for indicators of impairment

Gains or losses arising from derecognition of an intangible asset are measured as the difference between the net disposal proceeds and the carrying amount of the asset and are recognised in the profit and loss when derecognised.

f) Biological Assets

Biological assets consist entirely of tree plantations which are measured at fair value less any point of sale costs. Gains and losses arising on initial recognition or change in fair value, less estimated point of sale costs, are included in profit and loss in the period in which they arise.

The fair value of tree plantations is determined by an independent valuer.

The valuation method for immature trees is the net present value of future net harvest revenue less estimated costs of owning, protecting, tending and managing trees. For mature trees fair value is deemed to be the net harvest revenue value.

g) Property, Plant and Equipment

All items of property, plant and equipment are valued at the cost of purchase from the Crown as at 1 July 1992 adjusted for subsequent additions at cost, disposals and depreciation. Plant and equipment are recorded at cost less accumulated depreciation. Land and capital work in progress are recorded at cost. Some library books have been identified as heritage assets and are recorded at fair value as determined by an independent valuer. Valuations are obtained every five years or more often where circumstances indicate that a significant change in fair value has occurred.

Expenditure incurred on property, plant and equipment is capitalised where such expenditure will increase or enhance the future benefits provided by the asset. Expenditure incurred to maintain future benefits is classified as repairs and maintenance.

When an item of property, plant and equipment is disposed of the difference between the net disposal proceeds and the carrying amount is recognised as a gain, or loss, in profit and loss.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011 (CONTINUED)

g) Property, Plant and Equipment (cont)

Depreciation is provided for using the straight-line method to allocate the historical cost, less an estimated residual value, over the estimated useful life of the asset.

The useful lives of the major classes of assets have been calculated as follows:

Buildings and Land Improvements	40–60 years
Plant and Equipment	4–15 years
Furniture and Fittings	10 years
Motor Vehicles	3–7 years
Library Books	20 years

h) Recoverable amount of non-current assets

At each reporting date, the group assesses whether there is any indication that an asset may be impaired. Where an indicator of impairment exists, the group makes a formal estimate of recoverable amount. Where the carrying amount of an asset exceeds its recoverable amount the asset is considered impaired and is written down to its recoverable amount.

Recoverable amount is the greater of fair value less costs to sell and value in use. It is determined for an individual asset, however, if the asset's value in use cannot be estimated to be close to its fair value less costs to sell, and it does not generate cash inflows that are largely independent of those from other assets or groups of assets, it is determined for the cash-generating unit to which the asset belongs.

In assessing value in use, the estimated future cash flows are discounted to their present value using a pre-tax discount rate that reflects current market assessments of the time value of money and the risks specific to the asset.

i) Trade Receivables

Trade receivables are initially recognised at fair value and subsequently valued at amortised cost less impairment allowance.

Collectability of trade receivables is reviewed on an ongoing basis. Debts that are known to be uncollectible are written off when identified. An allowance for doubtful debts is raised when there is objective evidence that it is probable the group will not be able to collect the debt. Financial difficulties and payment defaults without explanation are considered objective evidence of impairment.

j) Inventories

Consumable stores are valued at the lower of cost, on a weighted average price of stock on hand, and net realisable value.

Nursery stocks are valued at lower of cost or net realisable value. Changes in net realisable value are recognised in the profit and loss account in the period in which they occur.

k) Research Costs

Research costs are expensed in the period incurred.

l) Provisions and Employee Benefits

Provisions are recognised when the group has a present obligation (legal or constructive) as a result of a past event, it is probable that an outflow of resources embodying economic benefits will be required to settle the obligation and a reliable estimate can be made of the amount of the obligation.

Provisions are measured at the present value of management's best estimate of the expenditure required to settle the present obligation at the Statement of Financial Position date using a discounted cash flow methodology.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011 (CONTINUED)

l) Provisions and Employee Benefits (cont)

(i) Wages, Salaries and Annual Leave

The liability for wages, salaries and annual leave recognised in the Statement of Financial Position is the amount expected to be paid at balance date. Provision has been made for benefits accruing to employees for annual leave in accordance with the provisions of employment contracts in place at balance date.

(ii) Long Service Leave

The liability for long service leave is recognised and measured as the present value of expected future payments to be made in respect of services provided by employees up to the reporting date using the projected unit credit method. Consideration is given to expected future wage and salary levels, experience of employee departures, and periods of service. Expected future payments are discounted using market yields at the reporting date on national government bonds with terms to maturity and currencies that match, as closely as possible, the estimated future cash outflows.

(iii) Defined Benefit Plan

The defined benefit plan is unfunded. The cost of providing benefits under the defined benefit plan is determined using the projected unit credit actuarial valuation method. Actuarial gains and losses are recognised in the profit and loss account in the period in which they arise.

The defined benefit liability recognised in the Statement of Financial Position represents the present value of the defined benefit obligations.

Long service leave and retirement leave provisions are based on an actuarial valuation.

m) Leases

Group as a Lessee

Operating lease payments, where the lessors effectively retain substantially all the risks and benefits associated with ownership of the leased items, are included as an expense in the profit and loss in equal instalments over the lease term.

Group as a Lessor

Leases in which the group retains substantially all the risks and benefits of ownership of the leased asset are classified as operating leases. Initial direct costs incurred in negotiating an operating lease are expensed as incurred.

n) Cash and Cash Equivalents

Cash and short-term deposits in the Statement of Financial Position comprise cash at bank and in hand and short-term deposits with an original maturity of six months or less.

For the purposes of the Statement of Cash Flows, cash and cash equivalents consist of cash and cash equivalents as defined above, net of outstanding bank overdrafts.

o) Goods and Services Tax (GST)

The financial statements are prepared on a GST exclusive basis.

p) Foreign Currencies

Functional and presentation currency

Both the functional and presentation currency of New Zealand Forest Research Institute Limited and its subsidiaries is New Zealand dollars.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011 (CONTINUED)

p) Foreign Currencies (cont)

Transactions and balances

Transactions in foreign currencies are initially recorded in the functional currency by applying the exchange rates ruling at the date of the transaction. Monetary assets and liabilities denominated in foreign currencies are retranslated at the rate of exchange ruling at the Statement of Financial Position date.

Non-monetary items that are measured in terms of historical cost in a foreign currency are translated using the exchange rate as at the date of the initial transaction. Non-monetary items measured at fair value in a foreign currency are translated using the exchange rates at the date when the fair value was determined.

q) Revenue Recognition

Research Revenue

Research revenue from both Government and commercial sources is recorded when earned based on the percentage of work completed. Percentage of work completed is based on management judgement, after considering costs incurred and other contracted commitments. Work completed but not invoiced is recorded as accrued revenue while work invoiced but not completed is recorded as revenue in advance.

Government revenue includes revenue received from the Foundation for Research, Science and Technology and from the Ministry of Research Science and Technology under the Capability Fund, Public Good Science and Technology Investment, and Preseed Accelerator Fund programmes. Funding includes both devolved and milestone related programmes. Government revenue has only been recognised after all appropriate conditions have been met.

