SCION
Next generation biomaterials

Scion Annual Report 2009

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From the Chairman

Dr Russ Ballard

The 2008/09 year has brought outstanding success for Scion in terms of our scientific achievements, our financial performance, and reinforcement of our strategic direction. This is particularly gratifying when viewed against the background of uncertainty and change that has dominated the global and national economy. Throughout this challenging period, the drivers for Scion's strategy have held firm, enabling us to perform well and deliver positive outcomes for the benefit of New Zealand.

Over the past year we exceeded budget expectations and this positive result will have a flow-on benefit from our enhanced ability to invest in our people, infrastructure and products.

Scion's strategic direction

Scion contributes to the economic development of New Zealand by focussing on the following strategic goals:

1. Increase profitability of New Zealand's forest industries;
2. Optimise the value of marginal land;
3. Accelerate growth of the bioeconomy; and
4. Maximise the quality and impact of Scion's science.

The highlights in this report demonstrate how Scion has built scientific capability, sector and science partnerships, and strong links with policy agencies in support of these goals.

The financial crisis, fossil-fuel price instability, national energy security and international political shifts have accelerated global actions towards realising sustainable economic performance. For example, the United States and European Union have legislated for increased sustainability in energy, packaging, and greater use of renewable materials in new products.

Countries like New Zealand that can sustainably grow biomass and leverage international technology developments, are well positioned to improve their economic performance and produce goods and services based on biological resources.

Increasing profitability of New Zealand's forest industries

For New Zealand to realise the opportunities offered by the emerging bioeconomy, the international competitiveness of our existing forest industry must be improved. To address this, Scion has partnered with forest growers to create Future Forests Research (FFR). Over the past year, FFR has emerged as a promising vehicle for supporting forestry companies to overcome the challenges encountered in current operations. Research programmes aimed at increasing forest productivity and forest diversity, decreasing production costs, and meeting international environmental and product standards will help the sector to achieve its target of increasing export revenue to $14 billion per annum by 2025.

Scion is utilising its close partnerships with both the existing forest growing industry and emerging participants to develop research programmes and technology uptake initiatives. Equally, our linkages with manufacturing companies such as the Windsor Engineering Group and Falcon Engineering ensure new technologies are becoming more widely available to the solid wood processing sector and to support overseas growth of these New Zealand firms.

An important event this year was the historic Treaty of Waitangi settlement, which saw New Zealand's largest tracts of plantation forestry lands transferred to iwi ownership. Scion has been pleased to work with the Central North Island Iwi Collective (CNIIC) as they explored their business options this year and we look forward to building on the exciting opportunities presented through this collaboration.

Optimising the value of marginal land

New Zealand has millions of hectares of marginal land which is uneconomic and unsustainable for intensive food or feed production. Scion has demonstrated that forestry represents a viable use for this land, enabling growers to achieve sustainable production of timber, fibre or energy. At the same time, forests provide important environmental services such as carbon sequestration, soil stabilisation, flood control, and water quality protection.

For marginal land to be effectively utilised it is vital that land owners have access to tools that guide appropriate land use decisions; that effective harvesting technologies are available; and that policies are in place that enable financial returns to growers that reflect the real value of forests to society. Over the past year Scion has invested in research programmes aligned to meeting each of these pressing needs.

An emerging opportunity for forest growers is through the provision of "environmental services". Financial benefits are already obtainable for some of these services, such carbon sequestration, and Scion is working on developing monetary values that can be attributed to others. Integrating these new opportunities with New Zealand's existing world-class forest management systems and economic models requires more sophisticated landscape level decision-support tools. New Zealand-specific modelling systems developed by Scion have already been applied by landowners to drive their long term land use strategies. Many firms and regional councils are now working with our staff to achieve economic outcomes that are balanced with environmental considerations.

Scion is committed to building relationships with local and regional authorities to help implement sustainable land use options. Equally, we are keen to work with central government agencies in forming national policy frameworks relating to the Emissions Trading Scheme, climate change, renewable energy and sustainable land use that will encourage afforestation.

Accelerating growth of the Bioeconomy

Advancing new opportunities created by the bioeconomy requires the development of new products that can compete successfully in international markets. Leveraging the significant global investment in technology development to create biobased products is key to New Zealand realising this opportunity. Scion has significant global scientific partnerships in bioproduct development and we are focused on adapting these developments specifically for New Zealand-grown material, infrastructure and targeted domestic and international markets.

A new environmentally-friendly biofoam researched and developed by Scion scientists under contract to the Biopolymer Network earned international recognition at the 2008 Bioplastics Awards in Europe. Made from renewable resources, this novel biofoam product has the potential to replace polystyrene and satisfy growing consumer demands for sustainable products. In addition, our continuing partnership in the New Zealand Lignocellulosic Bioethanol Initiative, aimed at developing technologies for converting woody biomass to liquid biofuels, contributes towards reducing the Country's vulnerability to future oil shocks.

Maximising the quality and impact of Scion's science

During the past year, much work has been done to ensure our science capabilities are aligned to achieving the objectives articulated in our strategy. We have also invested $2.5m in important infrastructure to allow advanced research.

Our active relationships with end-users enabled us to maximise the quality and impact of our science in the commercial world. The quality of our science has been recognised through several prestigious awards and publications. At the same time, Scion provided strong support for policy agencies in the areas of economic development, sustainable land use, energy, waste, and climate change.

Finally, Scion continued to reach out to the community with programmes that profile the impact of our science to New Zealanders. Our biennial “Science in the Park” event this year attracted over 2,000 people from Rotorua and the Bay of Plenty, celebrating the excitement and curiosity that lie at the heart of all science activities.

Government support for science

It is pleasing to see Government initiatives being put in place over the past year to streamline funding processes and elevate the role of science in policy decision-making. The increase in Crown Research Institute (CRI) Capability Funding has been an appreciated investment in our strategy. More notably, the appointment of Sir Peter Gluckman as Chief Science Advisor to the Prime Minister signals welcome recognition of the important role of science in underpinning New Zealand’s future.

We support any endeavour to ensure that the expertise of our scientists is maximised for the national good. As Sir Peter articulated in his inaugural speech we have obligations to demonstrate the true value of what science can offer to New Zealand. We trust that the highlights described in this report will do just that.

People

Over the past year we have reshaped our organisation and management teams. It is a credit to our management and staff that they have delivered strong financial performance in the face of this organisational change and very challenging economic times. I wish to thank Scion’s Chief Executive Officer, Dr Tom Richardson, and his executive team, who have continued to provide positive leadership for the organisation.

The Board has continued to function as an effective, coherent and happy group, which has ensured the challenges faced by the organisation have been worked through rationally and consistently with the executive team. I would particularly like to recognise the significant contribution made over several years by our departing Board members, Kathy Garden and John Palmer.

Last but not least, I would extend a tremendous vote of thanks to our staff for their outstanding efforts over the last financial year.

From the Chief Executive Officer

Dr Tom Richardson

Scion has had a very successful year. We have achieved this result because our areas of focus are important to New Zealand (and in many instances globally); because we have strengthened our research and commercial partnerships; and because our staff are committed to our values of vitality, innovation and collaboration.

Operational highlights

Innovation requires partnerships that bring ideas to reality. Future Forests Research (FFR) was founded on this premise, enabling stronger links between forest growers in New Zealand and the research providers who can help them achieve their productivity, quality and environmental performance goals. The FFR programmes are delivering immediate benefits to the forest industries, such as a national productivity model of radiata pine (page 8), and sawmill studies that demonstrate the commercial potential of other species. Longer term studies will reshape the composition and management of forests and how they are harvested, particularly those on steep terrain (see page 16).

Extending beyond the forestry growing sector, Scion has built new relationships with commercial partners to accelerate innovation in the wood processing sector. Our licensee arrangements with New Zealand companies Windsor Engineering and Falcon Engineering have opened doors to wider export markets for technologies developed by Scion. Equally, our ongoing relationship with international wood modification specialists Titan Wood Ltd is helping to expand the use of plantation-grown softwoods in high-value applications throughout the world (see page 13).

Despite the global economic recalibrations under way, New Zealand will continue to create most of its wealth from land-based industries, and there is scope for real improvements. To deliver this potential, Scion is developing tools that enable land owners to make optimum use of their resources in a sustainable manner. For many land owners, forests are becoming a more economic and environmentally-sound option.

In addition to the value derived from timber or fibre, there is growing realisation that the ability of forests to sequester carbon, and to protect soil and water quality represents a potential economic and environmental opportunity for forest growers and the nation. As I write this overview, Ernslaw One Ltd, a New Zealand forest growing company, has completed the first major sale of local AAUs (Assigned Amount Units). This transaction sets a bold precedent for future sales that will bring a new revenue stream to many forest growers.

Scion has worked closely with forest growers, the Ministry for the Environment and Ministry of Agriculture and Forestry over several years to define exactly how much carbon is contained in New Zealand's forests and the potential for future sequestration on marginal lands. Important milestones in this programme were achieved in the 2008/09 year (see page 10).

While most climate change attention in New Zealand has focused on forests being a major store of sequestered carbon, they could equally represent a substitute energy option that will reduce carbon emissions. Three significant reports have been completed over the past year as part of the ongoing Bioenergy Options study that articulate this opportunity in detail; map out the steps required to achieve it; and highlight the particular role of New Zealand's marginal lands (see page 16).

Our innovative work in bioplastics and wood plastic composites is providing still more renewable product opportunities in the areas of construction, packaging and consumer goods (see page 18).

Building global networks

Scion continues to be an active participant in international scientific and policy networks. Our representation on the technical committee for the Montréal Process has assisted in the development of criteria and indicators to ensure sustainable management of the world's forests. In 2009, we also significantly extended our European partnerships aligned with the NZ-EU Joint Science and Technology Cooperation agreement (see page 27).

It has been tremendously gratifying to see external recognition for the efforts of our talented and committed staff during the year. Two of our outstanding young scientists, Karen Love and Dr Tripti Singh, were among the winners of the 2008 MacDiarmid awards (see page 23); Scion's Biofoam development work with Biopolymer Network Limited (BPN) was judged "Best Innovation in Bioplastics" at the Bioplastics Awards in Europe (see page 18); and Dr David Bergin was co-named as 2009 Forester of the Year by the New Zealand Institute of Forestry (see page 23).

The expertise, confidence and commitment of our staff were further recognised when Scion was named New Zealand's most "exciting research and science company" by the National Business Review (NBR).

Financial

The 2008/2009 year has been a period of very strong financial performance for the Institute. Scion achieved a net group profit of $2.283 million and a return on equity of 9.2%, providing a $1.5 million dividend to the Government. This achievement resulted from good performance across nearly all areas. The net profit showed a favourable variance of $1.872 million when compared to a budget of $0.411 million profit.

Scion's total revenue of $43.973 million was an increase on last year of 5.4% ($2.263 million). This is a strong result in these difficult times.

Scion has made a considerable investment in its people in 2008/09, contributing $0.596 million into supporting staff with postdoctoral study, sabbaticals, student stipends, tertiary training and leadership development. Scion remains committed to investing in developing our people in order to ensure the organisation's long-term contribution to New Zealand.

Net cash flows from operating activities were $7.613 million, compared to $4.318 million in the previous financial year. The improved operating cash flow is a result of better profitability and on-going strong cash management. The improved operating cash flow has allowed Scion to increase its bank deposits from $1.968 million last year to cash deposits of $7.014 million at 30 June 2009. This positive outcome will underpin our investment in capability and infrastructural assets as outlined in our approved three-year business plan to 2011.

Te Papa Tipu Properties Ltd, the subsidiary company established by Scion in 2004 to manage the land on its Rotorua campus, is operating successfully and attracting new tenants to the North Drive Estate. Timberlands Ltd completed construction of their new head office in 2009 and Interpine have entered into a 20 year lease, bringing the total number of tenants to four.

The close of this financial year finds Scion performing strongly and the organisation in a confident and positive mood. Areas that we invested in are now growing, and we are very well positioned to support the needs of the Government, business sectors, and the wider community. Moreover, our positive financial platform means we can continue significant investments in bolder science and new infrastructure.

Like most successes, ours has many contributors. Our science, support staff and management have delivered our aggressive work programmes and developed exciting new science offerings that have gained support from our partners and clients. The internal structure of the organisation has been developed to maximise the benefits from our multi-disciplinary teams. Scion is better positioned as a result of this new structure, and I thank all staff for their commitment to Scion and for supporting the change programmes this year.

The technical and financial successes achieved over the last 12 months have made this past year a bright spot in our long and rich history. This report serves to highlight the achievements that have placed us in a strong position to deliver further benefits to New Zealand.

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 and Strategic Business Plan;
- adopting annual operating and capital budgets;
- monitoring performance against key objectives and budgets on a monthly basis;
- evaluating the performance of the Chief Executive Officer; and
- evaluating the effectiveness of the Board.

The Board operates in accordance with Scion's Constitution. It has eight directors which meet 11 times over the year. The Chief Executive Officer, 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 Committee is composed of no less than three directors appointed by the Board on the recommendation of the Chairman. While the Chairman of the Board is an ex-officio member of the Committee and has full voting rights, he is not Chairman of the Audit and Risk Committee.

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 Officer. The Committee also approves the appointment and remuneration of senior executives and reviews Scion's succession planning and training and development plans.

The 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 the Committee and has full voting rights, he is not Chairman of the Remuneration and Organisation Committee.

The Chief Executive Officer 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.

Scion's Benefit to New Zealand

1. Increasing profitability of New Zealand's forest industries

New Zealand has built its economy on a remarkable ability to grow biomass, fuelled by favourable climatic and soil conditions. In recent years it has been evident that the low profitability of the New Zealand forest industry is unsustainable and counterproductive to realising the considerable benefits that forests can offer.

Scion has developed a strategy in partnership with the sector that will support a lift in productivity and help to increase profitability of forest growing and forest product manufacturing. This strategy builds on Scion's close partnerships with the existing forest industry and emerging participants.

Forest growing

Scion has partnered with the forestry sector to create Future Forests Research Ltd (FFR), an organisation focused on increasing forest productivity, improving wood quality and ensuring environmental sustainability. Research activities and membership are clustered around four themes: Radiata management, Diversified species, Harvesting, and Environmental and Social research.

FFR provides a valuable link with end users of research who include forest growers, regional councils, education providers and consultants. Among the many projects contained within each theme, a few examples are listed below.

Productivity models - Research is focused on intensifying forest management systems for achieving greater profit from radiata pine. A major outcome has been the incorporation of research findings into the widely used management tool "ATLAS Forecaster". The inclusion of a national productivity model of radiata pine allows growers to predict the impact of site and silviculture on tree growth, yield, wood value and internal rate of return. This enhancement of the Forecaster tool will allow new investments to be assessed more directly and also provide a yard stick for measuring expected productivity against actual.

Forest inventory - A collaborative study between CSIRO and Scion made use of CSIRO's remote-sensing-based tree counting software and allowed Scion to develop a prototype inventory system known as "TimberLine". The novel sampling method combines total tree counts in a mature stand with ground-based individual tree measurements. This approach offers the potential of greater precision and significant cost savings compared with currently practised pre-harvest inventory methods.

Managing weeds - Weed control is the single most important treatment influencing growth and survival of tree plantations in New Zealand. Weed management research is important because forestry companies with Forest Stewardship Council (FSC) certification are required to minimise their use of herbicides. Progress has been made by Scion over the past financial year to quantify how key properties of the commonly used herbicide, terbuthylazine, vary across New Zealand forest soils in relation to criteria outlined by the FSC.

Diversified species - The Diversified Species theme completed its first year of operation in 08/09, delivering useful results for growers of commercial species other than radiata pine. Scion has an extensive body of past research to build on, especially for Douglas-fir and eucalypts. Growth models for new species will be accelerated by technologies already developed for radiata pine. This research is supported by $1.6 million from the Foundation for Research, Science and Technology (FRST) over five years with significant industry co-funding contributed through FFR. The focus of the programme is on Douglas-fir, eucalypts, redwoods, cypresses and indigenous species.

Milling redwood - Renewed interest has been shown in planting redwood (*Sequoia sempervirens*) in New Zealand, as it grows on a wide range of sites and outperforms radiata pine in some cases. A Forest Industry Development Agenda (FIDA)-funded sawing study completed in the 08/09 year demonstrated that 38% of the tree volume delivered 50% of the value. The proportion of clear heartwood, found to be relatively high in New Zealand-grown redwood, was crucial in delivering this value.

Harvesting - The Harvesting theme also completed its first full year with a focus on reducing the costs, and improving the productivity and safety of logging operations. This research is important to the industry due to the high relative costs of extraction versus returns. Amongst the world's major wood producers, New Zealand has third-to-highest harvesting costs per cubic metre. FFR is focused on identifying practical opportunities for the industry to reduce costs and improve its ability to compete on international markets. More information on Scion's harvesting research is available on page 16.

Quantifying non-timber values - The Environmental and Social theme was formally established in the 08/09 year. It now has a robust research programme in place focused on increasing the sustainability and global competitiveness of the New Zealand forestry sector. A significant project completed this year investigated ways in which the recreational opportunities offered by forests could be valued economically. This pioneering study focused on the popular Whakarewarewa forest park in Rotorua as a first step in quantifying the various environmental and social benefits offered by production forests.

