SCION
Next generation biomaterials

Scion Annual Report 2010

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From the Chairman

Mr Tony Nowell

Scion has delivered a solid performance during 2009/2010, building on the scientific, strategic and financial accomplishments of recent years. A before-tax profit of $3.240 million is a notable achievement in the current economic environment, and compares favourably with the $2.488 million that was budgeted. In the Government's 2010 Budget, a tax rule change relating to building depreciation required a one-off tax adjustment of $3.170 million, which led to a net loss of $0.978 million for the year.

Scion's continued success has been realised against a backdrop of Crown Research Institute reform undertaken by the Government, and we find ourselves in a good position to respond to the recommendations of the Crown Research Institute Taskforce.

The Government also signalled its ongoing commitment to research, science and technology in Budget 2010. This will enable our research to continue delivering economic benefits to the nation and contributing to social, cultural and environmental outcomes for New Zealand, as the organisation has done for over 60 years.

Scion's strategic direction

Scion focuses on four strategic goals, which were first articulated in 2008/2009 and refined in 2009/2010:

1. Increase the value and profitability of New Zealand's forests;
2. Optimise the value of marginal land;
3. Accelerate development of bioproducts from renewable resources; and
4. Maximise the quality and impact of Scion's science.

Despite continued challenges in the global economy, the key drivers for Scion's strategy remain firmly in place – supporting economic growth from New Zealand's natural resources to improve the wealth and wellbeing of New Zealanders.

Science and innovation is increasingly being called upon to underpin economic growth by supporting businesses, institutions and individuals to be more productive and smarter. The highlights contained in this report demonstrate how Scion is doing just that, under the four goals.

Increase the value and profitability of New Zealand's forests

New Zealand's forest-based industries are well established economic contributors, with annual export earnings of $3.5 billion, and are major regional employers. These industries will contribute to further economic growth through deployment of new products and processes. Scion is working in partnership with forest growers through Future Forests Research and other stakeholder groups to realise opportunities for improving returns to forest investors and to mitigate risks. The research programmes and technology transfer facilitated by Future Forests Research is aimed at increasing productivity, improving quality and ensuring sustainability of forest production. Scion also provides the knowledge to enable growers to take advantage of the economic benefits offered by environmental services such as carbon sequestration, conservation of biodiversity, erosion control, and recreation.

Optimise the value of marginal land

Scion has identified specific opportunities to collaborate with other researchers and end users to realise greater economic benefits from New Zealand's under-performing regional landscape. A new decision-support tool developed over the past year will enable marginal land owners and policy makers to make land use decisions that optimise economic benefits and mitigate environmental and social impacts. Other research programmes targeted at achieving this goal include developing diverse forest species and biomass processing technologies that broaden the opportunities available to landowners for utilising marginal lands.

Accelerate development of bioproducts from renewable resources
Scion is providing technologies and knowledge to assist the growth of innovative companies making products from forest resources, other plants and organic waste streams. Such products range from solid timber to bioplastic composites and biofuels. Over the past year, Scion has worked with several national and international partners to explore the possibilities inherent in utilising our largest renewable plant resource. These partnerships range from the Solid Wood Innovation consortium, which serves New Zealand and Australian sawmilling manufacturers, through to Sandia National Laboratories, one of the largest research and engineering providers in America specialising in lignocellulosic biofuels development. These partnerships enable Scion to provide leadership in developing bioenergy, biorefining and industrial biotechnology industries.

Maximise the quality and impact of Scion's science
In order to achieve the ambitious goals described above, Scion has invested in its high-performing individuals and teams, many of whom have been recognised through prestigious awards and publications. Over the past year, we have also invested in our research environment and infrastructure to support collaborative arrangements and encourage open access to knowledge and facilities. Uptake and transfer of science and technology outcomes are being achieved through our active relationships with end users, industry partners and innovators.

Crown Research Institute Taskforce recommendations

Scion, as a Crown Research Institute, is a key component of New Zealand's science system and plays a vital role in supporting innovation. A clear highlight of the 2009/2010 year for all Crown Research Institutes was the announcement by Research, Science and Technology Minister the Hon Dr Wayne Mapp that the Government would adopt the recommendations of the Report of the Crown Research Institute Taskforce.