Sale of Goods

Revenue is recognised when the significant risks and rewards of ownership of the goods have passed to the buyer. Risk and reward are considered passed to the buyer at the time of delivery.

Interest Revenue

Interest revenue is recognised when earned based on applicable interest rates applied to the group's cash deposit balances.

r) Taxation

The income tax expense charged to the profit and loss includes both the current year's provision and the income tax effects of temporary differences calculated using the liability method.

Tax effect accounting is applied on a comprehensive basis to all temporary differences. A debit balance in the deferred tax account, arising from temporary differences or income tax benefits from income tax losses, is only recognised if it is probable there will be taxable profits available in the future against which the deferred tax asset can be utilised.

Subsequent realisation of the tax benefit is subject to the requirements of income tax legislation being met.

s) Borrowing Costs

Borrowing costs are recognised as an expense when incurred except for those borrowing costs determined as directly attributable to the acquisition, construction or production of a qualifying asset (i.e. an asset that necessarily takes a substantial period of time to get ready for its intended use or sale).

t) Interest-bearing Loans and Borrowings

All loans and borrowings are initially recognised at the fair value of the consideration received net of issue costs associated with the borrowing.

After initial recognition, interest-bearing loans and borrowings are subsequently measured at amortised cost using the effective interest method. Amortised cost is calculated by taking into account any issue costs, and any discount or premium on settlement.

For the purpose of valuing bank borrowings, the bank interest rate is taken as the discount rate. As such the bank borrowings are carried at the value of the debt with the bank.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011 (CONTINUED)

u) Trade and Other Payables

Trade and other payables are carried at amortised cost and due to their short term nature they are not discounted. They represent liabilities for goods and services provided to the group prior to the end of the financial year that are unpaid and arise when the group becomes obliged to make future payments in respect of the purchase of these goods and services. The amounts are unsecured and are usually paid within 60 days of recognition.

v) Derivative Financial Instruments and Hedging

The Group uses derivative financial instruments such as forward currency contracts to hedge its risks associated with foreign currency fluctuations. These derivative financial instruments are initially recognised at fair value on the date on which a derivative contract is entered into and are subsequently remeasured to fair value.

Derivatives are carried as assets when their fair value is positive and as liabilities when their fair value is negative.

Derivative assets and liabilities held for the purpose of trading are classified as current in the statement of financial position. Derivative assets and liabilities are classed as non-current when the remaining maturity is more than 12 months, or current when the remaining maturity is less than 12 months.

The fair values of forward currency contracts are calculated by reference to current forward exchange rates for contracts with similar maturity profiles.

Any gains and losses arising from changes in the fair value of derivatives, except for those that qualify as cash flow hedges, are taken directly to profit or loss for the year. The group does not apply hedge accounting.

1.2 Significant Accounting Judgements, Estimates and Assumptions

a) Revenue Recognition

Revenue is recognised based on the percentage of work completed on a project basis. Percentage of work completed is based on management judgement after considering such things as hours completed, costs incurred, milestones achieved and actual results to date.

b) Heritage Assets

The group holds several heritage assets which have significant value due to being both rare, and having importance to the nation. Where a heritage cost can be measured reliably they are revalued at least every five years and included as part of property plant and equipment.

Due to the nature of some heritage assets, management does not believe they can be valued reliably. These assets have been identified as disclosed. Details of heritage assets can be found in note 10 and 21.

c) Biological Assets

The group's biological assets consist of tree plantations. These are valued at the net present value of future net harvest revenue less estimated costs of owning, protecting, tending and managing trees. The valuation process includes several judgements and estimations around discount rates, future costs, and future prices. Management used the experience of a registered forestry valuer to reduce the risk of misstatement resulting from these judgements and estimates.

d) Defined Benefit Scheme

The group operates an unfunded defined benefit plan. Significant assumptions used involving the plan include the discount rate and future salary increases as set out in the notes to the financial statements. Management used the experience of a registered actuary to reduce the risk of misstatement resulting from these judgements and estimates.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011 (CONTINUED)

1.3 Accounting Standards Issued but not yet Effective

The following standards have had changes that have been issued but not yet made effective:

• NZ IAS 1 Presentation of Financial Statements	1 January 2011
• NZ IAS 12 Income Taxes	1 January 2012
• NZ IAS 24 Related Party Disclosures	1 January 2011
• NZ IAS 26 Accounting and Reporting by Retired Benefit Plans	1 April 2011
• NZ IAS 27 Consolidated and Separate Financial Statements	1 January 2013
• NZ IAS 28 Investments in Associates	1 January 2013
• NZ IFRS 7 Financial Instruments: Disclosures	1 January 2011
• NZ IFRS 9 Financial Instruments (2010)	1 January 2013
• NZ IFRS 10 Consolidated Financial Statements	1 January 2013
• NZ IFRS 12 Disclosure of Interest in Other Entities	1 January 2013
• NZ IFRS 13 Fair Value Measurement	1 January 2013
• FRS 44 NZ Additional Disclosures	1 July 2011

The group has chosen not to apply the changes in the above standards prior to their effective date except for NZ IAS 24 where the group has applied the partial exemption for government related entities from 30 June 2010. While these standards are applicable to the group they are not expected to have a material impact on our accounts.

1.4 Changes in Accounting Policy and Disclosures

The accounting policies are consistent with those of the previous financial year.

In addition under the Annual Improvements Project improvements to NZ IFRS have been made to the following standards that affect Scion but are not seen to have a material impact on the financial statements:

- NZ IAS 1 Presentation of Financial Statements
- NZ IAS 7 Statement of Cash Flows
- NZ IAS 17 Leases
- NZ IAS 18 Revenue
- NZ IAS 21 The Effects of Changes in Foreign Exchange Rates
- NZ IAS 28 Investment in Associates
- NZ IAS 32 Financial Instruments: Presentation
- NZ IAS 36 Impairment of Assets
- NZ IAS 39 Financial Instruments: Recognition and Measurement
- NZ IFRS 7 Financial Instruments: Disclosures

	GROUP		PARENT	
	ACTUAL 2011 \$000	ACTUAL 2010 \$000	ACTUAL 2011 \$000	ACTUAL 2010 \$000
2. Revenue and Other Income				
(a) Revenue				
Government research revenue	20,783	21,054	20,783	21,054
Commercial research revenue	22,259	22,146	22,249	22,134
Distribution on wind up of subsidiaries	0	0	0	7,063
Royalty	12	20	12	20
Interest revenue	299	273	299	273
	43,353	43,493	43,343	50,544
(b) Other Income				
Change in fair value of plantation trees	315	77	315	77
	315	77	315	77

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011 (CONTINUED)