The science carried out by Scion for FFR Ltd will ensure that return on investment from the New Zealand forest industries will increase in line with sector plans. The effective relationships enabled by this key industry partnership are already improving knowledge and technology transfer.

> *"As an organisation, FFR is extremely well served by our key research provider Scion and we should not forget that their success is our success. A strong, vibrant and well focussed forestry CRI is critically important to our industry."*
> *Phil Taylor – Managing Director, Blakely Pacific; Chairman, Future Forests Research*

Improving the forest resource

An important area of research for the forest industry is aimed at increasing the yield and rate of wood production. One approach to this is through advanced tree breeding. Scion continues its shareholding in the Radiata Pine Breeding Company, a New Zealand company focused on the provision of superior radiata pine germplasm to its shareholders and customers in Australasia. In addition to research carried out for RPBC, Scion has a highly experienced molecular genetics team focused on applying the latest technologies to tree improvement activities.

Genome sequencing has become a routine technology to assist in identifying genetic traits in plants and animals for commercial breeding purposes. The difficulty is that new statistical methods are needed to process the huge amount of data generated by increased genome sequencing. The 08/09 financial year saw the start of a five-year research programme that will enhance global advances in data analysis and improve New Zealand's competitive advantage in the biological sectors.

The new 'Virtual Institute of Statistical Genetics' is a collaborative research programme led by Scion that draws on New Zealand's most highly skilled gene mapping statisticians and geneticists from seven universities, Crown Research Institutes and private companies. The focus of this research will be to overcome statistical issues associated with analysing vast quantities of new data generated by genomic technologies. To this end, Scion received investment from FRST and work is now under way to address these complex statistical challenges associated with massive

gene databanks. This research will also have value for a range of agronomically important plant and animal species, and for the medical sector which uses genome sequencing for diagnostic purposes.

Realising the economic potential of environmental values

Forests offer a diverse range of environmental and social values in addition to the value derived from timber or fibre. For example, the ability of forests to sequester carbon, and to protect soil and water quality represents a potential economic and environmental opportunity for forest growers and the nation. Scion is seeking to quantify these benefits so that growers may eventually gain monetary values for environmental services.

The emergence of carbon trading on the international market is creating potential for a new revenue stream to forest growers. Underpinning this opportunity, the Government must ensure that changes in carbon stocks can be accurately estimated and reported over time as part of New Zealand's commitment to the Kyoto Protocol. Scion has been a key player in developing carbon modelling methods and forest inventory procedures for the Ministry for the Environment (MfE) to enable a robust assessment of national carbon stocks in all forests.

Research for MfE conducted over the past five years has underpinned the improvement of the New Zealand Land Use and Carbon Analysis System (LUCAS), developed to monitor carbon stocks within planted forests. In 08/09 the focus of this work undertook a significant shift as Scion began to analyse actual data from forest plots established throughout the country during 2007 and 2008. Data from field measurements and from airborne scanning LiDAR have been used. Plots are located on a 4 km grid overlaid on forests established after 31 December 1989 on non-forested land, representing an important carbon sink for New Zealand under the rules of the Kyoto Protocol.

Scion calculated the carbon stock per hectare based on plots in these post-1989 forests (Kyoto forests) as at 1 January 2008 and predicted for the first time carbon sequestration over the first commitment period of the Kyoto Protocol from 1 January 2008 to 31 December 2012. These figures are enabling MfE and the Ministry of Agriculture and Forestry (MAF) to determine the Kyoto net position for the first commitment period (2008-2012) for New Zealand and to enable MfE to meet New Zealand's international reporting requirements under Kyoto.

> *"Scion has provided MfE with results key to the overall success of the LUCAS programme. It is the first time that New Zealand has had values for the carbon content in Kyoto Forests, positioning us so that IPCC GPG (Intergovernmental Panel on Climate Change Good Practice Guidance) can be met under the Kyoto Protocol."*
> *Peter Stephens – LUCAS Designer, MfE.*

Measuring forestry's footprint

Carbon trading is not the only means by which the forestry sector can leverage an economic advantage over other industries. Under the New Zealand greenhouse gas (GHG) Footprint Strategy, Scion has completed a detailed study on the carbon footprint of log production from New Zealand's radiata pine plantation forests that creates a new opportunity for forest growers. The work completed in this project has underpinned an additional project funded by MAF to develop a tool that will enable the sector to identify and prioritise opportunities to reduce their GHG footprint.

Life Cycle Analysis (LCA) revealed that GHG emissions in the forestry sector are largely dominated by harvesting (50%) and log transport (42%). These two factors represent over 90% of the total global warming potential of the log production process. This information will be used to inform policy making, provide a benchmark for forestry operations, and enable LCA on wood-based products. This project was part-funded by MAF's GHG Footprinting Strategy for the Land-Based Primary Sectors.

"Greenhouse gas footprinting has been identified as an emerging strategic advantage for the forestry and wood processing sector. This means we need to disclose the GHG footprint of our products to our customers in a credible manner. The LCA study provides a valuable base for us to derive figures for our own operations. The results hold weight due to Scion's credibility as a Crown Research Institute."
Andrew Karalus - Nelson Forests Ltd, Business Improvement Manager

Plantation forests and climate change

The potential impact of climate change is one of the great issues of modern time. Scion has been successful in winning a number of contracts under the Sustainable Land Management & Climate Change (SLMCC) programme for MAF that help to prepare New Zealand for likely changing conditions.

A significant output completed by Scion (and supported by Landcare Research and NIWA) over the past year was a report that evaluates the potential impacts of climate change on the productivity of New Zealand's planted forests. As well as evaluating the direct vulnerability of forests to adverse climatic events, indirect factors such as weeds, insects and fire were also considered. The report identified that new opportunities could emerge for novel species or enhanced growth potential under different climate scenarios.

Montréal Process

Scion has a commitment to ensuring that the New Zealand forest industry is at the forefront of debates on indicators of sustainable forest management. For several years, Scion has been heavily involved in revising the international set of Montréal Process Indicators of Sustainable Forest Management. The revision of the indicators by the Technical Advisory Committee (TAC) led by Dr Tim Payn of Scion began in 2005 and has involved extensive input from technical experts in all twelve member countries.

Scion researchers have provided important continuity in the revision process; convening, facilitating, attending and contributing to all TAC and working group meetings. The revision process has resulted in the inclusion of indicators covering new concepts, such as avoided fossil fuel emissions, and ecosystem services. The revised set will form the basis of international reporting from 2010 onwards. Scion's contribution represents a major input into this important international process, helping to ensure that all indicators are underpinned by robust science.

Protecting New Zealand's forest resources

The diverse benefits provided by forests are at risk from damage caused by insect pests, pathogens and weeds. Such risks are increasing due to global travel and trade. They may also increase with climate change. As New Zealand's leading provider of forest biosecurity science for over 60 years, Scion focuses on developing robust systems for preventing forest pests and diseases from entering New Zealand, and eliminating or managing those that are already here.

Over the past financial year, Scion scientists have served on a task force aimed at protecting one of New Zealand's most iconic tree species. A species of Phytophthora (provisionally named *Phytophthora taxon Agathis*) was found to be associated with dying kauri in northern areas of the country. This disease is being treated as an exotic invader and the Kauri Dieback Joint Agency Response Team has been formed to coordinate the response.

This team includes MAF Biosecurity New Zealand, the Department of Conservation and four regional councils (Auckland Regional Council, Northland Regional Council, Environment Bay of Plenty and Environment Waikato). Scion, Plant and Food, and Landcare Research scientists are also involved in a MAF-managed project aimed at managing the disease, supported by joint-agency funding.

Protecting communities from wild fire

Fire represents a risk to forests in many parts of New Zealand, as well as threatening lives and causing widespread damage in rural areas. Scion offers the only rural fire research capability in New Zealand, providing valuable support to fire management agencies charged with minimising the risks and losses associated with wildfires. The experience in Australia over the past summer served as a potent reminder of how fire-prone areas can rapidly turn into disaster zones when homes, lives and communities are under threat.

By studying fire-affected communities in New Zealand, Scion scientists are gaining valuable insights into how people can prepare for, and recover from, wildfire events. This financial year Scion completed an overview of fire insurance issues drawn from international literature and a case study focused on the 2000 Wither Hills fire, the largest grass fire experienced in New Zealand since 1983. The fire burnt through farmland, destroying fences, water pipes, livestock and plantation forests and threatened properties on the outer suburbs of Blenheim.

Results from this project have highlighted the need for adequate insurance and a greater understanding of policy terms and conditions, as well as highlighting lessons for fire management in New Zealand. Comprehensive reports documenting the lessons learnt and recommendations for Rural Fire Authorities and landowners have been widely distributed and well received by the Marlborough District Council, Federated Farmers of NZ, and Rural Fire and Emergency Management Officers.

This project is part of the broader fire research programme within Scion that recently underwent an independent assessment initiated by FRST. The review panel emphasised the group's strong end-user linkages and the benefit of their relationship with Australia's Bushfire Cooperative Research Centre.

> *"I would like to commend Scion on their [rural fire research] work being rated as 'excellent' by an independent funding review committee. It is evident that with the essential strong end-user support in the oversight of this programme, rural fire management clearly fits into this category. It is heartening to know that rural fire science carried out in New Zealand is considered world class."*
> *Hon Nathan Guy – Minister of Internal Affairs*

Wood processing

Scion has a number of research programmes focused on improving the value and performance of wood-based products. Many of these programmes involve partnerships with manufacturing companies to ensure that new technologies become more widely available to the processing sector and to support overseas growth of New Zealand products.

Predicting pine performance

An important aspect of Scion's research is to enable the wood products industry to gain premium prices. Scion continues its shareholding and support for WQI Ltd, a New Zealand research and development company focused on enhancing the quality and value of radiata pine. In 2008/09

Scion completed a study that has shown it is possible to predict the in-service stability of radiata timber.

Technology developed by Weyerhauser US to test the performance of softwood timber in North America has been successfully shown by Scion to work on boards milled from radiata pine. The system takes key measurements of timber and uses the information to predict exactly how the board will behave in use.

Weyerhauser developed the rigorous grading and quality control process to ensure their timber has predictable strength and structural reliability. This technology has been adapted for processing four timber species commonly grown and sold in the North American market. It ensures that their performance-tested timber is well suited for manufacturing roof and floor trusses, glue-laminated beams, or as a consistent and predictable part of floor joist and wall framing.

The ability to guarantee performance of radiata pine in the same way is particularly valuable for products used in demanding applications such as structural beams and window frames where stability is paramount. WQI Ltd is now looking for opportunities to commercialise the prediction technology in Australasia.

This project is part of a larger WQI programme aimed at predicting the stability of wood at all stages of the sawmilling process from logs to green timber. The past year has marked the completion of WQI Ltd and the foundation of its successor, Solid Wood Innovation (SWI). Scion projects and shareholding initiated during WQI Ltd will continue under the SWI consortium.

Ensuring product standards through controlled wood drying

The quality and value of timber products can be heavily influenced by the wood drying process. A sophisticated monitoring and control system for kiln-drying timber known as DrySpec™ has been developed by Scion over many years to ensure optimum results.

During the 2008/09 year, New Zealand-based company, Windsor Engineering Group Ltd, has extended their licence to market DrySpec™ in the northern hemisphere. Windsor now has several sawmills operating with DrySpec™ throughout the world, and they recently achieved their first installation in Eastern Europe. Windsor's market expansion builds on their previous success in establishing DrySpec™ widely throughout the southern hemisphere.

Scion's achievement in developing DrySpec™ over many years reflects its world-class capability in timber drying technologies. This long standing research programme is now being continued under the Solid Wood Innovation (SWI) industry consortium, with renewed focus on energy efficiency and timber quality.

> *"The true strength of the relationship between Scion and Windsor is the way the two organisations can combine their expertise to offer a world-class solution to the timber drying market. Scion's R&D, along with Windsor's practical on-site experience and commercialisation abilities, allow for continuous improvements to the benefit of the Dryspec technology."*
> *Maurice Davies - Managing Director, Windsor Engineering Group Ltd*

Acetylation technology

An opportunity for wider use of New Zealand-grown wood has been created by technology developed by Scion and purchased by Titan Wood Limited. This UK based company leads the field in the commercial production of acetylated wood and that is expanding its markets for acetylated wood products under the brand Accoya®.

Wood acetylation is a process that increases the amount of ‘acetyl’ molecules in wood, thereby modifying its physical and chemical properties. These properties allow Titan Wood to market Accoya® as a “new wood species” based on plantation-grown softwoods with performance properties that match or exceed those of the very best tropical hardwoods.

Scion continues to provide valuable research and development support for the company as they focus on drying and acetylation of radiata pine and southern yellow pine. This important relationship will ensure ongoing promotion of acetylated radiata pine as a suitable and reliable substitution for tropical hardwoods in international markets.

A-grader gets an upgrade

Advanced instrumentation enables sawmills to gain quality improvements through smarter processing systems. Scion and Falcon Engineering are exploring the application of microwaves to enable a new tool that can be linked to the A-Grader or stand alone to measure moisture content in timber. The original A-grader used sound waves to measure timber stiffness, enabling sawmills to gain quality improvements, leading to significant savings. Over the past financial year, the new technology has been tested using a lab-scale instrument, and a demonstration version has been built for commercial trials. This microwave technology is being developed by Scion with support of PreSeed investment and in kind support from Falcon Engineering, who has negotiated a commercial license.

Douglas-fir versus radiata pine in leaky homes

A significant project was completed by Future Forests Research comparing the performance of Douglas-fir versus radiata pine in leaky home situations. Results of the Scion study confirmed that Douglas-fir maintained superior stiffness to untreated radiata when exposed to decay conditions, a finding that has important implications for the New Zealand building code and Douglas-fir growers.

2. Optimising the value of marginal land

New Zealand has millions of hectares of marginal land which is currently uneconomic and unsustainable for intensive food or feed production. Scion has demonstrated that, in many instances, forestry represents a viable use for this land and can provide substantial economic, environmental and social benefits. This situation presents an exciting opportunity to transform the forest growing sector by growing trees for a range of different values and products, extending well beyond the normal production of wood and fibre.

For marginal land to be more productively utilised for forestry, it is vital that landowners have access to tools that guide appropriate land use decisions; that effective harvesting technologies are available; and that durable policies are in place to support afforestation. Over the past year Scion has invested in research programmes aligned to meeting these needs.

Results of this research are assisting government agencies to develop systems that will enable forest growers to earn money from environmental services, such as carbon sequestration (see MfE project on page 10) and new product value chains, such as biofuels.

Restoring degraded soils through forestry

Scion has completed a study for Land Information New Zealand (LINZ) to determine the role of trees in restoring degraded soils and promoting ecologically sustainable management. With its focus on dryland properties undergoing tenure review in the Mackenzie Basin, this study dealt with areas at the extreme climatic end of the marginal land spectrum.

A primary objective of the tenure review is to “promote the management of reviewable land in a way that is ecologically sustainable” (Crown Pastoral Land Act 1998). The Scion study therefore provided valuable information about land use options in this challenging terrain. Results showed that exotic trees perform better than any other plant form in the area, and represent a real option for long-term sustainable land use. Any such use would have to carefully consider risks of wilding spread and their potential visual impact on the landscape.

This study made use of trials set up by Scion scientists 15 years ago specifically to answer long-term sustainable dryland management questions. These trials demonstrate that native trees are much more difficult to establish (and slower growing) in the high country than exotic species, particularly in low rainfall areas. Hence, they have not been considered as an initial woody cover in the drier, sub-humid regions of the Mackenzie Basin. However, native tree establishment may be easier in the more favourable micro-climates which the more hardy introduced trees can create.

Understanding wildings

A research project funded by MAF's Sustainable Farming Fund and nine major end users is generating valuable information about wilding conifers. Wildings spread most readily on lightly vegetated and grazed lands, which are typical of much of the South Island high country.

One objective of the study involved mapping areas affected and improving risk assessment. In the South Island, a total of just over 800,000 ha could be described as 'affected', although only 145,000 contained significant numbers of wildings. Two risk assessment decision support systems have been produced, and are used by land managers and administrators to determine spread risk from existing and proposed plantings. One is being adapted for spatial display on Google Earth.

A second objective covered wilding control, and has resulted in the production of a practical manual covering fifteen control techniques, specifically aimed at farmers.

The third objective explored vegetation successions associated with wilding management and control. Results have shown how hardy introduced conifers can act as a 'nurse' crop for the return of native plants onto exposed and depleted land.

Tangata whenua breaks new ground

A core strategic focus for Scion is to strengthen relationships with Maori land owners, many of whom control significant areas of forests and marginal land. Iwi collectives across New Zealand are increasingly being empowered to make land use decisions for achieving multiple outcomes. Four Maori Trusts in the Rotorua area (collectively referred to as Nga Whenua Oranga Mo A Tatou Whakatipuranga) have been the first tangata whenua grouping to win government funding from the FRST Techlink programme. The grant awarded to the Trusts in September 2008, enables them to commission research that will guide future land use decisions.