The Crown Research Institute Taskforce recommended a suite of changes that would allow Crown Research Institutes to be even more potent contributors towards a prosperous New Zealand. The Minister described the changes that will occur as the recommendations are implemented as "the most significant in the sector in 20 years" and "will make the Crown Research Institutes powerful engines of growth".

Some of the changes announced by the Minister include:

- greater clarity on the role and purpose of each Crown Research Institute;
- strategic and longer-term funding for Crown Research Institutes;
- strengthening Crown Research Institute accountability (Boards, management and staff) to deliver benefit to New Zealand; and
- a set of balanced financial and non-financial performance indicators specific to each Crown Research Institute strategic plan.

Scion is in an excellent position to respond to these changes. Our recent strategic repositioning has clearly presented Scion's purpose, direction and national benefits. In many areas our sector and scientific linkages are the best they have been in many years. Now, with longer-term and more devolved Government backing, Scion will be able to do what it does best - undertake the science that the forest sector and the country needs, and engage well with end users to ensure that research findings are translated into practice and economic returns. The Board, with more control over its resources and assets, is comfortable with the greater responsibility and accountability expected of it for delivering the benefits from using these resources.

Following the Government's adoption of the Crown Research Institute Taskforce recommendations, substantial new funding was committed in the 2010 budget. Of $321 million for new initiatives over the next four years, $225 million is new funding. While Scion will not directly get more government funding, we will stand to benefit from the flow-on effect of the multi-million dollar investment in business research and developments through technology transfer and other initiatives.

Acknowledgements

We approach the end of the 2009/2010 year with pride in our achievements and anticipation for an equally prosperous future. For some, however, it marks the end of a rewarding relationship with the organisation. Both former Chair Dr Russ Ballard and his Deputy Chair Bronwyn Monopoli have reached the end of their six-year terms on the Scion Board. Russ and Bronwyn deserve an enormous vote of thanks for their leadership over this period. They have created a harmonious Board with skilled, hard working Directors, which has shown through in the organisation's very positive contribution to the forestry sector and New Zealand.

Another key departure is that of our Chief Executive Officer, Dr Tom Richardson. Tom's significant contribution, both as a scientist and as a chief executive, means he leaves Scion a strong, robust company that is well equipped to go from strength to strength. He has been an extremely dedicated and professional advocate for the forest industries, and has been a real pleasure for the Scion Board to work with. On behalf of the Board, I heartily thank Tom for his contribution and wish him all the very best for his new role as Chief Executive Officer at AgResearch.

Looking ahead

As Scion enters into a new era of exciting opportunities for the forestry sector and its supporting science, I look forward to my role as the new Chair, with Alison Andrew as our Deputy Chair. Finally, I extend heartfelt thanks to Dr Tom Richardson, his executive team and all of Scion's dedicated staff who have made this organisation an asset to New Zealand and who have paved the way for such a promising future.

From the Chief Executive Officer

Dr Tom Richardson

2009/2010 has been a landmark year in Scion's history. Not only have we enjoyed another successful year in terms of our science achievements and financial performance in challenging economic times, we have seen a major resurgence in the Government's commitment to research, science and technology and a comprehensive review of the system in which Crown Research Institutes operate.

Scion's success is built on a strategy developed in response to its operating environment and the anticipated implementation of the Crown Research Institute Taskforce recommendations. It aligns Scion's science and commercial focus with the opportunities being presented locally, nationally and globally. It is pleasing to reflect on the progress we have made in 2009/2010 towards our four strategic goals.

Goal 1: Increase the value and profitability of New Zealand's forests

Scientists increasingly face the challenge of delivering information to end users in a meaningful and relevant way as the complexity of knowledge increases. This emphasis on technology transfer lies at the heart of the Future Forests Research partnership, which is becoming a highly effective conduit between researchers and end users of our work.