	GROUP		PARENT	
	ACTUAL 2011 \$000	ACTUAL 2010 \$000	ACTUAL 2011 \$000	ACTUAL 2010 \$000
3. Expenditure and Finance Costs				
(a) Expenditure				
Personnel remuneration and expenses	24,613	24,219	24,613	24,219
Other personnel related costs	513	657	513	657
Contractors and subcontractors	4,606	4,738	4,590	4,712
Consumables	832	925	832	925
External services	3,287	2,924	3,287	2,924
Travel and accommodation	1,261	1,247	1,261	1,246
Lease and rental costs	731	743	1,113	1,098
Depreciation	2,233	2,130	2,213	2,109
Amortisation	217	123	217	123
Loss on disposal of fixed assets	33	65	34	65
Impairment of assets	280	0	280	0
Reversal of impairment	(28)	(34)	(28)	(34)
Premises	1,430	1,790	1,332	1,668
Directors' fees	268	281	259	269
Restructuring costs	547	65	547	65
Bad debts written off	0	7	0	7
Doubtful debt provision	31	(39)	31	(39)
Fair value movement on foreign exchange contracts	42	1	42	1
Other	474	448	474	448
	41,370	40,290	41,610	40,463
(b) Finance Costs				
Bank loans and overdraft	19	45	19	44
	19	45	19	44
4. Auditor's Remuneration				
Amounts paid or due and payable to the auditors for:				
Auditing financial statements				
Parent entity auditor	150	142	150	142
Risk advisory	25	0	25	0
	175	142	175	142

Audit fee costs are included in contractors and sub-contractors expenses in Note 3(a) Expenditure.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011 (CONTINUED)

5. Equity

New Zealand Forest Research Institute Limited has authorised, issued and paid up capital of 17,516,000 (2010: 17,516,000) ordinary shares. Shares do not have a par value.

All shares have equal rights with respect to voting, dividends and distribution on winding up. There are no restrictions on the distribution of dividends or repayment of capital.

No dividends were declared or paid to shareholders during the year (2010: \$1,109k @ 6.33 cents per share).

The asset revaluation reserve is used to record increments and decrements in the fair value of heritage book assets.

Capital Management

Scion is 100% Crown owned. Scion completes a three year plan on an annual basis and as part of that three year plan, any capital requirements for the future. When managing capital, management's objective is to ensure the entity continues as a going concern while balancing its financial goals of delivering returns in line with market cost of capital, with its public good goals of reinvesting in science that will benefit New Zealand. Management uses total equity as capital. The group has no externally imposed capital requirements.

6. Provisions

The group has provisions for long service leave and restructuring. The long service leave provision totals \$613k at June 2011 (2010: \$620k) and was valued by an actuary.

The group has a restructuring provision of \$377k in 2011 (2010: \$48k).

The provisions are made up as follows:

	GROUP AND PARENT	
	ACTUAL	ACTUAL
	2011	2010
	\$000	\$000
Current Provision	498	142
Non Current Provision	492	526
	990	668

Movement in each class of provision during the year is as follows:

	Long	Restruct-	TOTAL	Long	Restruct-	TOTAL
	Service	uring		Service	uring	
	Leave			Leave		
		2011			2010	
	\$000	\$000	\$000	\$000	\$000	\$000
Balance 1 July	620	48	668	599	0	599
Provision reversed during the year	0	0	0	0	0	0
Amounts used during the year	(70)	(212)	(282)	(64)	0	(64)
Provisions made during the year	60	541	601	94	48	142
Discount rate adjustment	3	0	3	(9)	0	(9)
Balance 30 June	613	377	990	620	48	668

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011 (CONTINUED)

7. Pension Plans

a) Defined Benefit Plan

Scion operates an unfunded defined benefit plan. The plan is closed to new members and will cease when all current members have either retired or left the group. There are no assets backing the unfunded liability.

The cost of providing benefits under the defined benefit plan is determined using the projected unit credit actuarial valuation method. Actuarial gains and losses are recognised in the Profit and Loss account. Past service cost is recognised immediately.

The defined benefit liability recognised in the Statement of Financial Position represents the present value of the defined benefit obligation.

	GROUP AND PARENT	
	ACTUAL	ACTUAL
	2011	2010
	\$000	\$000
Net plan expense		
Current service cost	43	46
Interest cost on benefit obligation	77	78
Net actuarial gains recognised in the year	(16)	(57)
Net plan expense	<u>104</u>	<u>67</u>

The net plan expense is included in the Personnel remuneration and expense line in Note 3(a) Expenditure.

	Defined Benefit Plan				
	2011	2010	2009	2008	2007
	\$000	\$000	\$000	\$000	\$000
Benefit liability included in the Statement of Financial Position					
Present value of defined benefit obligation	1,250	1,314	1,278	1,099	1,160

	GROUP AND PARENT	
	ACTUAL	ACTUAL
	2011	2010
	\$000	\$000
Changes in the present value of the defined benefit obligation are as follows:		
Opening balance	1,314	1,278
Current service cost	43	46
Interest cost	77	78
Actuarial gains recognised in the year	(16)	(57)
Benefits paid	(168)	(31)
Closing balance	<u>1,250</u>	<u>1,314</u>
Current provision	46	68
Non-current provision	<u>1,204</u>	<u>1,246</u>
	<u>1,250</u>	<u>1,314</u>

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011 (CONTINUED)

7. Pension Plans (cont)

a) Defined Benefit Plan

The history of experience adjustments is as follows:

	2011 \$000	2010 \$000	2009 \$000	2008 \$000	2007 \$000
Experience adjustments on plan liabilities	(9)	(41)	(38)	(126)	0

The principal actuarial assumptions used in determining the defined benefit plan obligations are shown below:

	2011 \$000	2010 \$000
Discount rate	6.19%	5.87%
Future salary increases	4.50%	4.50%

b) Defined Contribution Plan

During the period defined contributions totalling \$163k (2010: \$142k) were made to the Government Superannuation Fund.

8. Trade and Other Payables

	GROUP		PARENT	
	ACTUAL 2011 \$000	ACTUAL 2010 \$000	ACTUAL 2011 \$000	ACTUAL 2010 \$000
Trade payables	2,740	2,817	2,740	2,788
Other payables	47	6	46	6
Employee payables and accruals	2,788	2,665	2,788	2,665
Payable to associates	10	68	10	68
Payable to directors	0	10	0	10
Revenue in advance	1,559	1,635	1,551	1,628
	7,144	7,201	7,135	7,165

The carrying amount disclosed above is a reasonable approximation of fair value. Trade creditors are non-interest bearing and are normally settled within 60 days.