This research is focused on the assessment of soil resources for improved land use management and decision making, as soil quality and potential is a vital input to all types of land-based primary production. Enhanced land use decision making capability within the four Trusts may enable improved productivity of current land uses, diversification of land use options, and greater awareness of environmental risks.

Forestry and bioenergy in New Zealand

Climate change has focused interest on forests as a major store of sequestered carbon, but they could also provide a major renewable energy option that will reduce carbon emissions. Over the 2008/09 year Scion has completed three significant reports that articulate this opportunity in detail and reinforce the role of New Zealand's marginal land in meeting these needs. The reports are part of the Bioenergy Options for New Zealand study, which is being led by Scion as part of the broader EnergyScape programme funded by FRST and are available on the Scion website.

The three reports published this year as part of the ongoing Bioenergy Options study were entitled: *Pathways Analysis*; *Research and Development Strategy*; and *Analysis of Large Scale Bioenergy from Forestry*. These studies built on the original *Situation Analysis* report completed in the previous financial year that identified the exciting potential offered by various biomass options, and woody biomass in particular.

The studies reveal that it is possible for New Zealand to be self-sufficient in terms of liquid transport fuels, by using biofuels produced from plantation forests grown on land that does not impact domestic or export food production. Indeed, these forests could be used to produce a diverse range of substitute energy products, including heat, power and bioethanol, and energy carriers like gas, biochars and chemicals, along with traditional forest products (i.e. timber and fibre).

An analysis of large scale bioenergy from forestry study took this idea a step closer to reality by investigating a range of macroeconomic scenarios related to scrub and low-to-medium productivity grazing lands spanning the country. Scion, with input from Landcare Research, Motu and Infometrics, took a holistic approach which considered the economic, environmental and land use impacts of large-scale biofuel production from forestry.

The various scenarios from this study demonstrate that sourcing energy from forests to meet New Zealand's liquid fuel requirements not only offers considerable environmental benefits but can also buffer the economy from fluctuating oil prices. Furthermore, the study showed that domestic biofuel production from forestry can also lead to a net increase in employment, especially in regional areas. Along with the energy and wood products arising from increased afforestation, ancillary benefits of forests could also be realised including flood mitigation, improved water quality, erosion control and carbon sequestration.

Harvesting research

In order for New Zealand to realise the considerable opportunities offered by planting forests on marginal land, improved technologies are needed that increase the efficiency of harvesting on

steep terrain. Scion has invested Capability Funding to revive activity in this vital area of research (see page 9).

The fledgling programme received a boost this financial year when Scion was successful in attracting funds from MAF. This funding is significant because it represents the first time in many years that the government has directly supported harvesting research.

Over the past financial year, harvesting specialists have focused on technologies of particular relevance to managing operations on marginal land. A practical evaluation of new excavator machinery developed overseas that is capable of “walking” up steep hillsides was completed. In addition, they have conducted field studies and reported on three harvesting crews that are trialling innovations in systems and equipment, to assess opportunities for widespread uptake across New Zealand.

3. Accelerating growth of the bioeconomy

Advancing new opportunities created by the bioeconomy requires the development of new products, renewable energy systems and smart technologies for utilising waste. Leveraging the massive global investment in technology development to create biobased products is key to New Zealand realising this opportunity.

Scion has significant global scientific partnerships in bioproduct development and is focused on adapting these specifically for New Zealand grown material, infrastructure and targeted domestic and international markets.

Creating new bio-plastics

The Biopolymer Network Ltd (BPN) is a unique collaboration that demonstrates the power of scientific partnerships. With an equal shareholding from each of three CRIs: Scion, AgResearch and Plant & Food, BPN has a mission to commercialise or manufacture new biological based products arising from the collaborations of the three science partners.

Major recognition of BPN's success was achieved this year at the prestigious International Bioplastics Awards announced in Munich. A new environmentally friendly biofoam researched and developed by Scion scientists under contract to BPN won the "Best Innovation in Bioplastics" category. The novel polylactic acid (PLA) foam was selected for its green credentials and key performance attributes at low densities, which are comparable to existing petroleum-based materials like expanded polystyrene foam. The process has also been proven on existing manufacturing lines, removing many barriers to uptake which may otherwise have existed. The product has potential for use in many applications where polystyrene is traditionally applied, such as in thermal or acoustic insulation.

Scion researchers working within the Biopolymer Network (BPN) have developed new biopolymers derived from pine bark for industrial polymer applications. Specific pine bark tannin extracts, and modified tannins, have been developed as biobased functional additives and formulated into industrial polymer products such as plastics and coatings. Input and support from industry partners such as Nuplex Industries Ltd, a New Zealand-based company, is assisting in the development of such biopolymers for some commercial applications such as specialty coatings. Furthermore, in parallel, and through collaboration with our BPN partner AgResearch, a comprehensive "whole-of-life" cost model has been developed for the pine bark extraction process. This model will provide a useful tool for assessing the commercial viability of various manufacturing and investment scenarios for this technology.

Wood-plastic composites

The combination of bioplastics and wood fibres offers a wide range of exciting new product opportunities. Scion has developed a wood fibre plastic pellet product that can be used as a new feedstock in producing wood polymer composites. This year, Scion has successfully completed a trial for manufacturing wood fibre plastic pellets at a commercial medium density fibreboard (MDF) plant in New Zealand. Samples of this novel feedstock have been provided to moulding companies in New Zealand and overseas for evaluation. This technology has subsequently attracted interest from a major producer of MDF in Europe. The relationship developing with this producer will help further de-risk the technology, eventually enabling export opportunities for New Zealand companies.

Creating plastics from fruit

New Zealand's fruit giant, Zespri has teamed up with Scion's bioplastics team to develop innovative ways of using fruit waste to create bio-based polymers. One example is the development of a bioplastic "spife", a spoon-like utensil for eating kiwifruit made from bioplastic material derived from fruit waste. Bioplastics incorporating kiwifruit waste streams such as hairs,

skins and whole fruit, were successfully moulded into spifes on existing processing equipment at Alto Plastics plant in Henderson. Zespri and Scion are working together to investigate sustainable pathways forward for fruit residue utilisation and improved carbon footprints for the kiwifruit industry.

New products from bioplastics

As new bioplastic materials become available, it is necessary to develop suitable applications for their use. Students at Unitec's School of Design took up a challenge, outlined by Scion and the Designers Institute of New Zealand, of creating stylish, functional products using bioplastics derived from sustainable resources. Two students received awards for their designs, in the 2008 BeST Design Award, student category. Unitec and Scion have since teamed up to develop a framework for manufacturing a sustainable chair made from wood and bioplastic based on one of the winning designs.

Producing bioethanol from wood

Scion is focused on developing biorefinery processes to create new products from renewable lignocellulosic (woody) materials. One research programme is aimed at determining the viability of producing bioethanol from New Zealand's radiata pine resource. In the 2008/09 year, Scion carried out successful pilot-scale trials on fibre pre-treatment and enzymatic processing. This research was made possible through support from FRST's High Technology Transformational Research, Science & Technology (High Tech TRST) fund and collaboration with Verenium, a US company developing and commercialising cellulosic ethanol and high-performance specialty enzymes.

The programme builds on intellectual property (IP) already developed at laboratory scale by the New Zealand Lignocellulosic Bioethanol Initiative (NZLBI), a partnership created two years ago between several public and private enterprises, including Scion and Verenium. The partners have co-invested over $1 million in research and development of softwood-based second-generation bioethanol technologies that achieved high conversion efficiencies and high quality lignin substrates for co-product generation at laboratory scale.

Over the past year, Scion's linkages with Verenium have extended beyond the existing NZLBI initiative to work with wastewater treatment technologies associated with Verenium's bioethanol demonstration plant in Louisiana.

Biomass resource analysis, integrated resource-to-product modelling and life cycle assessments are also important aspects to understand. Scion estimates that domestic biofuel from woody biomass could potentially replace 50% of the overall transport fuels market by 2030, given New Zealand's plentiful land resources for plantation forestry (see page 16). This outcome will reduce emissions by 17 million tonnes of CO_2 equivalent per year; offset greenhouse gas liabilities costing $680 million; and potentially replace $3.5 billion in petroleum imports. Bioethanol production will also create the opportunity for new added-value chemical by-products from lignin.

Biorefinery processes

Since lignin is one of the major constituents of wood, generating new products from wood will generally yield lignin as a significant by-product. Currently lignin is of little commercial value and in New Zealand is used primarily as a low grade fuel by the pulp and paper industry. However, lignin is a highly promising renewable resource for many aromatic chemicals and polymers that are components of many plastics and resins.

Scion's research programmes are developing techniques to open up new possibilities for alternative uses for lignin as a raw material for various chemicals. Scion was successful this year in winning support from FRST's International Investment Opportunities Fund (IIOF) to investigate the use of lignin for producing chemicals. The IIOF project supports Scion's participation in LigniVal, an international research collaboration led by VTT Technical Research Centre of Finland. The ultimate

goal of this work is the valorisation of lignin to provide a sustainable source of chemicals and materials that will subsidise commodity product costs in a biorefinery context.

Substitute energy in schools

Scion has been involved for many years with a nationwide initiative run by the Energy Efficiency and Conservation Authority (EECA) to convert school boilers from fossil fuels to renewable wood pellet fuel. Thirty-one schools have now been converted under this programme, over half of which have been supervised by Scion.

Over the past year, Scion assisted Macleans College in Bucklands Beach to become the first school in Auckland to convert its coal-fired boiler to run on wood pellets. The conversion was supported by EECA and Auckland Regional Council (ARC) with Scion acting as technical advisor and project manager.

The point of difference with the Macleans boiler conversion is the ability to monitor the boiler from a remote location via the internet. Optimising boiler efficiency requires specialist knowledge which many of today's school caretakers do not have. The development of remote monitoring is a step towards using a boiler specialist to monitor boiler efficiency; adjusting fuel flow and air intake to ensure high efficiency and low emissions, thereby removing that responsibility from the school caretakers.

Advanced wood processing

Just as biorefineries offer a new approach to processing woody biomass, Scion is exploring new ways of processing solid wood. Scion has patented a method of drying green wood using supercritical CO_2 to extract water from the wood cell lumens. Over the past year, pilot-scale trials have successfully demonstrated a repeatable process that can dry wood in a fifth of the time taken to reach the same moisture content achieved through traditional kiln drying. Ongoing research is focused on potential applications for wood modification to develop high-value niche products.

Future options for bio-packaging

Scion is also developing sustainable options for food packaging based on plastic and paper technologies. New materials under development, in collaboration with an Industry Advisory Group, CRIs and universities, include lightweight biopolymer products, hybrid fibre-bioplastic products, bioplastics and biofoams.

A new coating developed by Scion that provides an environmentally-friendly solution for water vapour resistance in corrugated paperboard has taken steps towards commercialisation this year. An industry-scale trial of the new coating was successfully carried out by a packaging manufacturer in Melbourne. Further benchmark evaluations showed the new coating compared favourably with most other commercial coatings. This trial confirmed that Scion's novel coating represents an environmentally-friendly alternative for paperboard corrugating companies.

Deriving value from waste

The implementation of waste levies has prompted the development of technologies that create new products from waste. Scion scientists have devised a unique cost-saving method of treating sludge from sewage treatment plants and converting it into a number of valuable by-products. The disposal of sludge is a major and costly problem for most local authorities and it is commonly dumped in local landfills. The Rotorua District Council has contracted Scion to apply the technology to the sludge produced at the local wastewater treatment plant.

"This technology could save ratepayers up to $650,000 a year within three years. Scion's process would also extend the landfill's life since fourteen per cent of the Rotorua landfill's annual capacity is taken up by sewage sludge. This project is a great opportunity for Rotorua to lead the way in minimising waste. We are lucky to have Scion right here and close to all of the sites they need to be."
Peter Dine - Works Manager, Rotorua District Council

Community input into water and sewage management

Effective waste management and utilisation requires strong community acceptance. Scion facilitated a large community dialogue project with collaborators from the University of Canterbury, Landcare Research and Te Rūnanga o Ngāi Tahu. This project was aimed at improving water and wastewater management for Little River, a semi-rural community on Banks Peninsula that is part of the broader Christchurch region. Small rural communities, which are often faced with substantial challenges to achieve sustainable water and sewage management, often feel excluded from the decision making process. Scion's research project focused on identifying methods for improving community dialogue to achieve sustainable outcomes.

The research involved interviews of over 70 residents of Little River, including members of the Wairewa runanga. Scion also conducted a successful hui at the Wairewa marae, which brought together residents, Christchurch City Council staff, elected councillors and representatives from Environment Canterbury. The initial focus of the research team was on capturing community knowledge of potable water, stormwater, and sewage issues and views on how these problems could be addressed. The findings of this research enabled these councils to identify, prioritise and select acceptable and appropriate water and waste management solutions.

This project was completed as part of Scion's long running "Waste to Resource" programme. Renewed funding for this research programme was awarded by FRST in 2009 with the formation of a new partnership between Scion, ESR and Landcare Research. The collaborative research programme is entitled "Closing the loop – Rebuilding our soils with biowastes" and fully integrates environmental, social, cultural and economic knowledge within the Kaikoura and Tuaropaki Trust case study communities.

Exploring ways to improve water quality

The improvement of water quality in lakes is a critical issue for many parts of New Zealand. Scion continues to work with Environment Bay of Plenty and Matamata-based company Blue Pacific Minerals to test a product that absorbs phosphorous, a harmful nutrient in many lakes. The volcanic mineral zeolite has been modified by Scion to enhance its natural ability to absorb phosphorous, and act as a sediment cap on a lake bed.

Results from a 2007 trial in Lake Okaro shows that phosphorous levels in the bottom water of the lake have been reduced by more than 50% over time. A second application is being made with the goal of blocking all phosphorous release from the lake bed.

This trial is part of Environment Bay of Plenty's wider management plan for the lake, which includes planting programmes, wetland restoration and working with land owners to reduce nutrient run-off. Lake Okaro is viewed by the regional council as a pilot study in lake water remediation that can be applied to other Rotorua lakes.

Measuring footprints of building materials

Scion is committed to research that guides the emerging policy and regulatory requirements relating to the bioeconomy. A contract completed by Scion under the Sustainable Land Management & Climate Change (SLMCC) programme for MAF focused on adapting LCA data and methods for New Zealand buildings. The purpose of the research was to develop New Zealand-specific datasets for a range of building materials, reflecting the specific processing variables and electricity mix within the country. The research was important to New Zealand as hydro power dominates New Zealand's electricity mix, thus lowering the environmental impact of New Zealand's building materials compared to those in Europe.

The resulting report was of pivotal value to MAF as it was the first time that an LCA data inventory had been completed for New Zealand buildings. The results of this project, in combination with the greenhouse gas foot printing research for the forestry sector (page 10), will lay the basis for understanding the impact of different building types. This project was a collaboration between Scion, the University of Victoria of Wellington and Stuttgart University in Germany.

4. Maximising the quality and impact of Scion's science

Throughout its history, Scion's contribution to New Zealand has been achieved through the work of talented people who dedicate their expertise to delivering outcomes of tangible value to the nation. The prosperous future of Scion and New Zealand depends on developing and utilising this capability for maximum benefit.

A key strategic goal for Scion is to foster a culture of innovation by investing in its high performing individuals and teams, and providing a research environment that is world class. In addition, Scion actively engages with the local, national and international community through energising partnerships and communicating its successes. The purpose of these activities is to help raise the profile of science in New Zealand and to emphasise the benefits Scion delivers for the community.

The following highlights illustrate how Scion's expertise is enhanced, recognised and shared.

Recognising high performance

Rewarding young talent

Two Scion scientists were recognised as rising stars in the MacDiarmid Young Scientists of the Year Awards last year, winning national recognition for their work in wood and wood fibre. Karen Love won the Masters Award as the best entry for her research into wood fibre, while Dr Tripti Singh was named runner-up in the Adding Value to Nature category.

Karen has been seeking ways of treating the surface of wood fibre so it can be used in high-value applications, such as in fibre-reinforced composite materials. Her research focuses on new uses for wood as an alternative to fibreglass composites that are expensive to make and do not easily decompose.

Tripti's research is around developing an environmentally friendly treatment to protect green wood from fungal degradation. Blue stain fungi is an infection that discolours radiata pine logs soon after harvest and is estimated to cost forestry exporters up to NZ$100 million a year.

Hosted and organised by FRST, the awards recognise excellence in New Zealand's young researchers, with top marks given to entries that combine brilliant, innovative research with the ability to communicate it in a way that attracts the interest of the next generation of potential scientists and researchers.

Scion forester wins award

Scion scientist Dr David Bergin was co-winner* of the 2009 Forester of the Year, awarded by the New Zealand Institute of Forestry. This prestigious award recognises his long contribution to advocating the use of native tree species for commercial, environmental and cultural benefits. As a site management specialist in ecological restoration and native planting programmes, David's research has covered a range of ecosystems including coastal sand dunes, riparian areas, regenerating indigenous forest and plantations.