Practical examples of technology transfer include new enhancements to the Forecaster modelling system that now make it possible for forest growers to predict the modulus of elasticity across a range of sites in New Zealand (see page 9). Modulus of elasticity, or stiffness, is a key determinant of wood quality and structural timber value, so the ability to tailor regimes to meet grading standards creates significant opportunities to improve the profitability of forestry stands.

Future Forests Research, strongly supported by Scion, was successful in winning funds from the Primary Growth Partnership for harvesting research (see page 11). The Government's allocation of this new funding will benefit the New Zealand economy, particularly as marginal lands are converted to forestry. This funding bid was a highlight in 2009/2010 that would not have been achieved without the close working partnership between forest growers and researchers that Future Forests Research provides.

Another highlight for Scion in 2009/2010 was the renewal of our partnership with ArborGen, a US-based forestry biotechnology company. Over the next three years, the partnership will focus on developing valuable traits, such as improved growth and superior wood quality, for both commercial forestry and biomaterials applications. This partnership has already developed a pipeline of lead candidates and the rate of new discoveries will only accelerate.

Goal 2: Optimise the value of marginal land

Computer-based models provide a powerful tool to make complex knowledge available to end-users in a way that can be tailored to their application. The development of "Acres", a new land-use decision tool, unveiled at the 2010 New Zealand National Agricultural Fieldays, enables land owners and policy makers to explore the options and outcomes of different agricultural and forestry scenarios (see page 14). This tool is particularly valuable for those considering the conversion of hill country to forestry, as the financial and environmental outcomes of different forestry options (such as species, planting densities, harvesting dates) can be evaluated.

Understanding the soil characteristics of specific sites is a key element of land use optimisation. In 2009/2010 Scion completed a soil mapping project for land in the Lake Rotorua area owned by four Maori trusts. This information forms the basis for new farm-specific land use capability maps to guide improved land use management and decision-making. Improvements may relate to enhanced productivity from current land uses, a greater awareness of environmental risks, and better understanding of options for land use diversification (see page 15).

An important opportunity for using marginal land was identified by Scion through a series of reports "*Bioenergy Options for New Zealand*". This major two-year study, which concluded with the fifth and

final report in October 2009, highlighted the vital role plantation forestry can play in New Zealand's future energy needs (see page 15). The findings from this study were summarised and presented in a series of meetings with key Government Ministers and officials.

Goal 3: Accelerate development of bioproducts from renewable resources
New Zealand wood processors require technologies and knowledge that will enable them to remain competitive and to position products into global markets. Scion continues to deliver research through Solid Wood Innovation, with recent emphasis on timber drying (see page 17). To improve Scion's contributions to wood processing innovation, Scion began implementing a new wood processing and sector engagement plan in 2010. This plan focuses far more effort on one-to-one engagement with individual companies that have the capacity to compete globally via innovation.

A tree, and indeed any biological material, is increasingly viewed as a chemical storehouse that can be converted to products. New Zealand's ability to produce sustainably certified biomass is a comparative advantage that must be leveraged by the massive global investment in bio-based product development. New bio-based energy, packaging and chemical precursors are among the fastest growing segments of these global markets and New Zealand can produce biomass feedstocks to supply these markets.

Scion is connecting New Zealand research, science and technology activities and companies with these industrial biotechnology opportunities. In 2009/2010 the New Zealand – United States Joint Commission Meeting on Science and Technology Cooperation identified bioenergy as a priority area for research and collaboration between the countries (see page 20). This outcome complements agreements with other regions, including the European Union's Framework Programme for Research and Technological Development (FP7), which place strong emphasis on new bio-based product development.

Consistent with these international trends, this year the New Zealand Government released policy positions relating to waste minimisation. Their actions include a $10 per tonne waste levy on all waste sent to landfill. Scion's biomaterials-to-product conversion skill has resulted in a strong partnership with Rotorua District Council to divert municipal biosolids away from their landfill. A proprietary technology platform developed through this partnership and now moving to pilot scale, achieves substantial volume reductions (<95%) and creates options for waste-to-energy and chemical recovery (see page 18).