9. Income Tax

(a) Income Tax Expense

The major components of income tax expense in the Statement of Comprehensive Income are:

Current income tax

	GROUP ACTUAL 2011 \$000	GROUP ACTUAL 2010 \$000	PARENT ACTUAL 2011 \$000	PARENT ACTUAL 2010 \$000
Current income tax charge	561	1,099	489	1,042
Adjustments to prior year current income tax charge	(37)	(62)	(38)	(62)
	524	1,037	451	980

Deferred income tax

Relating to origination and reversal of temporary differences

	(11)	3,181	(13)	3,182
Income tax expense/(income) reported in the Statement of Comprehensive Income	513	4,218	438	4,162

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011 (CONTINUED)

	GROUP		PARENT	
	ACTUAL 2011 \$000	ACTUAL 2010 \$000	ACTUAL 2011 \$000	ACTUAL 2010 \$000
9. Income Tax				
(b) Amounts charged or credited directly to other comprehensive income				
<i>Deferred income tax related to items charged (credited) directly to other comprehensive income</i>				
Net gain on revaluation of heritage assets	6	0	6	0
(c) Reconciliation between the aggregate tax expense/(income) recognised in the Statement of Comprehensive Income to tax expense/(income) calculated at the statutory income tax rate				
Accounting profit/(loss) before income tax	2,330	3,240	2,029	10,114
Tax at the statutory income tax rate of 30% (2010: 30%)	699	972	609	3,034
Adjusted by:				
Prior year income tax	(2)	1	(3)	1
Deferred tax adjustment for change in building depreciation rates	(245)	3,397	(245)	3,397
Deferred tax adjustment for tax rate change	83	(238)	84	(237)
Entertainment	6	7	6	7
Non-deductible legal fees	6	4	6	2
Tax exempt income	(2)	0	(2)	0
Intercompany receivable	(15)	0	0	0
Other	(17)	75	(17)	77
Distribution on wind up of subsidiaries	0	0	0	(2,119)
Income tax expense	513	4,218	438	4,162

Tax losses of loss making entities within the group are fully offset against taxable profits of profit making entities.

The deferred tax adjustment for change in building depreciation rates in the year ending 30 June 2010 resulted from the removal of the allowable tax depreciation deductions for buildings with an expected life of 50 years or more. This was announced in the New Zealand Government's 2010 Budget and is effective for income years starting on or after 1 April 2011. This significantly reduced the tax base of buildings, thereby creating a large taxable temporary difference, which in turn has resulted in a large deferred tax liability. The related movements in deferred tax have been recognised as a tax expense in this Statement of Comprehensive Income.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011 (CONTINUED)

	GROUP		PARENT	
	ACTUAL	ACTUAL	ACTUAL	ACTUAL
	2011	2010	2011	2010
	\$000	\$000	\$000	\$000
9. Income Tax (cont)				
(d) Deferred income tax relates to the following:				
<i>Deferred tax liabilities</i>				
Property, plant and equipment	(3,218)	(3,488)	(3,203)	(3,475)
Nursery inventory	(70)	(46)	(70)	(46)
Standing timber	(223)	(145)	(223)	(145)
	(3,511)	(3,679)	(3,496)	(3,666)
<i>Deferred tax assets</i>				
Patents and trademarks	130	130	130	130
Payroll provisions	911	1,053	911	1,053
Provision for doubtful debts	28	21	28	21
Other	65	81	65	81
	1,134	1,285	1,134	1,285
<i>Net Deferred Tax Asset/(Liability) per Statement of Financial Position</i>	(2,377)	(2,394)	(2,362)	(2,381)

The group has no unused tax losses (2010: \$0k).

(e) Imputation credits

Under section ME 1(2)g of the Income Tax Act 1994 New Zealand Forest Research Institute Limited is not required to maintain an imputation credit account due to it being a Crown Research Institute.

Te Papa Tipu Properties Limited, a wholly owned subsidiary of New Zealand Forest Research Institute Limited, has an imputation credit account with a balance of \$125,505 at 30 June 2011 (2010: \$65,302).

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011 (CONTINUED)

10. Property, Plant and Equipment

GROUP	Land & Improvements \$000	Buildings \$000	Plant & Equipment \$000	Furniture & Fittings \$000	Motor Vehicles \$000	Books & Periodicals \$000	Capital Work in Progress \$000	Total \$000
At 1 July 2010								
Carrying amount net of accumulated depreciation and impairment at 1 July 2010	1,619	15,089	4,946	162	88	244	866	23,014
Additions	59	13	1,314	50	124	0	1,175	2,735
Transfers from CWIP	0	(4)	737	16	0	0	(749)	0
Transfers to intangibles from CWIP	0	0	0	0	0	0	(77)	(77)
Reclassifications	8	(4)	(6)	0	0	0	0	(2)
Disposals	0	(9)	(11)	0	0	0	(18)	(38)
Reversal of impairment provision	0	22	0	0	0	0	0	22
Provisions for impairment	0	(273)	(2)	0	0	0	0	(275)
Depreciation expensed	(37)	(591)	(1,558)	(34)	(13)	0	0	(2,233)
Carrying amount net of accumulated depreciation and impairment at 30 June 2011	1,649	14,243	5,420	194	199	244	1,197	23,146
At 30 June 2011								
Cost or fair value	1,889	20,068	30,843	1,655	340	244	1,197	56,236
Accumulated depreciation and impairment	(240)	(5,825)	(25,423)	(1,461)	(141)	0	0	(33,090)
Net carrying amount	1,649	14,243	5,420	194	199	244	1,197	23,146

Books and periodicals include some library books classified as Heritage Assets. The group engaged Rowan Gibbs, an antiquarian bookseller of 37 years experience of Smith's Bookshop Limited to determine the fair value of the heritage library books as at 30 June 2008. Fair value is the amount for which the books could be exchanged between a knowledgeable willing buyer and a knowledgeable willing seller in an arms length transaction as at valuation date. Fair value is determined by reference to recent prices realised at national and international auctions and prices being asked for by specialist dealers for comparable items. Refer to note 21 regarding other heritage assets. The heritage asset library books have been valued at \$75,000.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011 (CONTINUED)

10. Property, Plant and Equipment (cont)

GROUP	Land & Improvements \$000	Buildings \$000	Plant & Equipment \$000	Furniture & Fittings \$000	Motor Vehicles \$000	Books & Periodicals \$000	Capital Work in Progress \$000	Total \$000
At 1 July 2009								
Carrying amount net of accumulated depreciation and impairment at 1 July 2009	1,668	15,238	5,032	164	101	244	335	22,782
Additions	0	318	1,211	30	0	0	845	2,404
Transfers from CWIP	0	49	265	0	0	0	(319)	(5)
Reclass to intangibles	0	0	0	0	0	0	5	5
Disposals	(12)	(43)	(21)	0	0	0	0	(76)
Reversal of impairment provision	0	21	13	0	0	0	0	34
Depreciation expensed	(37)	(494)	(1,554)	(32)	(13)	0	0	(2,130)
Carrying amount net of accumulated depreciation and impairment at 30 June 2010	1,619	15,089	4,946	162	88	244	866	23,014
At 30 June 2009								
Cost or fair value	1,834	19,766	31,145	1,578	216	244	335	55,118
Accumulated depreciation and impairment	(166)	(4,528)	(26,113)	(1,414)	(115)	0	0	(32,336)
Net carrying amount	1,668	15,238	5,032	164	101	244	335	22,782
At 30 June 2010								
Cost or fair value	1,821	20,077	32,165	1,590	216	244	866	56,979
Accumulated depreciation and impairment	(202)	(4,988)	(27,219)	(1,428)	(128)	0	0	(33,965)
Net carrying amount	1,619	15,089	4,946	162	88	244	866	23,014

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011 (CONTINUED)