*Note: 2009 Forester of the Year was awarded jointly to David Bergin and George Asher, CEO of the Lake Taupo Forest Trust and General Manager of the Lake Rotoaira Forest Trust in the Central North Island.

David has a long track-record of successful collaboration with land management agencies, regional councils and special interest groups including Coast Care, Landcare Trust, Project Crimson, a number of Maori Trusts, Trimble Foundation and Tane's Tree Trust. He has developed practical guidelines for the rehabilitation of natural vegetation and sustainable management of culturally significant plants. This has included promoting the establishment of native trees for a range of benefits, including wood production.

> *"The 2009 Forester of the Year award demonstrates that New Zealand forestry is not just about plantations of radiata pine forests and their impact on climate change. The award to David recognises the importance of New Zealand's native tree species and their potential role in a commercial environment."*
> *Dr Andrew McEwen – President, New Zealand Institute of Forestry*

Microscopy Awards

Scion scientist Stefan Hill was awarded the Keith Williamson Memorial Medal for presentation of the most innovative technique or use of instrumentation at the New Zealand Microscopy conference. Stefan won for his fundamental research into the nano-structure of cellulose. Using the Australian synchrotron, he was able to study changes in the supramolecular structure of cellulose to a 100th of a nanometre, getting to the very core of how these structures work.

Chairman's Awards

Scion's biennial Chairman's Awards' are awarded to staff who deliver outstanding performance in their particular field. This year Dr Armin Wagner and Samir Shah were recipients of this important award. Armin's award was bestowed for his ground-breaking research into lignin structure and function in conifers, and the problem of compression wood in pines at the molecular level. Samir won for his work on the novel process developed under the Biopolymer Network for making a PLA-based biofoam for use in various applications as a possible alternative to polystyrene. Both scientists will be using their award funds to participate in international conferences.

Inaugural Scion Emeritus Status Scientist

Dr Paul Kibblewhite was recently appointed Scion's inaugural Emeritus Status scientist. Emeritus status was created to enable retiring staff who have achieved eminence in their field to have a continued involvement with Scion, where this will be beneficial to both the organisation and the individual. Dr Kibblewhite has given 49 years of continuous service, produced 144 refereed publications, and is a globally-recognised expert on wood fibre.

Outreach and communication

Science in the Park 2009

Scion opened its doors to the community in March 2009 for its biennial Science in the Park event. This year's event was a great success, attracting over 2000 people from Rotorua, the Bay of Plenty and beyond. Feedback from the public was resoundingly enthusiastic and the positive impact on local children is particularly evident.

The popular open day is an opportunity for members of the public to gain a better understanding of Scion's work and the contribution that local science makes to New Zealand. Science in the Park is free to all members of the public and includes interactive displays, demonstrations, science experiments, tours and giveaways.

> Comments from the public on Science in the Park, 2009:
> *"Fun and informative, a really great day"* ● *"Thank you for a brilliant experience… we arrived shortly before 11 am and left sometime around 4 pm"* ● *"It was awesome, and the staff were amazing; they smiled and explained over and over again about their work: very, very well done"* ● *"Everyone was just so friendly, helpful and knowledgeable. We all had a great time. Looking forward to the next open day"*

IUFRO International Forest Biosecurity Conference

Scion initiated and hosted the International Forest Biosecurity Conference in March 2009, a highly successful event sponsored by the International Union of Forest Research Organisations (IUFRO) and MAF Biosecurity New Zealand. The programme featured over 90 speakers from 14 different countries, representing a huge body of knowledge aimed at forest protection. This was the first time international scientists had gathered under the "biosecurity" banner to focus on the risks to forests posed by insect pests, weeds and diseases.

A highlight of the conference programme was a workshop spanning an entire day and sponsored by the Organisation for Economic Co-operation and Development (OECD). During the workshop, international guest speakers discussed the challenge of integrating biosecurity research and science in policy, regulation and operational management.

> *"This workshop provides an invaluable opportunity for scientists, industry and policy makers from around the world to share knowledge and work together to create solutions for critical problems. If these challenges can be met, there will be huge benefits for the global community, as well as for New Zealand."*
> *Hon David Carter – Minister of Agriculture, Forestry and Biosecurity.*

Forestry leaders' forum

A successful forum for the New Zealand Forest Owners' Association (NZFOA) was jointly hosted by Future Forests Research Ltd (FFR) and Scion in October 2008, bringing industry leaders together to discuss research programmes.

A feedback survey undertaken at the end of the Forum indicated strong support for both the collaborative model represented by FFR and the coherent "whole forest" research picture presented. The priority of harvesting research was highlighted as a major opportunity for cutting costs.

Land Treatment Collective

Scion hosted the Annual Meeting of the New Zealand Land Treatment Collective (LTC), which has run for over 20 years. This network of professionals involved in the land treatment of wastes and waste products is a key knowledge transfer mechanism for Scion's land application and biowastes programmes. The conference demonstrated that the LTC (which is managed by Scion) remains a highly successful and important conduit for national work in this area.

Biodiversity in review

Ten years of research and international collaboration on biodiversity issues in plantation forests has been set out in a new book co-edited by Scion entomologist and ecologist, Dr Eckehard Brockerhoff. As a special issue of the international journal *Biodiversity and Conservation*, the book is entitled "Plantation Forests and Biodiversity: Oxymoron or Opportunity?"

The findings reported in the book can assist with the improvement of best practice guidelines for the establishment and management of plantation forests. The topical examples of applied conservation issues will make the volume highly valuable for use in conservation biology courses.

This work is the result of ongoing collaboration of forest scientists from numerous countries under the umbrella of the International Union of Forest Research Organisations (IUFRO) and with contributions from the World Conservation Union and the World Wide Fund for Nature.

Transferring knowledge to end users

Scion fire researchers have developed tools and training programmes that make their knowledge more widely available to end users. The development of a field manual and software for predicting fire behaviour represent key examples of technology transfer to the rural fire sector over the past year. The field manual and decision support software developed by Scion incorporate outcomes from research on the fire environment (fuels, topography, weather) and fire behaviour. These resources provide practitioners (fire managers and fire fighters) with science-based tools that can be readily used to reduce the risks and costs associated with wildfire.

> *"I get glowing reports from guys in the field who are using the field manual all the time. Having this information at hand is really valuable because there are so many complex factors involved in fire-related decisions."*
> *Tony Teeling – Department of Conservation Deputy Principal Rural Fire Officer*

Encouraging dialogue

Maori advisory group, Te Aroturuki, together with Scion has created a new website (www.tap.net.nz) aimed at improving dialogue between hapu/iwi and scientists. The Te Aroturuki Process, which is being recommended and adopted by the science sector and government agencies, is now available to assist scientists with cross-cultural communication.

The Te Aroturuki Process was born out of the recognition that scientists need guidelines for effective engagement regarding controversial technologies. The web-based toolkits encourage scientists to adopt what is considered as 'best practice' for engagement with Maori – particularly around issues where there is likely to be active and sometimes emotional debate, such as genetic modification. The toolkits provide background information on Maori protocols, language and values along with useful ideas about how research proposals can deliver real benefits for Maori.

Te Aroturuki is a pan-iwi national Maori advisory group that was established in 2003 in response to the need for better communication.

"The Te Aroturuki process encourages good communication which leads to robust, long term relationships that will help scientists rethink research in light of priorities and values inherent in Maori communities."
Bevan Tipene-Matua - Te Arotūruki

Historic wood goes under the microscope

Scion provides a wood identification service to a wide range of national and international clients. Samples are often of historic significance including various ship wrecks, weatherboards from Antarctic huts, and archaeological artefacts from Pacific islands.

Scion's microscopy specialist, Dr Lloyd Donaldson, completed work for the Department of Conservation (DOC) this year to identify timber used in government buildings in Wellington. Historic buildings are often investigated as to the nature of timber used in the construction so that similar timber, be it native or imported, can be used for the renovation.

In this case, Scion was contacted to identify a window frame that was being replaced as part of a renovation. Examination of the timber revealed Scots pine (*Pinus sylvestris*), which is distinguished from other pines by the large size of the pits between wood fibres and ray cells. The small growth rings also distinguished the sample from New Zealand grown pines so the sample was clearly imported from Europe.

Other examples this year where Scion's wood anatomy expertise was called upon include Hone Heke's purported flagpole (also identified as Baltic pine, probably salvaged from a ship), and the Princes Gate archway at Government Gardens in Rotorua (Douglas-fir).

Building international capability

Scion is an active participant in international networks aimed at building science capacity to underpin development of a bioeconomy. In February 2009, Scion was one of the successful partners in the establishment of a new collaboration known as "TRANZFOR" as part of the European Union (EU) International Research Staff Exchange Scheme (IRSES). The five TRANZFOR partners are: Scion; CSIRO, Australia; Institut Nationale de la Recherche Agronomique (INRA), France; Forest Research, United Kingdom; and Instituto Superior de Agronomia (ISA), Portugal.

The goal of this important programme is to build enduring international science collaborations through a series of scientific exchanges within active research programmes related to forests and climate change. Approximately 75 scientists will travel between countries as part of this programme. Dr Steve Pawson was the first Scion scientist to participate in an exchange, involving 10 weeks in France, working with INRA scientists in the area of biosecurity risk assessment. Support for New Zealand scientists is being provided directly by the Ministry of Research, Science and Technology (MoRST).

Sponsorship

Scion provides sponsorship for a wide range of staff and community activities, with a particular focus on opportunities to promote science. Sponsorship highlights of the 2008/09 year include:

- Tracey Bates from Rotorua's John Paul College was selected as the 2008 Scion Suffrage Scholar. Scion offers its Suffrage Centennial Scholarship annually to promote science as an attractive career option for school leavers. The successful candidate receives $2,000 towards tuition fees and an offer of summer vacation work for the duration of their undergraduate studies. Created in 1993 as part of New Zealand's centennial suffrage celebrations, the scholarship has helped many young local students to date achieve their science ambitions.
- Scion provided financial support to Sophia Frentz, a student at Tauranga Girls' College, to compete at the International Biology Olympiad (IBO) in Tsukuba, Japan. As part of a four-strong New Zealand team, Sophia won a bronze medal, contributing to the overall team total of two bronze and one silver. She is the first student from the Bay of Plenty to make an IBO team.
- Scion continued its ongoing support for the NIWA Science and Technology Fair for the Bay of Plenty region by providing judges for the competition. Scientists in Scion's Christchurch office provide similar support in the Canterbury and Westland science fairs.
- Staff at Scion's Christchurch office have sponsored a tui recovery project on Banks Peninsular. This Project, which is a partnership programme between the Banks Peninsula Conservation Trust and Ngai Tahu runanga, aims to establish a tui population back on the peninsula. Sponsorship funds have been provided towards the relocation of one adult female tui, who has been named 'Scion'.

"I would like to thank Scion for your help in making all this possible – I couldn't have done it without my sponsors!" - Sophia Frentz.

Managing facilities

Investment in infrastructure

An important milestone was achieved this year with the completion of a new glasshouse facility for research into genetically modified organisms at Scion's campus in Rotorua. The secure glasshouse and growth chamber facility will be used to house young transgenic trees for experimental purposes and field trials. The access-controlled PC2-compliant facility is self contained, with its own autoclave, independent wastewater treatment/sterilisation, storage areas and laboratory work write-up area.

Wellington office relocates to prime position

Scion has re-located its Wellington office to 111 The Terrace (Equinox House), which offers close proximity to key government clients and stakeholders. Office space is being shared with our collaborators at Landcare Research and with Science New Zealand.

Scion's Environmental Performance for 2008-2009

Scion has continued to focus on waste minimisation as part of its initiative to manage its environmental footprint. A recycling initiative at Scion's Rotorua campus separates plastic and glass drink and milk bottles, aluminium cans, cardboard, paper and more recently steel cans from other waste. On average, this initiative recovers the following material on a monthly basis:

- $5m^3$ of paper;
- $6m^3$ of cardboard; and
- $1m^3$ of plastic drink bottles.

During 2008-2009, 6kg of aluminium and 0.46kg of batteries were recycled.

Rotorua also has a vermicompost site that consumes tearoom and café organics and produces "worm juice" and vermicasts for staff members. During the year, Scion commenced reporting to staff on energy, transport and water usage figures and carbon emissions

Good Employer and Equal Employment Opportunities Reporting

Underpinning Scion's strategic goal "Maximise the quality and impact of Scion's science" are policies, programmes and practices which address:

- Good and safe working conditions and equal opportunities programme;
- 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.

These policies, programmes and practices are reviewed on an ongoing basis.

1. Leadership, Accountability and Culture

A key element of bedding in Scion's organisational reshape was supporting and developing the organisation's people and project leadership capability. This was achieved through the provision of targeted training programmes, coaching and mentoring.

The launch of the revised organisational values, after extensive employee consultation, supported the ongoing development on an organisational culture where people and their contributions are valued. Scion's values of "Vital, Innovative, and Collaborative" express that staff work in respectful partnerships with colleagues, clients and communities to harness diversity, uncover new thinking and make a difference.

Scion continues to collaborate with employees in the development of personnel programmes and policies. Comprehensive employee consultation resulted in the introduction of a reshaped matrix-based organisation. Employee input was an invaluable part of the process ensuring a smooth transition to the new structure.

Employee input was also sought on a range of management decisions including the review of the remuneration system, enhancement of the performance management system, and procurement changes. Scion maintains a strong relationship with the Public Services Association via the Partnership for Quality.

2. Recruitment, Selection and Induction

Scion continues to demonstrate its commitment to equality of opportunity and rejects discrimination on any grounds for all employees (whether they be current or prospective employees) regardless of marital status, age, sex, religion, ethnic origin, ethical beliefs, colour or race, disability, sexual orientation, political opinion, family status or employee representation. Robust recruitment and selection systems are in place to ensure an impartial, transparent process focussed on selecting the best person for the job.

3. Employee Development, Promotion and Exit

The development needs of all employees are identified during the performance planning cycle enabling learning and development plans to be agreed with each employee. This year a core focus was the development of project and team leadership capability. A range of learning and development opportunities were provided to employees including training courses on:

- Transition to Team and Project Leadership
- Influencing
- Financial Management
- Project Management
- Getting Organised
- Presentation Skills
- Science Writing
- Belbin Team Roles
- Myers Briggs Type Indicator

A key achievement for Scion was the enhancement of the performance management system to include definitions of performance and collaborative behaviours applicable to all employees. Scion's exit interview process was reviewed and enhanced, and exit interview data analysed and reported to management and the Board of Directors.

Scion regularly supports staff to pursue ongoing education and achieve higher qualifications. The following three staff gained PhDs over the past year:

- Katrin Walbert completed her degree through Lincoln University, focusing on mycorrhizae in pine plantations.
- David Tappin, a human factors specialist, completed his PhD through Massey University focusing on reducing meat-worker injuries.
- Anne-Marie Smit gained her PhD though Victoria University of Wellington, investigating the metabolic processes of carbon utilisation in specific isolates of nitrogen-fixing bacteria.

4. Flexibility and Work Design

Flexible work arrangements and work-life balance continue to be an important part of Scion's employment brand. Policies are in place to support flexible working arrangements. During the year agreements were made with 10 employees to reduce their working hours and two employees transferred locations to support family circumstances. Nine employees increased their hours after a period of part-time work. Five employees were given leave without pay to pursue non-work related interests.

5. Remuneration, Recognition and Conditions

Scion's remuneration system was reviewed to ensure that Scion was using best practice, to streamline and align key processes and to create clarity and transparency. The revised remuneration system was launched and implemented.

A three-year Collective Employment Agreement was agreed with the PSA.

Staff recognition includes long service recognition awards, long service leave, the Chairman's Awards, and Emeritus Status award for recognition of services rendered to retiring staff.

The Scion life insurance scheme was drawn on for the families of two staff members who died during the year.

6. Harassment and Bullying Prevention

Scion has a stance of zero tolerance to harassment and bullying. The organisation responded promptly and in accordance with its procedures to all accusations of harassment and bullying.

Scion has Workplace Support Services and an Employee Assistance Programme in place to enable staff to discuss workplace issues and concerns.

7. Safe and Healthy Environment

Scion has an active Health and Safety Committee and representatives. Training is provided to committee members, managers and staff. Personal responsibility is promoted through inclusion of health and safety objectives in all position descriptions and personal performance plans.

Workplace Profile

As at 30 June 2009:

- Total permanent employee complement of 337, consisting of 182 males and 155 females.
- Maori represents 5% of permanent employees.
- 4.8% of employees recorded as disclosing a disability.
- 30% of employees are in the under 40-years age group, 34% are in the 40 to 49 years age group, and 36% in the 50 years and over age group.
- 34% of employees are recorded as disclosing a nationality other than New Zealander or Maori, and represent 23 nationalities.

Scion's Capability Funding

Scion's use of the Crown Research Institute Capability fund supports achievement of Scion's four strategic goals: (1) to improve the profitability of the New Zealand forestry sector; (2) to optimise use of marginal land; (3) to develop technologies to underpin expansion of New Zealand's bioeconomy; and (4) Maximising the quality and impact of Scion's science.

In the 2008/09 period, Scion committed to eight two-year programmes which were designed to address gaps in national need and national science capability. Scion has also supported a number of smaller highly focused investigative projects to address some specific capability gaps and identify new opportunities.