Goal 4: Maximise the quality and impact of Scion's science
The partnerships touched on above enable Scion to maximise the quality, uptake and transfer of science and technology outcomes. Another crucial factor in achieving this goal is our ability to attract new and invest in existing high-performing employees, a number of whom have been recognised by awards over the past year (see page 22). The cultural diversity of our staff, representing around 29 different nationalities, helps us to build national and international research collaborations that enable knowledge and talent to be developed and shared.

Financial

The 2009/2010 year has been a period of consistently solid financial performance for the company. We achieved a before-tax profit of $3.240 million, which is a notable achievement in the current economic environment and compares favourably with the $2.488 million that was budgeted. A net group loss of $0.978 million resulted from a one-off tax adjustment of $3.170 million.

Strong operational performance resulted in a return on equity before the $3.170 million one-off tax adjustment of 8.2%, enabling Scion to pay a $1.1 million dividend to the Government. Scion's total revenue of $43.493 million was a small decrease on last year and $3.663 million below budget. This shortfall was due to the timing of key funding streams planned for the 2009/2010 year, which were delayed and now are expected to have a positive impact on our 2010/2011 results.

Scion has made a considerable investment in its people in 2009/2010, contributing $0.680 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 $3.437 million, compared to budget of $4.259 million. The unfavourable variance to budget included an additional $0.425 million paid in taxes relating to the strong performance in 2008/2009. Scion finished the year with $6.580 million cash in the bank. This will underpin our investment in capability and infrastructural assets as outlined in our approved three-year business plan to 2013.

Looking ahead

This is my last report as Chief Executive Officer of Scion, a role that I have found immensely rewarding for the past five years. The outstanding success of the organisation is a tribute to the alignment of our Board, the management team and all our staff in seeking to return value for New Zealand. I have been inspired by the passion, expertise, commitment and enthusiasm that these groups have contributed. It has been a privilege to lead Scion and to have contributed to this institute's legacy.

I am excited by where Scion is as an organisation today and what lies ahead. I feel that Scion is extremely well positioned to respond to the Government's expectations of Crown Research Institutes and to deliver even more for 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 who 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 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.

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

The Chief Executive 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

Goal 1. Increase the value and profitability of New Zealand's forests

Scion and the forest growing sector will partner to improve returns to growers, to access new, higher-value markets, and to identify the economic benefits offered by Environmental Services such as carbon sequestration, conservation of biodiversity, erosion control, and recreation.

Expanding forestry's potential

Scion and US biotech company, ArborGen, have extended their collaboration in gene discovery and molecular breeding for forest trees. The relationship, which began in 2006, focuses on developing and applying characteristics such as improved growth and wood quality for both commercial forestry and bioproduct applications.

The ArborGen collaboration has already led to discoveries for enhancing growth and wood characteristics in trees. With one of the world's most extensive tree germplasm resources, ArborGen uses both conventional breeding and advanced genetic technologies to discover and produce high yield seedlings for their customers. Together, Scion and ArborGen are identifying those genes likely to lead to commercial benefit, and the rate of new discoveries will only accelerate.

This year, the collaborative team discovered a gene-trait association that can be used as a marker for selecting elite germplasm for key wood quality traits. The significant association was identified between a specific DNA sequence with growth rate and wood density in a gene that is important for cellular structure.

The work we are carrying out with Scion actually forms our 'Discovery Programme', so the relationship is very important. The partnership is creating exciting synergies for breakthrough discoveries and product development. Even small incremental improvements in growth or wood density across the millions of trees planted annually in the United States and New Zealand will improve productivity, relieving pressure on native forests while meeting an ever growing demand for wood, fibre and energy."
Barbara Wells, Ph.D - ArborGen President & CEO.

Field trial extended for genetic modification

Scion obtained approval from the Environmental Risk Management Authority to use its containment site for another 10 years for trialling genetic modifications to commercial forestry species. New plantings will be used to assess herbicide resistance in radiata pine. The field test will be implemented and managed in accordance with the Ministry of Agriculture and Forestry's biosecurity regulations and Environmental Risk Management Authority controls.

Technology transfer through software

Genetic tree improvement is only one part of the productivity equation for the forestry sector. The two other critical factors are site and silviculture, or management practices. Forecaster is a software package that models the impacts of site, silviculture and genetics on tree and branch growth and wood properties. Forecaster can be used to predict wood value, internal rate of return and net present value of a forestry crop.