10. Property, Plant and Equipment (cont)

PARENT	Land & Improvements	Buildings	Plant & Equipment	Furniture & Fittings	Motor Vehicles	Books & Periodicals	Capital Work in Progress	Total
	\$000	\$000	\$000	\$000	\$000	\$000	\$000	\$000
At 1 July 2010								
Carrying amount net of accumulated depreciation and impairment at 1 July 2010	309	15,089	4,946	162	88	244	866	21,704
Additions	58	13	1,314	50	124	0	1,175	2,734
Transfers from CWIP	0	(4)	737	16	0	0	(749)	0
Transfers to intangibles from CWIP	0	0	0	0	0	0	(77)	(77)
Reclassifications	8	(4)	(6)	0	0	0	0	(2)
Disposals	0	(9)	(11)	0	0	0	(18)	(38)
Reversal of impairment provision	0	22	0	0	0	0	0	22
Provisions for impairment	0	(273)	(2)	0	0	0	0	(275)
Depreciation expensed	(17)	(591)	(1,558)	(34)	(13)	0	0	(2,213)
Carrying amount net of accumulated depreciation and impairment at 30 June 2011	358	14,243	5,420	194	199	244	1,197	21,855
At 30 June 2011								
Cost or fair value	508	20,068	30,843	1,655	340	244	1,197	54,855
Accumulated depreciation and impairment	(150)	(5,825)	(25,423)	(1,461)	(141)	0	0	(33,000)
Net carrying amount	358	14,243	5,420	194	199	244	1,197	21,855

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011 (CONTINUED)

10. Property, Plant and Equipment (cont)

PARENT	Land & Improvements	Buildings	Plant & Equipment	Furniture & Fittings	Motor Vehicles	Books & Periodicals	Capital Work in Progress	Total
	\$000	\$000	\$000	\$000	\$000	\$000	\$000	\$000
At 1 July 2009								
Carrying amount net of accumulated depreciation and impairment at 1 July 2009	325	15,238	5,032	164	101	244	335	21,439
Additions	0	318	1,211	30	0	0	845	2,404
Transfers from CWIP	0	49	265	0	0	0	(319)	(5)
Reclass to intangibles	0	0	0	0	0	0	5	5
Disposals	0	(43)	(21)	0	0	0	0	(64)
Reversal of impairment provision	0	21	13	0	0	0	0	34
Depreciation expensed	(16)	(494)	(1,554)	(32)	(13)	0	0	(2,109)
Carrying amount net of accumulated depreciation and impairment at 30 June 2010	309	15,089	4,946	162	88	244	866	21,704
At 30 June 2009								
Cost or fair value	441	19,766	31,145	1,578	216	244	335	53,725
Accumulated depreciation and impairment	(116)	(4,528)	(26,113)	(1,414)	(115)	0	0	(32,286)
Net carrying amount	325	15,238	5,032	164	101	244	335	21,439
At 30 June 2010								
Cost or fair value	441	20,077	32,165	1,590	216	244	866	55,599
Accumulated depreciation and impairment	(132)	(4,988)	(27,219)	(1,428)	(128)	0	0	(33,895)
Net carrying amount	309	15,089	4,946	162	88	244	866	21,704

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011 (CONTINUED)

11. Biological Assets

Biological assets consist of tree plantations. The group has 94 hectares of trees planted for experimental purposes. Trees will be harvested for sale when experimental work is completed and they have reached maturity.

	GROUP		PARENT	
	ACTUAL 2011 \$000	ACTUAL 2010 \$000	ACTUAL 2011 \$000	ACTUAL 2010 \$000
Carrying amount 1 July	482	405	482	405
Gain from changes in fair value less estimated point-of-sale costs	315	77	315	77
Carrying amount 30 June	797	482	797	482

The group has tree plantations at three locations:

- 31 hectares of immature Radiata Pine is located at Puruki. The trees were planted for experimental purposes. The group has a forestry right which expires in 2067.
- 20.8 hectares of immature Radiata Pine and 5.5 hectares of Mexican Cypress are located at Tikokino. The trees were planted for experimental purposes. The Mexican Cypress has zero value at 30 June 2011.
- 34.5 hectares of immature Radiata Pine is located at Mamaku plus 2.2 hectares of mature Sitka Spruce. The trees were planted for experimental purposes. The group has a forestry right which terminates when the trees are harvested or in 2024, whichever is the earlier.

No biological assets have been harvested during the year.

The tree plantations were valued as at 30 June 2011 by PF Olsen Limited, an independent forestry management and consultancy company.

The valuation method for immature trees is the net present value of future net harvest revenue less estimated costs of owning, protecting, tending and managing trees. For mature trees fair value is deemed to be the net harvest revenue value.

	GROUP		PARENT	
	ACTUAL 2011 \$000	ACTUAL 2010 \$000	ACTUAL 2011 \$000	ACTUAL 2010 \$000
12. Intangible Assets				
Software				
Opening balance				
At cost	3,227	2,920	3,227	2,920
Less accumulated amortisation	(2,789)	(2,698)	(2,789)	(2,698)
Opening net carrying amount 1 July	438	222	438	222
Opening carrying amount 1 July	438	222	438	222
External additions	425	339	425	339
Current year amortisation	(217)	(123)	(217)	(123)
Closing carrying amount 30 June	646	438	646	438
Closing balance 30 June				
At cost	3,089	3,227	3,089	3,227
Less accumulated amortisation	(2,443)	(2,789)	(2,443)	(2,789)
Closing net carrying amount 30 June	646	438	646	438

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011 (CONTINUED)

	PARENT	
	30 June 2011 \$000	30 June 2010 \$000
13. Investments in Subsidiaries		
Opening shares in subsidiaries	0	52
Acquired in current year	0	0
Closed in current year	0	(52)
Closing shares in subsidiaries	0	0

Subsidiaries	Shares	Percentage Held	Balance Date
Te Papa Tipu Properties Limited	100	100%	30 June
Atlas Technology Limited	100	100%	30 June

Te Papa Tipu Properties Limited was incorporated on 25 March 2004. The company owns the group's land assets.

Atlas Technology Limited does not trade.

New Zealand Forest Research Institute Limited is the registered holder of 100% of the shares of Future Forests Research Limited however these shares are held in trust for the members and therefore it has not been treated as a subsidiary for consolidation purposes.

All subsidiaries are incorporated in New Zealand.

	GROUP		PARENT	
	ACTUAL 2011 \$000	ACTUAL 2010 \$000	ACTUAL 2011 \$000	ACTUAL 2010 \$000
14. Investments in Associates				
(a) Investment Details				
Frontline Biosecurity Limited	0	0	0	0
Beacon Pathway Limited	10	9	20	20
Biopolymer Network Limited	187	137	15	15
	197	146	35	35

New Zealand Forest Research Institute Limited has a 25% (2010: 25%) shareholding in Frontline Biosecurity Limited. The company previously carried out research, development and commercialisation of biosecurity processes but has now stopped trading. The shareholders have agreed that the company repurchase its shares and the directors of Frontline Biosecurity have resolved to do this. The company has liquid assets totalling \$14k. The company has a balance date of 31 March.