Harvesting of trees
The harvesting operation has been identified by the forestry industry and the Ministry of Agriculture and Forestry (MAF) as a critical area in need of substantial productivity enhancement if New Zealand is to improve the international competitiveness of this important sector. New Zealand, unlike most international forestry countries, has a substantial proportion of its commercial forests on steep land. This will increase as New Zealand seeks to use more marginal land for forestry where it does not compete with pastoral activities and provides the dual benefits of creating new economic opportunity and also contributes to national goals such as protecting erosion prone country and absorbing carbon. To deliver these benefits we must develop cost competitive solutions to harvesting trees on fragile steep land.

The project this year has continued work in identifying specific areas for productivity enhancement such as in remote data capture systems, better log handling systems. It has also supported a PhD study in "Participative Ergonomics", to reduce musculoskeletal disorders in manual handling tasks and the other in remote work-task data acquisition.

Industry investment in this area has also rapidly increased over this two year period. Scion and the forestry industry successfully collaborated to secure investment from the MAF Sustainable Land Management Mitigation and Adaptation to Climate Change programme to develop ways to enhance productivity in steep country tree harvesting.

Looking ahead: This small programme has been very successful at exposing this research gap and bringing the need for further research in this area to the attention of industry and Government. A smaller programme ($100,000) will be funded through Capability Funding for a further two years. Industry is now actively supporting this area and with Scion are seeking Government investment from both the Foundation for Research, Science and Technology (FRST) and from the Primary Growth Partnership.

Realising non-timber benefits from forestry
Forests are a significant national asset. They make a direct economic contribution through the production of wood and fibre based products, and now their contribution to New Zealand's social, cultural and environmental goals are also being recognised. These latter values are delivered through outcomes such as ecosystem services (carbon sequestration, land erosion protection and biodiversity) and amenity activities such as recreation and tourism.

The focus of this two year project has been to develop a mechanism to value these non-traditional forest values and incorporate them into decision making. The former is being achieved by enhancing and growing Scion's capability in resource economics. Scion has increased its resource economics capability through this programme. A value chain model of the forest industry to identify the potential for forestry to increase carbon sequestration through changes in forest management and land use, along with the timber supply consequences of these changes has been developed. This work is now supporting several Government programmes.

Estimates of the value that recreational users (walkers and mountain bikers) place on Whakarewarewa forest features have been identified (e.g. the mix of tree ages and species, size of management blocks and amount of *Pinus radiata)* and reported to key stakeholders. The

information from this study will be used by Rotorua District Council, Timberlands Ltd and the new owners of this forest to guide their management of Whakarewarewa forest.

Looking ahead: The capability developed through this programme is now well embedded in many of Scion's programmes and also MAF-supported programmes in climate change and land use decision systems. A smaller ($150,000 for 2 years) Capability Funded programme will be continued to investigate ways to translate ecosystems services into direct financial benefit for forest owners.

Lignin BioDesigNZ
Lignin represents about 25% of most woody biomass it is important that special opportunities can be developed for this material. The objectives of this project are to find ways to manipulate lignin as a renewable resource and thereby discover opportunities for it as a high value chemical or material. Most methods for extracting lignin leave it in a form where it has little reactive and thereby useful properties. In this programme Scion has developed mechanisms to extract lignin from *Pinus radiata* where it is still reactive and also novel techniques to convert it into potentially valuable products. Scion is now participating as a partner in a large international project (LigniVal) specifically focused on lignin utilisation.

Looking ahead: This programme has been very successful at building a platform for further research and consolidating a new and important international partnership. The programme will be supported for a further two years at a slightly smaller level ($800,000 p.a.) to convert many of the new concepts into protectable and commercialisable product opportunities.

Dewatering of wood
Scion has developed and patented a novel approach to removing the free water from wood delivering a material in a form suited to further material enhancement. This last year has seen this work continue defining its impact on wood quality. The work has also enhanced knowledge of wood water relationships.

Looking ahead: This project will undergo a review in early August 2009. This review will contribute to the organisation's decision on the future of this technology.

New products from wood refining
This programme has explored new opportunities to develop high value products from many of the by-products of typical wood refining applications. These include production of chemical intermediates from the conversion of lignin, hemicelluloses and carbohydrate degradation products. Mechanisms to separate the fractions of wood (lignin, hemicelluloses and cellulose) to leave each fraction in as reactive a form as possible have been explored. The outcomes of this work are being used in other projects such as Scion's *Lignocellulosic Bioethanol Initiative* and new projects exploring ways to produce resins and other specialty chemicals.

Looking ahead: The outcomes and capability developed through this programme have been transferred to other programmes within Scion. These include the Lignocellulosic Bioethanol Initiative and the Engineered Biofibre Programme.

Matauranga Maori
In the first year of this project, scientists have identified sites of various sources of Kie Kie, Ti Kouka (cabbage tree) and Pingao and made progress on the extracting and characterising the fibres from leaves. In this last year fibres were prepared using both classic physico-chemical techniques and also the traditional Maori approach (retting). Characterisation of the fibres showed that the retting approach provided an excellent material with potential application as reinforcement in advanced composites. The project has also captured the interest of local hapu and provides new insights into these materials to a wide range of interested groups: scientists, materials developers, weavers and heritage groups.

Looking ahead: This has been a very successful programme to develop scientists of Maori descent in a programme of interest to a wide range or entities and individuals. Scion will now consider ways in which the relationships developed within the programme can continue to grow.

Design for the Biosphere
The first year of this project developed an assessment criteria framework that incorporated social, functional, economic and environmental indicators for the home environment into an operational tool to help build social and economic values into material and build solutions for a home. This recognised that the value of bio based materials is only realised when they are embedded in systems and consumer solutions such as a house. Year two of the project has applied the techniques to two popular exemplar products a house wall and a chair.

In focusing on this goal Scion has grown its skills in Life Cycle Analysis (LCA); extended this competence to include social indicators; grown its product development capability; and built a stronger systems development platform by bringing together skills in LCA, social science, product development, product performance and framework design.

In response to growing interest in LCA the project has also supported preparation of material for a forthcoming course in LCA for industry and other stakeholders. Scion has consequently grown its national and international profile in this area and is now involved in several substantial studies in LCA for both Government and industry.

Looking ahead: This programme has been very successful at building LCA capability within Scion and promoting its value both within the organisation and across New Zealand. It is also providing Scion with increased commercial services revenue and a potential new commercial product. LCA is now included in many programmes within Scion. A smaller programme has been proposed for further capability funding to use the technique for Scion specific products.

Induced resistance
Induced resistance is a novel mechanism for increasing resistance of trees to pathogen attack. Stimulation factors such as non-pathogenic microbes or other metabolites can prime the host's defensive mechanisms, resulting in enhanced defensive capacity and thus reduced pest impact. This may also prove to be a better approach than direct application of chemicals.

In this second year the major technical outcomes have been identification of culturable fungal endophytes from radiata pine that can now be trialled as biological control agents against a variety of pests of radiata pine and identification of non-culturable ectomycorrhizal communities from radiata pine in nurseries to enhance health and performance of seedlings prior to planting out in the forest.

The programme has also provided an opportunity to grow the leadership skills of a new scientist and to expand collaboration in forestry health science with researchers in Australia and the USA. The techniques under development have the ability to be applied to urban forestry health work an area which is currently not otherwise supported.

Looking ahead: The capability developed in this programme is now embedded in the broader biosecurity programmes. A further proposal has been submitted to the Scion Investment Committee for continued support to build Scion and New Zealand's capability in this area. The new programme would also seek to import d-factor viruses into New Zealand and to conduct proof of concept trials. Scion will continue to promote the need for research in urban forestry protection.

Weed control
Terbuthlyazine is a herbicide typically used for weed control in forestry in New Zealand. The Forest Stewardship Council (FSC) an international body which provides sustainable certification of forests and forest products, has banned its use due to its mobility in soil. This project sought to understand if this was an issue with New Zealand soils.

This research has quantified the range of adsorption for terbuthylazine across a broad spectrum of New Zealand soils, at 34 sites. These adsorption values strongly suggest that terbuthylazine used in forest vegetation management will not contaminate water bodies, before the herbicide is degraded by soil micro-organisms. However, detailed field studies will need to be conducted to validate these predictions.

Looking ahead: This project has successfully communicated the potential benefits to the forestry industry. Ongoing support will depend upon attracting commercial support from this industry.

Koura
Growth in manufacturing industries in New Zealand will increase pressure on New Zealand's precious water resources. Scion is carrying out research to help in the assessment of compromised aquatic environments.

The goal of this project was to evaluate the physiological effects of environmental stressors on a *taonga* species, the Northern koura (*Paranephrops planifrons*), with the objective of determining suitability as a sentinel species. The project has shown that koura are extremely sensitive to simulated bacterial infection but are tolerant of high metal and low dissolved oxygen levels. The project team was able to develop in vitro techniques for koura which provides a strong position for further work without stressing animals and addresses any concerns over animal ethics issues. The work was carried out in close association with Te Arawa and has as a consequence built a strong co-operative relationship that is expected to continue.

Looking ahead: Although successful in achieving its targets this project will not be continued within Scion in its current form. Scion will be reviewing its ongoing role in this area.

Nanoncrystallography
This small and highly targeted project was focused on developing new capabilities in using the Synchrotron and establishing participation in the joint New Zealand-Australian facility.

The project which included two Scion scientists tested a new theoretical framework to study the assembly of nanocrystals in biological systems. This year the project tested the new theoretical framework designed to allow studies of the assembly of nanocrystals in biological systems, using the extraordinary brilliance of the synchrotron X-ray beam, and answered a specific question: why do the mechanical properties of wood change irreversibly when it is first dried? Synchrotron data revealed changes in molecular packing at a level of detail never seen before, providing a plausible answer to the question.

Looking ahead: This small project has been valuable in better understanding the relationship between water and wood through use of sophisticated tools such as the Synchrotron. This work will inform the major programmes in timber drying and wood modification. In addition Scion will use this work to support an application to FRST in a New Economy Research Fund (NERF) portfolio.

Y88
In 2007, Scion produced its first draft genome sequence, from the bacterium *Novosphingobium nitrogenifigens* a nitrogen fixing bioplastic accumulating organism. Similar work undertaken on another bacterium WP01 (now officially designated *Sphingobium scionense* WP01^T) was developed further in 2008/9 and is now supporting Scion's proteomics research.

This work has further built Scion's capability in genome sequencing both in laboratory application and in the acquisition and use of bioinformatic tools for the analysis of the data. The skills acquired here will also be applied to Scion's participation in the International Conifer Genome Project.

Looking ahead: This small project has enhanced Scion's capability in new biotechnology techniques but also helped consolidate Scion's role in bioplastics technology. The outcomes of this work will be incorporated in Scion's bioplastics roadmap which will be completed in 2009/10.

Dehydrins
The focus of this project was to develop methods to express and purify a dehydrin protein in pines. This would enable better understanding of why dehydrins are important in determining wood characteristics and the effects of diversity and natural selection on the functional role of dehydrins. The skills and knowledge developed were used to support work in larger gene discovery and Molecular discovery projects.

Looking ahead: This work has supported and enhanced Scion's patenting position in this area. Part of this (that associated with markers) will be investigated for its commercial potential and if successful we will seek to secure early commercial investment.

All capability-funded projects were completed in full.

Financial Statements

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 2009.

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, at balance date, has five wholly-owned subsidiaries, Liro Limited, Forest Research (Australasia) Pty Limited, Atlas Technology Limited, Te Papa Tipu Properties Limited, Scion Australasia 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 two research consortiums – WQI Limited with a 12.82% shareholding and Radiata Pine Breeding Company Limited (RPBC) with a 17.64% shareholding.

- Forest Research (Australasia) Pty Limited was the Australian trading vehicle but has now ceased trading. The company is a New Zealand registered company.
- Te Papa Tipu Properties Limited owns the Group's land assets.
- Scion Australasia Limited is a special purpose company established for an unincorporated joint venture with Australia's national science agency, CSIRO.
- Atlas Technology Limited is a 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.
- 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.
- WQI Ltd is a consortium with 16 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.
- RPBC is a consortium with 17 shareholders and aims to develop and provide superior germplasm of radiata pine.

Summary of Group Financial Results to 30 June 2009

	2009 $000	2008 $000
Operating revenue	43,973	41,710
Surplus before taxation	3,396	1,205
Taxation expense	1,113	92
Net surplus attributable to the shareholders	**2,283**	**1,113**
Equity		
Issued and paid up capital	17,516	15,716
Retained earnings	8,643	7,860
Reserve	48	50
Total equity	**26,207**	**23,626**

Scion's Strategic Business Plan outlines the company's research capabilities as spanning three core themes:

- Sustainable Design – driving the purposeful development of new knowledge, technologies and feedstocks, enabling New Zealand to become a leader in sustainability.

- New Forests and Forest Science – driving innovation through diversification and supporting the transformation of the forestry sector for global success.

- Bioproduct Development – transforming renewable resources into global advantages.

The business plan takes Scion further down the pathway toward achieving its Biomaterials Futures vision, 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, pay-outs of equity leave provisions and redundancy payments. Some other benefits were not quantified and are therefore excluded, including staff parking, home telephone and fax costs, and membership of relevant professional societies.

Bands			Number in Each Band
$370,000	–	$379,999*	1
$200,000	–	$209,999	2
$190,000	–	$199,999	1
$160,000	–	$169,999	3
$150,000	–	$159,999	1
$140,000	–	$149,999	2
$130,000	–	$139,999	6
$120,000	–	$129,999	6
$110,000	–	$119,999	2
$100,000	–	$109,999	12

* Denotes Salary of Chief Executive

During the year ended 30 June 2009, $125k was paid to five employees in relation to cessation of employment with Scion (2008: $441k to 20 employees).

Dividend

A dividend of $1,500k was recommended and paid during the year (2008: $109k).

Directors' Profiles

Dr Russell Ballard, CNZM, (Chairman) – is an independent, non-executive Director. Dr Ballard is Chancellor of Massey University, Deputy Chairman of the New Zealand Correspondence School, a Director of TeamTalk Ltd, a Trustee of the Karori Sanctuary and the independent Chair of the Risk and Assurance Committee of the Inland Revenue Department, the Office of the Clerk of the House, and the New Zealand Food Safety Authority. Dr Ballard is also an external director on the Risk and Assurance Committee of the Ministry of Social Development. Previously Dr Ballard held several Chief Executive positions in the public service, including the Ministry of Forestry, Department of Education, Ministry of Agriculture and Fisheries, and Land Information New Zealand. Dr Ballard holds a MAgrSc and PhD (Forest Soils), a Diploma in Company Direction from the Institute of Directors (UK) and a Certificate in Company Direction from the Institute of Directors (NZ). He is a member of the New Zealand Institute of Forestry and an accredited member of the New Zealand Institute of Directors and a Fellow of the New Zealand Institute of Management.

Ms Bronwyn Monopoli, MBE, (Deputy Chair) – is a chartered accountant with her own practice based in Nelson dealing mainly with primary sector clients. She currently serves on the boards of Port Nelson Limited, the Animal Health Board, the Visitor Information Network, the WearableArt Development Trust, the Nelson Millennium Centre Trust, and the New Zealand International Arts Festival Trust. She has previously served as a director of a wide range of companies and government bodies, including the Humanware Group Limited, Landcorp Farming Limited, the New Zealand Wool Board, Tourism New Zealand and Trade New Zealand. Ms Monopoli has a BAgrSc and a BBS. She is a fellow of the New Zealand Institute of Chartered Accountants.

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 FITEC the New Zealand forest industry training organisation, a member of the Auckland Conservation Board, Chairman of Pentarch Forest Products Limited, Chairman of New Zealand Forestry Limited, Chairman of Berg Forests Limited, on the Board of the Wood Council of New Zealand (WoodCo) Inc., New Zealand section Chair of the Commonwealth Forestry Association, and a member of the New Zealand Institute of Forestry Registration Board. 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.

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.

Dr Kathy Garden (Director) – is Pro Vice Chancellor and Dean of the Faculty of Design and Creative Technologies at The Auckland University of Technology. She has held senior positions in the public and private sectors, including Director of Strategic Development at Manukau City Council, Executive Director of the New Zealand Business Council for Sustainable Development, Sustainable Development Coordinator for Fletcher Challenge, and Chief Policy Adviser at the Ministry of Research, Science and Technology. Dr Garden is on the Foundation for Research, Science and Technology's Funding Committee for the International Opportunities Fund and is a director of South Pacific Electronic Design Associates Ltd. Dr Garden holds BE, ME and PhD degrees in Electrical and Electronic Engineering, and is a Fellow of IPENZ. Dr Garden's term on the Board concluded 30 June 2009.

Mr Chris Karamea 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.

Mr John Palmer (Director) – has extensive experience in the forestry and construction industries. He was the chief executive officer of start-up Silva Forest Products, an Auckland based joint venture company formed by New Zealand's two largest foresters to export logs to Asia. Mr Palmer previously worked for construction chemicals company, Fosroc, where over a period of 18 years he held roles such as regional director for Asia Pacific and Europe, chief executive for China/Hong Kong, and chief executive for New Zealand. Mr Palmer's term on the Board concluded 30 June 2009.