Scion and Future Forests Research have been working hard to improve the usability of Forecaster over the past year as the software provides an excellent vehicle for transferring science knowledge to forest managers. New enhancements include the implementation of models for carbon sequestration (C-Change), heartwood volume, and modulus of elasticity (stiffness).

Forecaster has also been expanded to include VMAN, a vegetation management tool that is used by the industry to make decisions relating to herbicide operations. This development is important because it helps forestry companies with Forest Stewardship Council certification to demonstrate best practice with regard to herbicide use.The VMAN model includes data from a recently completed dose-response trial that was fully funded by industry to test a wide range of herbicides on major forest weed species. These data enable the model to provide recommendations on the weed combinations most often faced by end users.

Predicting site productivity
Scion has developed an advanced method of defining site productivity for radiata pine. The method, known as the 300 index, can estimate wood volume for any given site using a specially developed growth model. During the past year, the 300 index was tested to provide validation of the system over the full life (rotation) of a forestry stand, including its ability to predict the outcome of different silvicultural regimes.

Results show that the 300 index is able to make direct comparisons between pruned and unpruned regimes, and can make accurate predictions for genetically improved tree stocks. This tool is valuable because it represents a substantial improvement on the method currently used by forestry companies to measure site quality (i.e. Site Index).

Forest nutrition revisited
To ensure the capacity of a forest to produce timber and non-timber values in perpetuity, sustainable forest management requires that the soil is protected. In 2009/2010, Scion produced a report entitled “Plantation Forest Nutrition” that characterises the important forest soils of New Zealand and their chemical and physical properties. This information, available though Future Forests Research, enables members to ensure sustainable production while improving profitability by refining their nutrition management systems.

Supporting growth of alternative forestry species
For New Zealand forest growers who want to plant species other than radiata pine, information on growth and returns can be hard to come by. This situation is changing through work undertaken by Scion on a range of commercially promising species.

Cypress - In 2009/2010 Future Forests Research released a web-based cypress calculator which enables growers to assess the economics of growing either *Cupressus macrocarpa* or *C. lusitanica*. The Cypress Calculator allows users to locate their land on Google Earth and test a range of forest growing regimes to compare overall economic returns based on yield, log types and carbon stored.

Kauri - A growth model developed by Scion over the past year indicates that kauri has more productive commercial potential than was previously thought. The preliminary growth model, which is based on data spanning many years, shows high volumes on a wide range of sites. It suggests that a 60-year rotation is highly feasible, and could be shortened further by improved tree breeding. The benefit of the kauri model is that it provides growth predictions based on real plantings for the first time.

Douglas-fir - Tree improvement and deployment programmes for Douglas-fir in New Zealand are hampered by an irregular seed crop and difficulty in producing nursery-based cuttings. Scion has achieved a breakthrough in tissue culture that paves the way to developing embryogenesis capability in New Zealand for this species. This capability will enable increased production of improved tree stocks for Douglas-fir growers.

Harvesting research gets major boost
Better growth and management of trees has improved the economics of forestry over the years. However, the costs of harvesting can be a major constraint to profitability, representing about 46% or $32 of the $70 per m^3 cost of a log extracted on a typically hilly site. A successful funding bid by Future Forests Research, heavily supported by Scion, resulted in the industry receiving a major boost for harvesting research aimed at addressing this issue.

The funding comes from the Primary Growth Partnership, a new Government initiative to stimulate innovative research in the primary sector and to encourage higher industry contributions. The harvesting research programme will receive $6.5 million over six years, including industry contributions. This is the first time for many years that substantial investment has been put into harvesting research.

The focus of the new research programme will be on reducing the costs associated with steep country harvesting through improved mechanisation. The programme will create savings averaging $8 per m^3, which will have a major impact on increasing the international competitiveness of the New Zealand forest industry. There is also potential for new technology development in remote controlled machinery. By improving productivity and safety on the slopes, forestry will become a much more attractive proposition, particularly on marginal land.