New Zealand Forest Research Institute Limited has a 20% (2010: 20%) shareholding in Beacon Pathway Limited. The company carried out research in the area of sustainability in the built environment but is now in the final stages of being wound up.

New Zealand Forest Research Institute Limited has a 33.33% (2010: 33.33%) shareholding in Biopolymer Network Limited, a company carrying on research, development and commercialisation of biopolymers.

The group's proportion of voting power held in each associate is the same as its ownership interest.

All of the companies are incorporated in New Zealand.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011 (CONTINUED)

14. Investments in Associates (cont)

	GROUP		PARENT	
	ACTUAL	ACTUAL	ACTUAL	ACTUAL
	2011	2010	2011	2010
	\$000	\$000	\$000	\$000
(b) Movements in the carrying amount of the group's investments in associates				
Opening share of increase/(decrease) in net assets	101	96	(10)	(10)
Current year share of increase/(decrease) in net assets of associates	51	5	0	0
Closing share of increase/(decrease) in net assets	152	101	(10)	(10)
Cost of investments	45	45	45	45
Carrying amount of investments to 30 June	197	146	35	35

(c) Summarised financial information

The following table illustrates summarised financial information relating to the group's associates:

	GROUP	
	ACTUAL	ACTUAL
	2011	2010
	\$000	\$000
Extract from the associates' Statement of Financial Position:		
Current assets	964	1,594
Non-current assets	24	27
	988	1,621
Current liabilities	411	1,148
	411	1,148
Net assets	577	473
Share of associates' net assets	197	146
Extract from the associates' Statement of Comprehensive Income:		
Revenue	3,039	5,020
Net Profit	60	(59)

There are no known contingent liabilities relating to Associates.

15. Cash and Cash Equivalents

	GROUP		PARENT	
	ACTUAL	ACTUAL	ACTUAL	ACTUAL
	2011	2010	2011	2010
	\$000	\$000	\$000	\$000
Cash on hand	5	1	5	1
Bank	143	773	130	723
Call deposits	1,485	765	1,485	765
Short term deposits	5,130	5,041	5,130	5,041
	6,763	6,580	6,750	6,530

Cash at bank earns interest at 0.16% on daily credit balances over \$250,000 (2010: 0.33%). Deposits earn interest at rates ranging from 2.50% to 5.00% (2010: 2.75% to 4.29%). For the purposes of the Statement of Cash Flows, Cash and Cash equivalents are equivalent to Cash and Cash equivalents presented in the Statement of Financial Position.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011 (CONTINUED)

	GROUP		PARENT	
	ACTUAL	ACTUAL	ACTUAL	ACTUAL
	2011	2010	2011	2010
	\$000	\$000	\$000	\$000
16. Trade and Other Receivables				
Trade receivables	3,375	3,382	3,367	3,381
Allowance for impairment loss	(100)	(69)	(100)	(69)
Other debtors	61	14	60	14
Prepayments	599	686	599	686
Accrued revenue	819	537	819	537
Related party receivables:				
Associates	200	151	200	151
Other related parties	718	693	718	693
Subsidiaries	0	0	696	906
Carrying amount 30 June	5,672	5,394	6,359	6,299

(a) The carrying amount disclosed above is a reasonable approximation of fair value due to the short term nature of the receivables.

(b) Allowance for Impairment Loss

Trade receivables are non-interest bearing and are generally on 30–60 day terms. A provision for impairment loss is recognised when there is objective evidence that a trade receivable is impaired. A reduction in the allowance for impairment loss of \$31k (2010: impairment loss \$39k) has been recognised for the Group and a reduction of \$31k (2010: impairment loss \$39k) by the Parent for specific debtors. The allowance is included in a separate line item in Note 3 (a) Expenditure.

Movements in the allowance for impairment loss were as follows:

	GROUP		PARENT	
	ACTUAL	ACTUAL	ACTUAL	ACTUAL
	2011	2010	2011	2010
	\$000	\$000	\$000	\$000
Opening balance 1 July	69	108	69	108
Reversal of prior year provision	(11)	(105)	(11)	(105)
Charge for the year	42	66	42	66
Closing balance 30 June	100	69	100	69

At 30 June, the ageing analysis of trade receivables is as follows:

	Total	0-30	0-30	31-60	31-60	61-90	61-90	+91	+91
		Days	Days	Days	Days	Days	Days	Days	Days
		CNI*	CI*	CNI*	CI*	PDNI*	CI*	PDNI*	CI*
	\$000s	\$000s	\$000s	\$000s	\$000s	\$000s	\$000s	\$000s	\$000s
2011 Consolidated	3,375	3,070	0	147	0	49	0	9	100
Parent	3,367	3,063	0	146	0	49	0	9	100
2010 Consolidated	3,382	2,769	0	464	0	51	0	29	69
Parent	3,381	2,768	0	464	0	51	0	29	69

* Current not impaired (CNI)

* Past due not impaired (PDNI)

* Considered impaired (CI)

(c) For related party terms and conditions refer to Note 23.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011 (CONTINUED)

	GROUP		PARENT	
	ACTUAL	ACTUAL	ACTUAL	ACTUAL
	2011	2010	2011	2010
	\$000	\$000	\$000	\$000
17. Inventories				
Consumable stores (at cost)	57	66	57	66
Nursery stock	249	153	249	153
Closing carrying amount	306	219	306	219

Consumable stores recognised as an expense for the year are \$48k (2010: \$45k) for the Group and \$48k (2010: \$45k) for the parent company. The expense has been included in the "other" line item in Note 3 (a). Consumable inventory write-down in the period was \$0k (2010: \$1k).

18. Financial Instruments

Financial Instruments include:

Loans and Receivables

Cash and cash equivalents
Trade receivables
Other debtors
Accrued revenue
Related party receivables

Other Financial Liabilities

Trade payables
Other payables
Related party payables

All the above financial instruments are measured at amortised cost. Due to their short term nature their carrying amount is a reasonable approximation of their fair value.

Management have not identified any concentrations of risk for any of the below risk categories.

Liquidity Risk

The group's objective is to maintain a balance between continuity of funding and flexibility through the use of a bank debt facility and a bank overdraft. Management monitors, on a monthly basis, our free capacity within the debt facility and our forecasted ability to pay for that debt.

Trade payables are non-interest bearing and are normally settled within 60 days. The company and group liabilities all have contractual maturities of less than 120 days.

Credit Risk

Financial instruments that potentially subject the group to credit risk consist of bank balances and accounts receivable. The group generally does not require any security.

Significant new non-Government customers are credit checked. Trade receivable ageing is reviewed monthly and all aged trade receivables are followed up. Credit stops are used for non-paying customers.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011 (CONTINUED)

18. Financial Instruments (cont)

Maximum exposures to credit risk as at balance date are:

	GROUP		PARENT	
	ACTUAL 2011 \$000	ACTUAL 2010 \$000	ACTUAL 2011 \$000	ACTUAL 2010 \$000
Current account	143	773	130	723
Call and short term deposits	6,615	5,806	6,615	5,806
Trade receivables	3,275	3,313	3,267	3,312
Other debtors	61	14	60	14
Accrued revenue	819	537	819	537
Related party receivables	918	844	1,614	1,750

The above maximum exposures are net of any provision for impairment on these financial instruments.