Changes in Directors

Kathy Garden and John Palmer's term on the Board concluded on 30 June 2009. These Directors have been replaced by Ms Alison Andrew and Dr Brian Rhoades, who were appointed to the Board on 1 July 2009.

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 2009	Ensis 30 June 2009	Te Papa Tipu Properties 30 June 2009	Total 30 June 2009
Russell Ballard	58,000	12,000		70,000
Bronwyn Monopoli	38,000	8,000		46,000
John Palmer	28,500		8,000	36,500
Peter Berg	30,500			30,500
Kathy Garden	28,500			28,500
Michael Ludbrook	28,500			28,500
Chris Insley	28,500			28,500
Sheldon Drummond	28,500			28,500
External Director				
John Kahukiwa			3,000	3,000
Total	**269,000**	**20,000**	**11,000**	**300,000**

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 CEO'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
R Ballard
Chairman

27 August 2009

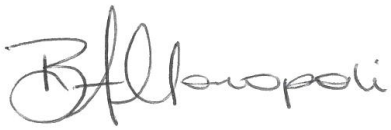
Statement of Responsibility

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 2009 fairly reflect the financial position and operations of the New Zealand Forest Research Institute Limited.



R Ballard
Chairman

B Monopoli
Director

27 August 2009

Performance Targets

Scion's performance against the targets contained in the 2008–2011 Statement of Corporate Intent was:

	Actual 2008	Actual 2009	Budget 2009
Revenue ($000)	41,710	43,973	45,371
EBIT Margin (EBIT % of Revenue)	2.4%	7.10%	3.2%
Return on average equity	4.8%	9.2%	1.7%
Return on average total assets	2.8%	5.8%	1.3%
Equity ratio	72.7%	71.4%	74.0%
Quick ratio:1	1.08	1.37	1.08
Gearing	0.0%	0.0%	10.6%
Interest coverage	57.88	156.00	235.42
Free cash flow to average total assets	13.6%	21.8%	8.2%

Non-financial Performance Measures	**Actual 2008**	**Actual 2009**	**Budget 2009**
Science FTE's	217	220	239+
Science Support FTE's	43	47	52+
Other FTE's	57	60	56+
Total FTE's	**317**	**327**	**347**
Revenue per FTE ($)	**131,577**	**134,474**	**130,752**
Research Application Metrics			
Commissioned reports to users	402	395	390
Presentations on technical information and research results	295	282**	200
Publications on technical information and research results	70*	156**	160
Peer reviewed articles	136	76**	140
New or improved processes, products, or services		8**	12
Keynote and plenary presentations	4	19**	25
Requests for information from databases and collections:			
- National Forestry Library	8,104	10,500	3,500
- National Wood Performance Archive	200	180	110
- National Forest Health Database	800	135	120
- National Forest Herbarium and Database	550	502	350
- Permanent Sample Plot Database	900	400	400
Patents Granted			
- In New Zealand	0	2	3
- Overseas	3	1	2
Number of licensing arrangements	3	3	4
Joint Ventures or formal associations	0	56***	95
Corporate Social Responsibility	Report	Report	Report
Environment Responsibility	Report	Report	Report
Maori Relationships			
Consultation with Maori	Report	Report	Report
Learning and development	Report		
Maori internships	0	5	5
R&D proposals involving Maori	6	7	7
Benefit to NZ	Report	Report	Report
Good Employer			
Policies to meet provisions of CRI Act	Report	Report	Report

+ Due to reclassification of FTE's, the numbers shown as budgeted in each category differs from the SCI.
* These measures reflect new assessment criteria and the dissolution of the UJV with CSIRO.
** Year end FRST reports due end of July and may result in an increase in these numbers.
*** Number under revised definition is 11; target in SCI for 2009/10 is 14.

EBIT = Earnings before net interest and tax
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
Interest Coverage = EBIT ÷ Interest expense
Free cash flow to average total assets = Cash flow from Operations ÷ Average total assets

Audit Report

ERNST & YOUNG

AUDIT REPORT

TO THE READERS OF NEW ZEALAND FOREST RESEARCH INSTITUTE LIMITED AND GROUP'S FINANCIAL STATEMENTS FOR THE YEAR ENDED 30 JUNE 2009

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, for the year ended 30 June 2009.

Unqualified Opinion

In our opinion:

- The financial statements of the company and group on pages 49 to 77:
    - comply with generally accepted accounting practice in New Zealand; and
    - give a true and fair view of:
        - the company and group's financial position as at 30 June 2009; and
        - the results of operations and cash flows for the year ended on that date.
- Based on our examination the company and group kept proper accounting records.

The audit was completed on 27 August 2009, and 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 the Auditor, and explain our independence.

Basis of Opinion

We carried out the audit in accordance with the Auditor-General's Auditing Standards, which incorporate the New Zealand Auditing Standards.

We planned and performed the audit to obtain all the information and explanations we considered necessary in order to obtain reasonable assurance that the financial statements did not have material misstatements, whether caused by fraud or error.

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.

The audit involved performing procedures to test the information presented in the financial statements. We assessed the results of those procedures in forming our opinion.

Audit procedures generally include:

- determining whether significant financial and management controls are working and can be relied on to produce complete and accurate data;
- verifying samples of transactions and account balances;
- performing analyses to identify anomalies in the reported data;
- reviewing significant estimates and judgements made by the Board of Directors;

- confirming year-end balances;
- determining whether accounting policies are appropriate and consistently applied; and
- determining whether all financial statement disclosures are adequate.

We did not examine every transaction, nor do we guarantee complete accuracy of the financial statements.

We evaluated the overall adequacy of the presentation of information in the financial statements. We obtained all the information and explanations we required to support our opinion above.

Responsibilities of the Board of Directors and the Auditor

The Board of Directors is responsible for preparing the financial statements in accordance with generally accepted accounting practice in New Zealand. The financial statements must give a true and fair view of the financial position of the company and group as at 30 June 2009 and the results of operations and cash flows for the year ended on that date. The Board of Directors' responsibilities arise from the Crown Research Institutes Act 1992 and the Financial Reporting Act 1993.

We are responsible for expressing an independent opinion on the financial statements and reporting that opinion to you. This 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 Institute of Chartered Accountants of New Zealand.

In addition to the audit we have carried out assignments in the area of technology advisory services which are compatible with those independence requirements. Other than the audit and these assignments, we have no relationship with or interests in the company or any of its subsidiaries.

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

Income Statement

FOR THE YEAR ENDED 30 JUNE 2009

	Note	GROUP ACTUAL 2009 $000	GROUP BUDGET (unaudited) 2009 $000	GROUP ACTUAL 2008 $000	PARENT ACTUAL 2009 $000	PARENT ACTUAL 2008 $000
Revenue	2 (a)	**43,973**	45,371	41,710	**43,977**	41,658
Other Income	2 (b)	**102**	0	157	**102**	89
Expenditure	3 (a)	**(40,684)**	(44,954)	(40,726)	**(42,224)**	(40,842)
Finance Costs	3 (b)	**(20)**	(6)	(17)	**(20)**	(17)
Share of Profit of Associates	15 (b)	**25**	0	81	**0**	0
Profit/(Loss) Before Tax		**3,396**	411	1,205	**1,835**	888
Tax Expense/(Credit)	9	**1,113**	0	92	**1,130**	15
Profit/(Loss) Attributable to the Shareholders of the Parent Company		**2,283**	411	1,113	**705**	873

The accompanying notes form part of these financial statements.

Statement of Recognised Income and Expense

FOR THE YEAR ENDED 30 JUNE 2009

	Note	GROUP ACTUAL 2009 $000	GROUP BUDGET (unaudited) 2009 $000	GROUP ACTUAL 2008 $000	PARENT ACTUAL 2009 $000	PARENT ACTUAL 2008 $000
Fair value gain on heritage assets		**0**	0	75	**0**	75
Deferred tax on heritage assets		**(2)**	0	(25)	**(2)**	(25)
Net income recognised directly in equity	5	**(2)**	0	50	**(2)**	50
Profit/(Loss) for the period	5	**2,283**	411	1,113	**705**	873
Total recognised income and expense for the period attributable to equity holders of the parent		**2,281**	411	1,163	**703**	923

The accompanying notes form part of these financial statements.

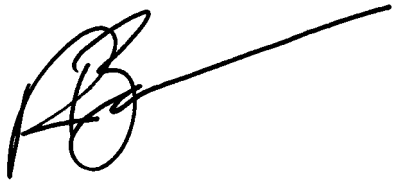
Balance Sheet

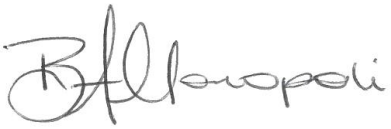
AS AT 30 JUNE 2009

	Note	GROUP ACTUAL 2009 $000	GROUP BUDGET (unaudited) 2009 $000	GROUP ACTUAL 2008 $000	PARENT ACTUAL 2009 $000	PARENT ACTUAL 2008 $000
Equity						
Share capital	5	**17,516**	17,716	15,716	**17,516**	15,716
Retained earnings	5	**8,643**	7,342	7,860	**1,213**	2,008
Revaluation reserve	5	**48**	0	50	**48**	50
		26,207	25,058	23,626	**18,777**	17,774
Non Current Liabilities						
Provisions	6	**525**	123	101	**525**	101
Defined benefit plan	7(a)	**1,213**	1,278	1,026	**1,213**	1,026
		1,738	1,401	1,127	**1,738**	1,127
Current Liabilities						
Trade and other payables	8	**8,329**	5,103	7,179	**15,404**	14,194
Provisions	6	**74**	40	315	**74**	315
Defined benefit plan	7(a)	**65**	27	73	**65**	73
Tax payable	9	**945**	15	71	**919**	0
Bank debt	10	**0**	2,990	0	**0**	0
		9,413	8,175	7,638	**16,462**	14,582
Total Equity and Liabilities		**37,358**	34,634	32,391	**36,977**	33,483
Non Current Assets						
Property, plant and equipment	11	**22,782**	26,991	22,678	**21,439**	21,315
Biological assets	12	**405**	322	322	**405**	322
Intangible assets	13	**222**	631	136	**222**	136
Deferred tax benefit	9	**788**	818	680	**801**	685
Investments in subsidiaries	14	**0**	0	0	**52**	52
Investments in associates	15	**141**	35	116	**35**	35
		24,338	28,797	23,932	**22,954**	22,545
Current Assets						
Cash and cash equivalents	16	**7,014**	13	1,968	**7,012**	1,943
Trade and other receivables	17	**5,796**	5,512	6,185	**6,801**	8,689
Inventories	19	**125**	236	230	**125**	230
Advance to associate		**76**	76	76	**76**	76
Equipment for resale		**9**	0	0	**9**	0
		13,020	5,837	8,459	**14,023**	10,938
Total Assets		**37,358**	34,634	32,391	**36,977**	33,483

The accompanying notes form part of these financial statements.

For and on behalf of the Board, who authorised the issue of these accounts on 27 August 2009.





Chairman Director

Cash Flow Statement

FOR THE YEAR ENDED 30 JUNE 2009

	Note	GROUP ACTUAL 2009 $000	GROUP BUDGET (unaudited) 2009 $000	GROUP ACTUAL 2008 $000	PARENT ACTUAL 2009 $000	PARENT ACTUAL 2008 $000
Cash Flows from Operating Activities						
Cash was provided from:						
Receipts from customers		**44,570**	44,813	38,745	**44,570**	38,756
Distributions from Ensis		**0**	0	2,228	**0**	0
Interest received		**293**	48	229	**293**	158
Income tax refund		**0**	0	465	**0**	0
		44,863	44,861	41,667	**44,863**	38,914
Cash was applied to:						
Payments to employees		**23,054**	25,609	22,072	**23,053**	22,070
Payments to suppliers		**13,846**	16,565	15,257	**14,035**	15,357
Interest paid		**20**	38	20	**20**	20
Income tax paid		**330**	0	0	**330**	0
		37,250	42,212	37,349	**37,438**	37,447
Net cash flows from operating activities	21	**7,613**	2,649	4,318	**7,425**	1,467
Cash Flows from Investing Activities						
Cash was provided from:						
Proceeds from sale of property, plant and equipment		**7**	0	13	**7**	13
Proceeds from loan repayments		**0**	0	180	**0**	135
		7	0	193	**7**	148
Cash was applied to:						
Purchase of property, plant and equipment		**2,690**	6,098	1,348	**2,690**	1,247
Purchase of intangibles		**184**	646	31	**184**	31
		2,874	6,744	1,379	**2,874**	1,278
Net cash flows used in investing activities		**(2,867)**	(6,744)	(1,186)	**(2,867)**	(1,130)
Cash Flows from Financing Activities						
Cash was provided from:						
Increase in term debt		**0**	2,215	0	**0**	0
Increase in capital		**1,800**	2,000	0	**1,800**	0
Net advances from subsidiaries		**0**	0	0	**211**	2,773
		1,800	4,215	0	**2,011**	2,773
Cash was applied to:						
Decrease in term debt		**0**	0	1,370	**0**	1,370
Payment of dividend		**1,500**	109	109	**1,500**	109
		1,500	109	1,479	**1,500**	1,479
Net cash flows from financing activities		**300**	4,106	(1,479)	**511**	1,294
Net Increase (Decrease) in Cash Held		**5,046**	11	1,653	**5,069**	1,631
Add opening cash brought forward		**1,968**	2	315	**1,943**	312
Add effect of exchange rate change on foreign currency balance		**0**	0	0	**0**	0
Ending Cash Carried Forward	16	**7,014**	13	1,968	**7,012**	1,943

The accompanying notes form part of these financial statements.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS

FOR THE YEAR ENDED 30 JUNE 2009

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 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 balance sheet.

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 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 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 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 Income Statement and its share of post acquisition increases or decreases in net assets, in the Consolidated Balance Sheet.

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 taken to the income statement.

Intangible assets created within the business are not capitalised and expenditure is charged to the income statement 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
Internally generated/Acquired	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 income statement 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 the Income Statement.

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.

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 balance sheet date using a discounted cash flow methodology.

(i) Wages, Salaries and Annual Leave

The liability for wages, salaries and annual leave recognised in the balance sheet 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 balance sheet 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 Income Statement 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 balance sheet comprise cash at bank and in hand and short-term deposits with an original maturity of three months or less.

For the purposes of the Cash Flow Statement, 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.

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 balance sheet 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 Income Statement 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.

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.

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.

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 and actual results to date.

b) Heritage Assets

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

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 23.

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.

1.3 Accounting Standards Issued but not yet Effective

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

	Application for Group
• NZ IAS 1R Presentation of Financial Statements	1 July 2009
• NZ IAS 23 Borrowing Costs	1 July 2009
• NZ IAS 27 Consolidated and Separate Financial Statements	1 July 2009
• NZ IAS 39 Financial Instruments: Recognition and Measurement	1 July 2009
• NZ IFRIC 9 Reassessment of Embedded Derivatives	1 July 2009
• NZ IFRIC 18 Transfers of Assets from Customers	1 July 2009
• Other amendments to NZ IFRS arising from the Annual Improvement Project	1 July 2009 and 1 July 2010

The group has chosen not to apply the changes in the above standards prior to their effective date. While these standards are applicable to the group they are not expected to have a material impact on our accounts.