Market Risk

Market risk on financial instruments comprise the following three types of risk:

Interest Rate Risk

The group's exposure to market interest rates relates primarily cash deposits. Cash and cash equivalents have been maintained during the year to a year ended 30 June 2011 group balance of \$6,763k (2010: \$6,580k).

	GROUP		PARENT	
	ACTUAL 2011 \$000	ACTUAL 2010 \$000	ACTUAL 2011 \$000	ACTUAL 2010 \$000
Cash in hand	5	1	5	1
Current account	143	773	130	723
Call deposits	1,485	765	1,485	765
Short term deposits	5,130	5,041	5,130	5,041
	6,763	6,580	6,750	6,530

The current account is managed at low levels and interest returns on the current account are not material. Cash funds in excess of our current requirements are invested in short-term bank deposits to attract improved interest returns. At 30 June 2011 bank call and short term deposits were earning interest at rates between 2.50% and 5.00% (2010: 2.75% and 4.29%).

At 30 June 2011, if interest rates moved as indicated in the table below, with all other variables being held constant, post tax profit and equity would have been affected as follows:

	GROUP AND PARENT			
	2011		2010	
Judgement of reasonably possible movements in interest rates:	Change in Interest Rate	Effect on Post Tax Profit & Equity \$000	Change in Interest Rate	Effect on Post Tax Profit & Equity \$000
	+3%	139	+3%	122
	-1%	(46)	-1%	(41)

Management has taken account of Reserve Bank of New Zealand indications of future interest rate movements in the Official Cash Rate and various other market indicators and after considering these indicators, believe the interest rate changes are reasonable and possible.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011 (CONTINUED)

18. Financial Instruments (cont)

Currency Risk

Only small balances are held in currencies other than New Zealand dollars, materially all in debtors. Collection on all these debtors is expected within 60 days resulting in minimal foreign exchange risk.

Other Price Risk

Other price risk primarily relates to the market price of financial instruments. As Scion does not trade in financial instruments there is no perceived risk in this category.

	GROUP		PARENT	
	ACTUAL 2011 \$000	ACTUAL 2010 \$000	ACTUAL 2011 \$000	ACTUAL 2010 \$000
19. Reconciliation of operating surplus after taxation with cash flows from operating activities				
Reported surplus/(loss) after taxation	1,817	(978)	1,591	5,952
Add (less) non-cash items:				
Depreciation (Refer note 3 and 10)	2,233	2,130	2,213	2,109
Amortisation	217	123	217	123
Impairment provision	252	(34)	252	(34)
Doubtful debts	31	(32)	31	(32)
Movement in deferred tax (Refer note 9)	(11)	3,182	(13)	3,182
Revaluation of biological assets	(315)	(77)	(315)	(77)
Distribution on wind up of subsidiaries	0	0	0	(7,063)
Write off provision intercompany advance	0	0	0	0
	2,407	5,292	2,385	(1,792)
Add (less) items classified as investing activity:				
(Gain) loss on disposal of property, plant and equipment	33	65	34	65
Share in associate company profit	(51)	(5)	0	0
Capital related items in creditors	10	39	10	39
	(8)	99	44	104
Movements in working capital items:				
(Increase)/Decrease in debtors and prepayments	(309)	433	(93)	1,888
(Increase)/Decrease in inventories	(87)	(94)	(87)	(94)
Increase/(Decrease) in creditors and accruals	200	(1,022)	229	(8,134)
Increase/(Decrease) in taxation payable	(827)	(293)	(839)	(284)
Increase/(Decrease) in intercompany debtors	0	0	(210)	(1,462)
(Increase)/Decrease in intercompany creditors	0	0	0	7,114
	(1,023)	(976)	(1,000)	(972)
Net cash flows from operating activities	3,193	3,437	3,020	3,292

20. Contingencies

Treaty of Waitangi Issues

Two verified land claims affecting the group currently exist:

- (i) Ngati Whakaue – covering the whole Rotorua Campus
- (ii) Ngati Wahiao – covering the southern end of the Rotorua Campus

No reliable estimates can be made of the impact of these contingencies.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011 (CONTINUED)

21. Heritage Assets

The company has identified its library, herbarium and germplasm collections as heritage assets. For the herbarium and germplasm collections the Directors believe that there is no practical basis upon which to reliably value these collections. For the library refer to note 10.

22. Commitments

Operating Lease Commitments – Group as Lessee:

The group has entered into commercial leases on certain motor vehicles and items of office equipment. The leases have lives of three or four years with renewal options included in the motor vehicle leases only. There are no restrictions placed on the lessee by entering into these leases.

Future minimum rentals payable under non-cancellable operating leases as at 30 June are as follows:

	GROUP		PARENT	
	ACTUAL 2011 \$000	ACTUAL 2010 \$000	ACTUAL 2011 \$000	ACTUAL 2010 \$000
Lease commitments under non-cancellable operating leases:				
Within one year	306	398	306	398
One to five years	239	410	239	410
	545	808	545	808

Operating Lease – Group as Lessor:

The group has entered into commercial property leases on its surplus corporate buildings and land. These non-cancellable leases have remaining terms of up to four years on buildings and 30 years on land leases. All leases include a clause to enable upward revision of the rental charge on an annual basis according to prevailing market conditions.

Future minimum rentals receivable under non-cancellable operating leases as at 30 June are as follows:

	GROUP		PARENT	
	ACTUAL 2011 \$000	ACTUAL 2010 \$000	ACTUAL 2011 \$000	ACTUAL 2010 \$000
Within one year	185	287	98	200
One to five years	480	725	132	376
Greater than five years	885	1,067	0	51
	1,550	2,079	230	627

Capital Commitments

Capital expenditure contracted for at balance date but not provided for

	852	127	852	127
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23. Transactions with Related Parties

(a) Parent

New Zealand Forest Research Institute Limited is wholly owned by the New Zealand Government (the ultimate parent). All transactions with the Government, Government departments and agencies and Government entities are conducted at arms length. Government Public Good Science funding and Capability funding comprises close to 50% of research revenue earned by Scion.