	GROUP		PARENT	
	ACTUAL 2009 $000	ACTUAL 2008 $000	ACTUAL 2009 $000	ACTUAL 2008 $000
2. Revenue and Other Income				
(a) Revenue				
Government research revenue	**21,144**	21,878	**21,144**	21,878
Commercial research revenue	**22,516**	19,384	**22,520**	19,403
Sale of Intellectual Property	**0**	200	**0**	200
Royalty	**17**	10	**17**	10
Interest revenue	**296**	238	**296**	167
	43,973	41,710	**43,977**	41,658
(b) Other Income				
Change in fair value of plantation trees	**83**	64	**83**	64
Net realised exchange fluctuations	**19**	93	**19**	25
	102	157	**102**	89
3. Expenditure and Finance Costs				
(a) Expenditure				
Personnel remuneration and expenses	**23,791**	22,122	**23,790**	22,120
Other personnel related costs	**704**	559	**704**	558
Contractors and subcontractors	**5,329**	7,012	**5,312**	6,979
Consumables	**1,057**	952	**1,057**	952
External services	**2,859**	2,922	**2,870**	2,856
Travel and accommodation	**1,509**	1,646	**1,508**	1,644
Lease and rental costs	**699**	680	**1,055**	1,035
Depreciation	**2,131**	2,053	**2,111**	2,033
Amortisation	**97**	113	**97**	113
Loss on disposal of fixed assets	**173**	146	**173**	146
Impairment of assets	**115**	11	**115**	11
Reversal of impairment	**0**	(48)	**0**	(48)
Impairment of intercompany advance	**0**	0	**1,353**	0
Inventory written off	**16**	0	**16**	0
Premises	**1,528**	1,289	**1,341**	1,118
Director's fees	**300**	283	**289**	272
Restructuring costs	**(119)**	417	**(119)**	417
Bad debts written off	**0**	26	**0**	26
Doubtful debt provision	**101**	1	**101**	1
Unrealised exchange fluctuations	**0**	89	**0**	89
Other	**394**	453	**451**	520
	40,684	40,726	**42,224**	40,842
(b) Finance Costs				
Bank loans and overdraft	**20**	17	**20**	17
Inland Revenue use of money interest	**0**	0	**0**	0
	20	17	**20**	17

	GROUP		PARENT	
	ACTUAL 2009 $000	ACTUAL 2008 $000	ACTUAL 2009 $000	ACTUAL 2008 $000
4. Auditor's Remuneration				
Amounts paid or due and payable to the auditors for:				
Auditing financial statements				
Parent entity auditor	**140**	146	**140**	146

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

5. Statement of Movements in Equity

	Ordinary Shares 2009 $000	Asset Re-valuation Reserve 2009 $000	Retained Earnings 2009 $000	Total 2009 $000	Ordinary Shares 2008 $000	Asset Re-valuation Reserve 2008 $000	Retained Earnings 2008 $000	Total 2008 $000
GROUP								
Balance as at 1 July	15,716	50	7,860	23,626	15,716	0	6,856	22,572
Income and expense for the period recognised directly in equity	0	(2)	0	(2)	0	50	0	50
Profit	0	0	2,283	2,283	0	0	1,113	1,113
Equity transactions:								
Shares issued	1,800	0	0	1,800	0	0	0	0
Dividend paid	0	0	(1,500)	(1,500)	0	0	(109)	(109)
Balance 30 June	**17,516**	**48**	**8,643**	**26,207**	**15,716**	**50**	**7,860**	**23,626**
PARENT								
Balance as at 1 July	15,716	50	2,008	17,774	15,716	0	1,244	16,960
Income and expense for the period recognised directly in equity	0	(2)	0	(2)	0	50	0	50
Profit	0	0	705	705	0	0	873	873
Equity transactions:								
Shares issued	1,800	0	0	1,800	0	0	0	0
Dividend paid	0	0	(1,500)	(1,500)	0	0	(109)	(109)
Balance 30 June	**17,516**	**48**	**1,213**	**18,777**	**15,716**	**50**	**2,008**	**17,774**

New Zealand Forest Research Institute Limited has authorised, issued and paid up capital of 17,516,000 (2008: 15,716,000) 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.

During the period dividends recognised as distributions to shareholders totalled $1,500k representing 8.56 cents per share (2008: $109k @ 0.69 cents per share). $1,500k was paid during the period.

The asset revaluation reserve is used to record increments and decrements in the fair value of heritage book assets. In the current year there was a $2k movement due to the change in tax rates affecting the deferred tax on these 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, 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.

6. Provisions

The group has provisions for long service leave and restructuring. The long service leave provision totals $599k at June 2009 (2008: $235k) and was valued by an actuary.

There is no restructuring provision in 2009. A provision of $181k in June 2008 was made to allow for costs associated with the termination of Ensis joint venture, a jointly controlled entity, and the reshaping of Scion, both of which occurred in the financial year ended 30 June 2008. Costs provided were for potential payments to terminated personnel. This provision was reversed in 2009.

The provisions are made up as follows:

	GROUP ACTUAL 2009 $000	GROUP ACTUAL 2008 $000
Current Provision	**74**	315
Non Current Provision	**525**	101
	599	416

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

	Long Service Leave	Restruct-uring	TOTAL	Long Service Leave	Restruct-uring	TOTAL
		2009			2008	
	$000	$000	$000	$000	$000	$000
Balance 1 July 2008	**235**	**181**	**416**	235	0	235
Provision reversed during the period	**0**	**(181)**	**(181)**	0	0	0
Amounts used during the period	**(118)**	**0**	**(118)**	(88)	0	(88)
Provisions made during the period	**425**	**0**	**425**	90	181	271
Discount rate adjustment	**57**	**0**	**57**	(2)	0	(2)
Balance 30 June 2009	**599**	**0**	**599**	235	181	416

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 balance sheet represents the present value of the defined benefit obligation.

	GROUP ACTUAL 2009 $000	GROUP ACTUAL 2008 $000
Net plan expense		
Current service cost	**43**	38
Interest cost on benefit obligation	**71**	73
Net actuarial (gains)/losses recognised in the year	**114**	(138)
Net plan expense	**228**	(27)

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

	Defined Benefit Plan				
	2009	2008	2007	2006	2005
	$000	$000	$000	$000	$000
Benefit liability included in the balance sheet					
Present value of defined benefit obligation	**1,278**	1,099	1,160	1,188	1,276

7. Pension Plans (cont)

a) Defined Benefit Plan

	GROUP ACTUAL 2009 $000	GROUP ACTUAL 2008 $000
Changes in the present value of the defined benefit obligation are as follows:		
Opening balance	**1,099**	1,160
Current service cost	**43**	38
Interest cost	**71**	73
Actuarial (gains)/losses recognised in the year	**114**	(138)
Benefits paid	**(49)**	(34)
Closing balance	**1,278**	1,099
Current provision	**65**	73
Non-current provision	**1,213**	1,026
	1,278	1,099

The history of experience adjustments is as follows:

	2009 $000	2008 $000	2007 $000	2006 $000	2005 $000
Experience adjustments on plan liabilities	**(38)**	(126)	0	68	44

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

	2009 $000	2008 $000
Discount rate	**6.14%**	6.42%
Future salary increases	**4.50%**	4.50%

b) Defined Contribution Plan

During the period defined contributions totalling $113k (2008: $111k) were made to the Government Superannuation Fund.

8. Trade and Other Payables

	GROUP ACTUAL 2009 $000	GROUP ACTUAL 2008 $000	PARENT ACTUAL 2009 $000	PARENT ACTUAL 2008 $000
Trade payables	**3,790**	3,325	**3,762**	3,282
Other payables	**19**	61	**19**	61
Employee payables and accruals	**2,696**	2,440	**2,696**	2,440
Intercompany payables (refer note 27)	**0**	0	**7,114**	7,065
Payable to associates	**40**	20	**40**	20
Payable to directors	**10**	11	**10**	10
Revenue in advance	**1,774**	1,322	**1,763**	1,316
	8,329	7,179	**15,404**	14,194

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.

	GROUP		PARENT	
	ACTUAL 2009 $000	ACTUAL 2008 $000	ACTUAL 2009 $000	ACTUAL 2008 $000
9. Income Tax				
(a) Income Tax Expense				
The major components of income tax expense in the Income Statement are:				
Current income tax				
Current income tax charge	**1,225**	564	**1,248**	470
Tax effect of loss offset	**0**	0	**0**	23
Tax losses recognised from previous years	**0**	(493)	**0**	(493)
	1,225	71	**1,248**	0
Deferred income tax				
Deferred tax expense/(income) related to prior year	**70**	10	**72**	0
Relating to origination and reversal of temporary differences	**(182)**	(101)	**(190)**	(97)
Amount of deferred tax expense/(income) related to changes in tax rates	**0**	112	**0**	112
	(112)	21	**(118)**	15
Income tax expense/(income) reports in the income statement	**1,113**	92	**1,130**	15
(b) Amounts charged or credited directly to equity				
Deferred income tax related to items charged (credited) directly to equity				
Net gain on revaluation of heritage assets	**(2)**	25	**(2)**	25
(c) Reconciliation between the aggregate tax expense/(income) recognised in the Income Statement to tax expense/ (income) calculated at the statutory income tax rate.				
Accounting profit/(loss) before income tax	**3,396**	1,205	**1,835**	888
Tax at the statutory income tax rate of 30% (2008: 33%)	**1,019**	398	**551**	293
Adjusted by:				
Prior year income tax	**19**	(64)	**70**	(58)
Utilisation of unrecognised prior year tax losses	**0**	(493)	**0**	(493)
Deferred tax adjustment for tax rate change	**0**	112	**0**	112
Tax recognised on pre-incorporation retirement leave	**0**	(4)	**0**	(4)
Entertainment	**4**	12	**4**	11
Non-deductible legal fees	**1**	15	**1**	14
Intercompany receivable	**0**	0	**406**	0
Other	**70**	116	**98**	117
Tax effect of loss offsets	**0**	0	**0**	23
Income tax expense	**1,113**	92	**1,130**	15

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

9. Income Tax (cont)

(d) Recognised deferred tax assets and liabilities

	CONSOLIDATED				PARENT			
	2009 $000 Current Income Tax	2009 $000 Deferred Income Tax	2008 $000 Current Income Tax	2008 $000 Deferred Income Tax	2009 $000 Current Income Tax	2009 $000 Deferred Income Tax	2008 $000 Current Income Tax	2008 $000 Deferred Income Tax
Opening balance	**(71)**	**680**	465	726	0	685	0	725
Charge to income	**(1,225)**	**112**	(71)	(21)	(1,248)	118	0	(15)
Prior period adjustment	**(1)**	**(2)**	0	0	(23)	0	0	0
Resident Withholding Tax paid	**22**	**0**	0	0	22	0	0	0
Charge to equity	**0**	**(2)**	0	(25)	0	(2)	0	(25)
Other payments	**330**	**0**	(465)	0	330	0	0	0
Closing balance	**(945)**	**788**	(71)	680	(919)	801	0	685

The reduction in the corporate tax rate from 33% to 30% from the 2009 tax year has been taken into account in calculating the value of deferred tax as at 30 June 2008.

	GROUP		PARENT	
	ACTUAL 2009 $000	ACTUAL 2008 $000	ACTUAL 2009 $000	ACTUAL 2008 $000
(e) Deferred income tax relates to the following:				
Deferred tax liabilities				
Property, plant and equipment	**(302)**	(355)	**(289)**	(350)
Nursery inventory	**(17)**	(41)	**(17)**	(41)
Standing timber	**(122)**	(97)	**(122)**	(97)
	(441)	(493)	**(428)**	(488)
Deferred tax assets				
Patents and trademarks	**119**	116	**119**	116
Payroll provisions	**895**	900	**895**	900
Provision for doubtful debts	**32**	2	**32**	2
Income in advance	**115**	51	**115**	51
Other accruals	**0**	1	**0**	1
Other	**68**	103	**68**	103
	1,229	1,173	**1,229**	1,173
Net Deferred Tax Asset per Balance Sheet	**788**	680	**801**	685

The group has no unused tax losses (2008: $0k).

(f) 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.

Scion Australasia Limited, a wholly owned subsidiary of New Zealand Forest Research Institute Limited, has an imputation credit account with a balance of $611,815 at 30 June 2009 (2008: $591,326).

Liro Limited a wholly owned subsidiary of New Zealand Forest Research Institute Limited has an imputation credit account with a balance of $938 at 30 June 2009 (2008: $938).

10. Bank Debt

The group had no borrowing as at 30 June 2009 (2008: $0). The total facility available to the group is $3,500,000 (2008: $3,500,000). The bank facility maturity date is 31 October 2009.

11. 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 2008								
Carrying amount net of accumulated depreciation and impairment at 1 July 2008	**1,704**	**14,953**	**4,838**	**191**	**105**	**244**	**643**	**22,678**
Additions	0	839	1,349	14	8	0	320	2,530
Transfers from CWIP	0	124	504	0	0	0	(628)	0
Disposals	0	(155)	(17)	(8)	0	0	0	(180)
Impairment provision made	0	(108)	(7)	0	0	0	0	(115)
Depreciation expensed	(36)	(415)	(1,635)	(33)	(12)	0	0	(2,131)
Carrying amount net of accumulated depreciation and impairment at 30 June 2009	**1,668**	**15,238**	**5,032**	**164**	**101**	**244**	**335**	**22,782**
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**

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 23 regarding other heritage assets. The heritage asset library books have been valued at $75k.

An impairment allowance was raised in respect of certain buildings which were deemed to be unsafe and hence no longer have value to the business.

An impairment allowance was raised for certain equipment which due to its condition no longer had value to the business or any resale value.

11. 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 2007								
Carrying amount net of accumulated depreciation and impairment at 1 July 2007	**1,383**	**15,387**	**5,540**	**144**	**96**	**169**	**404**	**23,123**
Additions	57	10	836	83	21	0	643	1,650
Transfers from CWIP	300	53	51	0	0	0	(404)	0
Disposals	0	(98)	(6)	0	(2)	0	0	(106)
Impairment provision made	0	0	(11)	0	0	0	0	(11)
Revaluations	0	0	0	0	0	75	0	75
Depreciation expensed	(36)	(399)	(1,572)	(36)	(10)	0	0	(2,053)
Carrying amount net of accumulated depreciation and impairment at 30 June 2008	**1,704**	**14,953**	**4,838**	**191**	**105**	**244**	**643**	**22,678**
At 30 June 2007								
Cost or fair value	1,476	19,139	28,931	1,518	239	169	404	51,876
Accumulated depreciation and impairment	(93)	(3,752)	(23,391)	(1,374)	(143)	0	0	(28,753)
Net carrying amount	**1,383**	**15,387**	**5,540**	**144**	**96**	**169**	**404**	**23,123**
At 30 June 2008								
Cost or fair value	1,833	19,007	29,650	1,577	208	244	643	53,162
Accumulated depreciation and impairment	(129)	(4,054)	(24,812)	(1,386)	(103)	0	0	(30,484)
Net carrying amount	**1,704**	**14,953**	**4,838**	**191**	**105**	**244**	**643**	**22,678**

11. Property, Plant and Equipment (cont)

PARENT	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 2008								
Carrying amount net of accumulated depreciation and impairment at 1 July 2008	**341**	**14,953**	**4,838**	**191**	**105**	**244**	**643**	**21,315**
Additions	0	839	1,349	14	8	0	320	2,530
Transfers from CWIP	0	124	504	0	0	0	(628)	0
Disposals	0	(155)	(17)	(8)	0	0	0	(180)
Impairment provision made	0	(108)	(7)	0	0	0	0	(115)
Depreciation expensed	(16)	(415)	(1,635)	(33)	(12)	0	0	(2,111)
Carrying amount net of accumulated depreciation and impairment at 30 June 2009	**325**	**15,238**	**5,032**	**164**	**101**	**244**	**335**	**21,439**
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**

11. Property, Plant and Equipment (cont)

PARENT	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 2007								
Carrying amount net of accumulated depreciation and impairment at 1 July 2007	**357**	**15,387**	**5,540**	**144**	**96**	**169**	**104**	**21,797**
Additions	0	10	836	83	21	0	643	1,593
Transfers from CWIP	0	53	51	0	0	0	(104)	0
Disposals	0	(98)	(6)	0	(2)	0	0	(106)
Impairment provision made	0	0	(11)	0	0	0	0	(11)
Revaluations	0	0	0	0	0	75	0	75
Depreciation expensed	(16)	(399)	(1,572)	(36)	(10)	0	0	(2,033)
Carrying amount net of accumulated depreciation and impairment at 30 June 2008	**341**	**14,953**	**4,838**	**191**	**105**	**244**	**643**	**21,315**
At 30 June 2007								
Cost or fair value	440	19,139	28,931	1,517	239	169	104	50,539
Accumulated depreciation and impairment	(83)	(3,752)	(23,391)	(1,373)	(143)	0	0	(28,742)
Net carrying amount	**357**	**15,387**	**5,540**	**144**	**96**	**169**	**104**	**21,797**
At 30 June 2008								
Cost or fair value	441	19,007	29,650	1,577	208	244	643	51,770
Accumulated depreciation and impairment	(100)	(4,054)	(24,812)	(1,386)	(103)	0	0	(30,455)
Net carrying amount	**341**	**14,953**	**4,838**	**191**	**105**	**244**	**643**	**21,315**

12. 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 2009 $000	ACTUAL 2008 $000	ACTUAL 2009 $000	ACTUAL 2008 $000
Carrying amount 1 July	**322**	258	**322**	258
Gain/(loss) from changes in fair value less estimated point-of-sale costs	**83**	64	**83**	64
Carrying amount 30 June	**405**	322	**405**	322

The group has tree plantations at three locations:

(a) 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.

(b) 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 2009.

(c) 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 agricultural assets have been harvested during the year.

The tree plantations were valued as at 30 June 2009 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 2009 $000	ACTUAL 2008 $000	ACTUAL 2009 $000	ACTUAL 2008 $000
13. Intangible Assets				
Software				
Opening balance				
At cost	**2,785**	2,748	**2785**	2,748
Less accumulated amortisation	**(2,649)**	(2,530)	**(2649)**	(2,530)
Opening net carrying amount 1 July	**136**	218	**136**	218
Opening carrying amount 1 July	**136**	218	**136**	218
External additions	**183**	31	**183**	31
Current year amortisation	**(97)**	(113)	**(97)**	(113)
Closing carrying amount 30 June	**222**	136	**222**	136
Closing balance 30 June				
At cost	**2,920**	2,785	**2,920**	2,785
Less accumulated amortisation	**(2,698)**	(2,649)	**(2,698)**	(2,649)
Closing net carrying amount 30 June	**222**	136	**222**	136

	PARENT	
	30 June 2009 $000	30 June 2008 $000
14. Investments in Subsidiaries		
Opening shares in subsidiaries	**52**	52
Acquired in current year	**0**	0
Disposed of in current year	**0**	0
Closing shares in subsidiaries	**52**	52

	Shares	Percentage Held	Balance Date
Subsidiaries			
Liro Limited	1,000	100%	30 June
Forest Research (Australasia) Pty Limited	100	100%	30 June
Atlas Technology Limited	100	100%	30 June
Te Papa Tipu Properties Limited	100	100%	30 June
Scion Australasia Limited	100	100%	30 June

Liro Limited does not trade.