A revision of the accounting standard for Related Party Disclosures (NZ IAS 24) was issued in November 2009 with effect from accounting periods beginning on or after 1 January 2011. Scion has chosen to apply the partial exemption for Government-related entities earlier than the effective date and has not disclosed transactions and balances with the Government and Government agencies and entities.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011 (CONTINUED)

23. Transactions with Related Parties (cont)

	PARENT	
	30 June 2011 \$000	30 June 2010 \$000
(b) Subsidiary Companies		
<i>Te Papa Tipu Properties Ltd</i>		
Charge for services	76	76
Payment of Rent	(382)	(356)
Net Paid on behalf	96	171
Amount (payable)/receivable at balance date		
– Intercompany account	696	906
	GROUP AND PARENT	
	30 June 2011 \$000	30 June 2010 \$000
(c) Associates		
<i>Beacon Pathway Ltd</i>		
Contribution to research outputs	0	(200)
Supplied goods and services	0	17
Receivable/(Payable) at balance date	(10)	(19)
Outstanding unsecured shareholders advance from New Zealand Forest Research Institute Limited to Beacon Pathway Ltd	0	76
<i>Biopolymer Network Ltd</i>		
Supplied goods and services	1,350	1,436
Received goods and services	0	0
Receivable/(Payable) at balance date	200	151
(d) Other Related Parties		
<i>Radiata Pine Breeding Company Ltd</i>		
Contribution to research outputs	0	(111)
Supplied goods and services	381	352
Receivable/(Payable) at balance date	88	12
<i>WQI Ltd</i>		
Supplied goods and services	473	604
Received goods and services	19	25
Receivable/(Payable) at balance date	162	150
The 2010 balance includes \$7k for research to be completed in the 2011 financial year. There is no revenue in advance in the 2011 balance.		
<i>Future Forests Research Ltd</i>		
Services provided	6,479	6,118
Goods received	2	0
Receivable/(Payable) at balance date	468	482

New Zealand Forest Research Institute Limited has a 0% shareholding in Radiata Pine Breeding Company Limited (2010: 17.15%) and a 6.02% shareholding in WQI Limited (2010: 5.95%). The company's policy is to record such investments at fair value but these shareholdings have not been recorded in the financial statements as their value is not considered to be material to the parent and group. The company disposed of its shareholding in Radiata Pine Breeding Company Limited on 30 August 2010. Refer to Note 13 for details on the company's shareholding in Future Forests Research Limited and Note 14 for shareholdings in associates.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011 (CONTINUED)

23. Transactions with Related Parties (cont)

Other

The group's transactions during the year and year end balances with other parties are as follows:

i) New Zealand Forest Owners Association Incorporated

Provided services totalling \$236k (2010: \$363k) and received services totalling \$9k (2010: \$5k). The amount receivable at year end was \$97k (2010: \$112k). There was no payable at year end (2010: \$nil).

ii) FITEC

Provided services totalling \$44k (2010: \$51k). The amount receivable at year end was \$6k (2010: \$6k). No services were received during the year (2010: \$nil). There was no payable at year end (2010: \$nil).

iii) New Zealand Farm Forestry Association Incorporated

No services were provided or received (2010: \$19k provided and none received). There was no receivable or payable at year end (2010: receivable of \$nil and payable of \$nil).

iv) NZ Forestry Ltd

No services were provided or received (2010: \$2k provided and \$7k received). The amount receivable at year end was \$3k (2010: \$3k). There was no payable at year end (2010: \$nil).

v) Wood Council of New Zealand

Provided services totalling \$3k (2010: nil). No services were received (2010: nil). There was no receivable or payable at year end (2010: receivable of \$nil and payable of \$nil).

vi) Juken New Zealand Ltd

Provided services totalling \$30k (2010: nil). No services were received (2010: \$6k). The amount receivable at year end was \$2k (2010: \$nil). There was no payable at year end (2010: \$nil).

vii) Tane's Tree Trust

Provided services totalling \$21k (2010: \$33k). No services were received (2010: \$nil). The amount receivable at year end was \$3k (2010: \$11k). There was no payable at year end (2010: \$nil).

viii) Orica New Zealand Ltd

Received services totalling \$4k (2010: \$nil). No services were provided (2010: \$nil). The amount payable at year end was \$1k (2010: \$nil). There was no receivable at year end (2010: \$nil).

ix) New Zealand Institute of Forestry Incorporated

Received services totalling \$5k (2010: \$4k). No services were provided (2010: \$nil). There was no receivable or payable at year end (2010: receivable of \$nil and payable of \$nil).

x) Waiariki Institute of Technology

Provided goods and services totalling \$21k and received services totalling \$2k (2010: \$6k provided and \$6k received). There was no receivable or payable at year end (2010: receivable of \$nil and payable of \$nil).

Mr Peter Berg, a director of New Zealand Forest Research Institute Ltd, is the President of New Zealand Forest Owners Association Incorporated and a director or member for Wood Council of New Zealand, New Zealand Institute of Forestry Incorporated, New Zealand Farm Forestry Association Incorporated, FITEC and Tane's Tree Trust. Mr Sheldon Drummond, a director of New Zealand Forest Research Institute Ltd, is a director of the New Zealand Forest Owners Association and an employee of Juken New Zealand Ltd. Mr Brian Rhoades, a director of New Zealand Forest Research Institute Ltd, is Chairman of FITEC. Ms Alison Andrew, a director of New Zealand Forest Research Institute Ltd, is a director of Orica.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011 (CONTINUED)

23. Transactions with Related Parties (cont)

Dr Warren Parker, CEO of New Zealand Forest Research Institute Ltd from 7 March 2011, is a director of Future Forests Research Ltd and Te Papa Tipu Properties Ltd.

Dr Tom Richardson, CEO of New Zealand Forest Research Institute Ltd up to 14 September 2010, was a council member of Waiariki Institute of Technology.

Terms and conditions of transactions with related parties

Outstanding balances at year end are unsecured and interest free. No guarantees are provided or received for any related party receivables or payables.

No related party debts were written off during the year (2010: \$nil) and no impairment allowance has been raised for any of these debts.

24. Key Management Personnel

Short term employee benefits
Long term employee benefits
Termination employee benefits
KiwiSaver employer contributions

	GROUP		PARENT	
	ACTUAL	ACTUAL	ACTUAL	ACTUAL
	2011	2010	2011	2010
	\$000	\$000	\$000	\$000
Short term employee benefits	2,060	2,120	2,052	2,112
Long term employee benefits	0	0	0	0
Termination employee benefits	42	0	42	0
KiwiSaver employer contributions	0	0	0	0
	2,102	2,120	2,094	2,112

Board of Directors

Mr Tony Nowell – Chairman
Ms Alison Andrew – Deputy Chair
Mr Peter Berg
Mr Sheldon Drummond
Mr Chris Karamea Insley
Mr Michael Ludbrook (resigned 30 June 2011)
Dr Brian Rhoades
Mrs Judith Stanway

Ms Barbara Forbes (Company Secretary)

EXECUTIVE MANAGEMENT

Dr Warren Parker – Chief Executive Officer

Dr Russell Burton – Group Manager, Investments

Mr Darren Hill – Group Manager, Business Development and Commercialisation

Dr Elspeth MacRae – Group Manager, Bioproduct Development

Ms Chelydra Percy – Group Manager, Corporate Services

Dr Brian Richardson – Group Manager, New Forests and Forest Science

Dr Trevor Stuthridge – Group Manager, Sustainable Design

Mrs Keri-Anne Tane – Group Manager, Human Resources

Mr Rob Trass – Chief Financial Officer

AUDITORS

Simon Brotherton

Ernst & Young, Auckland, on behalf of the Auditor-General

BANKERS

National Bank of New Zealand

SOLICITORS

Bell Gully, Auckland

Registered Office

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