Forest Research (Australasia) Pty Ltd does not trade.

Atlas Technology Limited does not trade.

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

Scion Australasia Limited was incorporated on 14 June 2004 as a special purpose company for a jointly controlled entity. Operations of the jointly controlled entity have ceased.

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 2009 $000	ACTUAL 2008 $000	ACTUAL 2009 $000	ACTUAL 2008 $000
15. Investments in Associates				
(a) Investment Details				
Frontline Biosecurity Limited	**0**	0	**0**	0
Beacon Pathway Limited	**40**	38	**20**	20
Biopolymer Network Limited	**101**	78	**15**	15
	141	116	**35**	35

New Zealand Forest Research Institute Limited has a 25% (2008: 25%) shareholding in Frontline Biosecurity Limited. The company carries out research, development and commercialisation of biosecurity processes. The company has a balance date of 31 March.

New Zealand Forest Research Institute Limited has a 20% (2008: 20%) shareholding in Beacon Pathway Limited. The company carries out research in the area of sustainability in the built environment.

New Zealand Forest Research Institute Limited has a 33.33% (2008: 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.

15. Investments in Associates (cont)

(a) Investment Details (cont)

All of the companies are incorporated in New Zealand.

The parent entity undertakes research projects with the Forest and Forest Products Research Organisation (FAFPRO) through five cooperatives. Expenditure incurred on research and recoveries from the cooperatives has been included in the financial statements.

	GROUP		PARENT	
	ACTUAL 2009 $000	ACTUAL 2008 $000	ACTUAL 2009 $000	ACTUAL 2008 $000
(b) Movements in the carrying amount of the group's investments in associates				
Opening share of decrease in net assets	**71**	(10)	**(10)**	(10)
Current year share of increase/(decrease) in net assets of associates	**25**	81	**0**	0
Closing share of increase/(decrease) in net assets	**96**	71	**(10)**	(10)
Cost of investments	**45**	45	**45**	45
Carrying amount of investments to 30 June	**141**	116	**35**	35

(c) Summarised financial information

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

	GROUP	
	ACTUAL 2009 $000	ACTUAL 2008 $000
Extract from the associates' balance sheets:		
Current assets	**1,707**	2,135
Non-current assets	**16**	45
	1,723	2,180
Current liabilities	**1,198**	1,528
Non-current liabilities	**0**	205
	1,198	1,733
Net assets	**525**	447
Share of associates' net assets	**141**	116
Extract from the associates' income statements:		
Revenue	**5,620**	6,352
Net Profit	**92**	74

There are no known contingent liabilities relating to Associates.

	GROUP		PARENT	
	ACTUAL 2009 $000	ACTUAL 2008 $000	ACTUAL 2009 $000	ACTUAL 2008 $000
16. Cash and Cash Equivalents				
Cash on hand	**7**	6	**6**	6
Bank	**277**	332	**276**	307
Call deposits	**6,730**	1,630	**6,730**	1,630
	7,014	1,968	**7,012**	1,943

Cash at bank earns interest at 0.33% on credit balances (2008: 0% on balances less than $100,000, 6.26% on balances over $100,000). Call deposits earn interest at the rate applicable on the day. For the purposes of the Cash Flow Statement, Cash and Cash equivalents are equivalent to cash and cash equivalents presented in the Balance Sheet.

	GROUP		PARENT	
	ACTUAL 2009 $000	ACTUAL 2008 $000	ACTUAL 2009 $000	ACTUAL 2008 $000
17. Trade and Other Receivables				
Trade receivables	**3,650**	3,896	**3,644**	3,891
Allowance for impairment loss	**(108)**	(7)	**(108)**	(7)
Other debtors	**103**	54	**103**	54
Prepayments	**601**	458	**598**	458
Accrued revenue	**417**	1,128	**417**	1,128
Related party receivables:				
Associates	**1,133**	656	**1,133**	656
Subsidiaries	**0**	0	**2,367**	2,509
Allowance for impairment loss	**0**	0	**(1,353)**	0
Carrying amount 30 June	**5,796**	6,185	**6,801**	8,689

(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. An allowance for impairment loss of $101k (2008: $1k) has been recognised for the Group and $101k (2008: $1k) 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 2009 $000	ACTUAL 2008 $000	ACTUAL 2009 $000	ACTUAL 2008 $000
Opening balance 1 July	**7**	60	**7**	60
Reversal of prior year provision	**(7)**	0	**(7)**	0
Charge for the year	**108**	1	**108**	1
Amounts written off	**0**	(54)	**0**	(54)
Closing balance 30 June	**108**	7	**108**	7

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

		Total $000s	0-30 Days CNI* $000s	0-30 Days CI* $000s	31-60 Days CNI* $000s	31-60 Days CI* $000s	61-90 Days PDNI* $000s	61-90 Days CI* $000s	+91 Days PDNI* $000s	+91 Days CI* $000s
2009	Consolidated	3,650	3,115	87	199	0	88	0	140	21
	Parent	3,644	3,109	87	199	0	88	0	140	21
2008	Consolidated	3,896	3,571	0	206	0	92	0	20	7
	Parent	3,891	3,566	0	206	0	92	0	20	7

* Current not impaired (CNI)
* Past due not impaired (PDNI)
* Considered impaired (CI)

(c) For related party terms and conditions refer to Note 27.

18. Investment in Ensis

Ensis was a 50:50 jointly controlled entity with CSIRO in Australia. Scion's share was held through Scion Australasia Limited. The jointly controlled entity was terminated on 31 December 2007, however this termination was effective 30 June 2007. All assets and liabilities of the jointly controlled entity were purchased at book value by the jointly controlled entity partners. The assets and liabilities were split based on where the assets resided and who delivered the related projects. Assets included debtors, creditors, intercompany balances and cash balances.

The investment in Ensis was recorded as a current asset as the joint venture agreement required all profits to be distributed in the year following that in which they are earned.

	GROUP	
	30 June 2009 $000	30 June 2008 $000
Opening share of profit	**0**	2,228
Distributions received	**0**	(2,228)
Closing share of profit	**0**	0

19. Inventories

	GROUP		PARENT	
	ACTUAL 2009 $000	ACTUAL 2008 $000	ACTUAL 2009 $000	ACTUAL 2008 $000
Consumable stores (at cost)	**68**	94	**68**	94
Nursery stock	**57**	136	**57**	136
Closing carrying amount	**125**	230	**125**	230

Consumable stores recognised as an expense for the year are $118k (2008: $108k) for the Group and $118k (2008: $108k) for the parent company. The expense has been included in the "other" line item in Note 3 (a). Consumable inventory write-downs in the period were $16k (2008: $0).

20. Financial Instruments

Financial Instruments include:

Loans and Receivables
Trade Debtors
Other Debtors
Intercompany Receivables

Other Financial Liabilities
Trade and Other Payables
Term Loan

All the above financial instruments are measured at amortised cost.

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.

The group's debt facility is with the National Bank of New Zealand Limited. As at 30 June 2009 no borrowings were drawn down (2008: nil).

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.

20. Financial Instruments (cont)

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.

Maximum exposures to credit risk as at balance date are:

	GROUP		PARENT	
	ACTUAL 2009 $000	ACTUAL 2008 $000	ACTUAL 2009 $000	ACTUAL 2008 $000
Current account	**277**	332	**276**	307
Call deposits	**6,730**	1,630	**6,730**	1,630
Receivables	**4,062**	5,072	**4,056**	5,067
Intercompany receivable	**0**	0	**1,014**	2,509
Associated trade receivables and advances	**1,209**	732	**1,209**	732

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

Market Risk

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

Interest Rate Risk

The groups exposure to market interest rates relates primarily to the groups long term debt and cash deposits. Debt has been managed at low levels over the reported period and cash and cash equivalents have increased during that period to a year ended 30 June 2009 group balance of $7,014k (2008: $1,968k).

	GROUP		PARENT	
	ACTUAL 2009 $000	ACTUAL 2008 $000	ACTUAL 2009 $000	ACTUAL 2008 $000
Cash in hand	**7**	6	**6**	6
Current account	**277**	332	**276**	307
Call deposits	**6,730**	1,630	**6,730**	1,630
	7,014	1,968	**7,012**	1,943

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 2009 bank call deposits were earning interest at rates between 2.50% and 3.60% (2008: 8.20% and 8.30%).

At 30 June 2009, 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:

	Parent and Group			
	2009		2008	
Judgement of reasonably possible movements in interest rates:	Change in Interest Rate	Effect on Post Tax Profit $000	Change in Interest Rate	Effect on Post Tax Profit $000
	+ 5%	**236**	+2%	22
	-1%	**(47)**	-6%	(66)

The movements in profit are due to higher/lower interest revenue on call deposit balances. The sensitivity is higher in 2009 than 2008 because of the increase in call deposits during 2009.

20. 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 2009 $000	ACTUAL 2008 $000	ACTUAL 2009 $000	ACTUAL 2008 $000
21. Reconciliation of operating surplus after taxation with cash flows from operating activities				
Reported surplus after taxation	**2,283**	1,113	**705**	873
Add (less) non cash items:				
Depreciation	**2,132**	2,053	**2,111**	2,033
Amortisation	**97**	113	**97**	113
Impairment provision	**117**	(37)	**117**	(37)
Doubtful debts	**101**	27	**101**	27
Movement in deferred tax benefit	**(110)**	21	**(118)**	15
Revaluation of biological assets	**(82)**	(64)	**(82)**	(64)
Write off provision intercompany advance	**0**	0	**1,353**	0
	2,255	2,113	**3,579**	2,087
Add (less) items classified as investing activity:				
(Gain) loss on disposal of property, plant and equipment	**173**	146	**173**	146
Share in associate company profit	**(25)**	(81)	**0**	0
Capital related items in creditors	**157**	(305)	**157**	(350)
	305	(240)	**330**	(204)
Movements in working capital items:				
(Increase)/Decrease in debtors and prepayments	**281**	(2,804)	**425**	(2,911)
(Increase)/Decrease in inventories	**105**	(130)	**105**	(130)
(Increase)/Decrease in Ensis profit receivable	**0**	2,228	**0**	0
Increase/(Decrease) in creditors and accruals	**1,510**	1,502	**1,572**	4,525
Increase/(Decrease) in taxation payable	**874**	536	**919**	0
Increase/(Decrease) in intercompany debtors	**0**	0	**(141)**	105
(Increase)/Decrease in intercompany creditors	**0**	0	**(69)**	(2,878)
	2,770	1,332	**2,811**	(1,289)
Net cash flows from operating activities	**7,613**	4,318	**7,425**	1,467

22. 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.

23. Heritage Assets

The company has identified its herbarium and germplasm collections as heritage assets. In accordance with NZ IAS 16, Property Plant and Equipment these assets are held under the cost model. The Directors believe that there is no practical basis upon which to reliably value these collections.

24. 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 2009 $000	ACTUAL 2008 $000	ACTUAL 2009 $000	ACTUAL 2008 $000
Lease commitments under non-cancellable operating leases:				
Within one year	**484**	390	**484**	390
One to five years	**278**	324	**278**	324
	762	714	**762**	714

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. The increase in non-cancellable operating leases shown in the table below, reflect the signing of a 20-year land lease with a new tenant, and an agreement to increase the annual rent to an existing tenant.

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

	GROUP		PARENT	
	ACTUAL 2009 $000	ACTUAL 2008 $000	ACTUAL 2009 $000	ACTUAL 2008 $000
Within one year	**287**	309	**199**	245
One to five years	**1,858**	579	**161**	325
Greater than five years	**1,116**	936	**0**	20
	3,261	1,824	**360**	590
Capital Commitments:				
Capital expenditure contracted for at balance date but not provided for	**611**	504	**611**	504

25. Transactions with Related Parties

During the year New Zealand Forest Research Institute Limited entered into the following transactions:

	PARENT	
	30 June 2009 $000	30 June 2008 $000
Subsidiary Companies		
Liro Limited		
Receipt of loan payment on behalf of Liro	**0**	(46)
Amount (payable)/receivable at balance date		
– Intercompany account	**(1,398)**	(1,398)

25. Transactions with Related Parties (cont)

	PARENT 30 June 2009 $000	PARENT 30 June 2008 $000
Subsidiary Companies (cont)		
Forest Research (Australasia) Pty Ltd		
Amount (payable)/receivable at balance date		
– Intercompany account	**1,353**	1,353
– Provision for impairment	**(1,353)**	0
	0	1,353
Scion Australasia Ltd		
Tax payment/(receipts) made on behalf	**22**	(536)
Ensis distributions received on behalf	**0**	(2,296)
Purchase of equipment	**(70)**	0
Amount (payable)/receivable at balance date		
– Intercompany account	**(5,716)**	(5,668)
Te Papa Tipu Properties Ltd		
Charge for services	**76**	80
Payment of Rent	**(356)**	(354)
Paid on behalf	**148**	369
Amount (payable)/receivable at balance date		
– Intercompany account	**1,014**	1,145
Associates		
Beacon Pathway Ltd		
Contribution to research outputs	**(200)**	(200)
Supplied goods and services	**179**	75
Receivable/(Payable) at balance date	**(16)**	8
Outstanding unsecured shareholders advance from New Zealand Forest Research Institute Limited to Beacon Pathway Ltd	**76**	76
Biopolymer Network Ltd		
Supplied goods and services	**1,383**	1,511
Received goods and services	**(1)**	0
Receivable/(Payable) at balance date	**108**	165
Other Related Parties		
Radiata Pine Breeding Co Ltd		
Contribution to research outputs	**(115)**	(118)
Supplied goods and services	**727**	433
Goods and services received	**0**	2
Receivable/(Payable) at balance date	**177**	160
WQI Ltd		
Supplied goods and services	**704**	469
Receivable goods and services	**7**	0
Receivable/(Payable) at balance date	**154**	66
Future Forests Research Ltd		
Services provided	**6,102**	432
Receivable/(Payable) at balance date	**671**	218
Government Entities and Agencies		
Supplied services	**26,940**	28,250
Services received	**(2,051)**	(2,733)
Receivable/(Payable) at balance date	**847**	1,770

25. Transactions with Related Parties (cont)

Other

During the year the group provided services to FITEC totalling $113k (2008: $61k), New Zealand Farm Forestry Association Incorporated $6k (2008: $0), New Zealand Forestry Limited $4k (2008: $8k), the New Zealand Forest Owners Association Incorporated $605k (2008: $539k), Pentarch Forest Products Limited $1k (2008: $2k) and Tane Tree Trust $60k (2008: $4k).

The group also received services totalling $11k (2008: $336k) from the New Zealand Forest Owners Association Incorporated and $5k (2008: $0) from the New Zealand Institute of Forestry Incorporated.

Mr Peter Berg, a director of New Zealand Forest Research Institute Limited, is the President of New Zealand Forest Owners Association Incorporated and a director of the other aforementioned entities. Mr Sheldon Drummond, a director of New Zealand Forest Research Institute Limited is a director of the New Zealand Forest Owners Association. The services were provided and/or received on normal trading terms.

Dr Russell Ballard, Chairman of New Zealand Forest Research Institute Limited was appointed Chancellor of Massey University on 5 December 2008. Services provided to Massey University for the period 5 December 2008 to 30 June 2009 totalled $22k and services received totalled $21k.

Terms and conditions of transactions with related parties

Sales to and purchases from related parties are made in arm's length transactions both at normal market prices and on normal commercial terms. 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 (2008: Nil) and no impairment allowance has been raised for any of these debts.

	GROUP		PARENT	
	ACTUAL 2009 $000	ACTUAL 2008 $000	ACTUAL 2009 $000	ACTUAL 2008 $000
26. Key Management Personnel				
Short term employee benefits	**2,173**	1,490	**2,165**	1,482
Long term employee benefits	**0**	0	**0**	0
Termination employee benefits	**13**	13	**13**	13
KiwiSaver employer contributions	**11**	1	**11**	1
	2,197	1,504	**2,189**	1,496

27. Segment Information

The group operates principally in New Zealand providing scientific research and technology to Government and commercial clients.

Board of Directors

Dr Russ Ballard – Chairman

Bronwyn Monopoli – Deputy Chair

Peter Berg

Sheldon Drummond

Kathy Garden (resigned 30 June 2009)

Chris Karamea Insley

Michael Ludbrook

John Palmer (resigned 30 June 2009)

Barbara Forbes (Company Secretary)

EXECUTIVE MANAGEMENT

Dr Tom Richardson – 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

Mr Stuart Potter – Group Manager: Human Resources

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

Dr Trevor Stuthridge – Group Manager: Sustainable Design

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

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Veritec

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Next generation biomaterials

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