Cable harvesting productivity
Forest harvesting operations on steep country can contribute over 50% of the cost of wood production in New Zealand, representing one of the highest harvesting costs in the world. Such steep country currently makes up over 45% of the New Zealand forest plantation estate. In order to explore ways of reducing these costs, Scion has developed a productivity model specifically for the cable harvesting systems used on hilly terrain.

The model, which was funded by the Ministry of Agriculture and Forestry provides a starting point for identifying critical areas where interventions could lead to improved productivity. This model will be further developed by adding new operational, systems and human data and by developing productivity relationships through ongoing research efforts in New Zealand and internationally. The project is notable because it is the first time that cable harvesting systems have been modelled in this way.

Protecting New Zealand's forest resources

Maintaining a national biosecurity overview
MAF Biosecurity New Zealand has established a governance panel to oversee biosecurity surveillance and diagnostic services across all sectors. The purpose of this new body is to ensure effective and efficient delivery of surveillance activities to detect new and existing pest risk organisms, and to monitor new and emerging threats. Scion has been invited to participate on this surveillance panel as a representative of the forestry and research sector.

Nectria flute canker - A research programme guided and supported by end users has succeeded in finding solutions to what was a potentially serious biosecurity threat. Scion has conducted research to investigate Nectria flute canker in radiata pine plantations of the Otago, Southland and Canterbury regions since identifying the disease in 2002. Associated with the pathogen *Neonectria fuckeliana*, this disease can result in stem malformation, decay, reduced harvest and value loss in pruned logs.

When the disease first emerged, the unchecked damage amounted to a value loss ranging from US$34 million to US$612 million. After eight years of ecological and operational research, forest growers now have an excellent understanding of how they can adapt their management regimes to reduce damage to their crop. The research programme culminated this year in the production of "*A guide to understanding Nectria flute canker-related defect in mature trees*".

The response to Nectria flute canker in New Zealand demonstrates the value of science in helping to solve the unique problems that are constantly present within biological industries. This result has been achieved with the assistance of the Ministry of Agriculture and Forestry, the New Zealand Forest Owners' Association, the Foundation for Research, Science and Technology, and considerable in-kind support from growers in affected regions through the Nectria Focus Group.

"The Nectria project has worked well because it is a true dialogue. That's how these research relationships work best. The industry has taken the lead in terms of setting the agenda and Scion has worked out the details. Through improving our knowledge of the disease we have been able to adapt our management practices to reduce infection risk. We believe this research has led to a substantial reduction in damaging Nectria infection of our pruned log resource."
Nectria Focus Group, August 2010

Phytophthora - *Phytophthora* species cause some of the most serious plant diseases world-wide in agriculture, forestry and native ecosystems. For this reason Scion, in collaboration with Landcare Research and Plant & Food Research, has an expanding research programme into the potential impact of *Phytophthora* diseases in New Zealand.

One species of *Phytophthora* that causes root rot in young pine trees is already affecting the forest industry. To address this issue, Scion and Plant & Food Research have carried out trials for the treatment of *Phytophthora* root rot in pine nurseries. During the 2009/2010 growing season, two forest nurseries reduced seedling mortality from the 18-30% recorded in previous seasons to less than 0.5% using the most successful of the tested products. The recommended treatment regime has been communicated to forest nursery growers through several different media and has now become operational in forest nurseries with a *Phytophthora* root rot problem.

"If you don't treat phytophthora in time, you can't grow any radiata at all. When infection in our nursery was at its worst, we lost about 150,000 seedlings. The trials we did were valuable because they helped us to establish the correct application rates for radiata and to work out the most effective treatment. Now we spray as a matter of course and last year we lost no trees to root rot."
Warwick Brown – Nursery Manager, Timberlands

Biological control proves promising
When new invasive organisms become established in New Zealand, biological control can offer a sustainable management alternative to long term pesticide use. Scion has a long and successful track record of using biological control agents against forest pests without impacting the natural ecosystem.

Gumleaf skeletoniser - An application to release a parasitic wasp to control the gum leaf skeletoniser, *Uraba lugens*, was approved by ERMA in June, 2010. This is a major step towards control of this pest and culminates over seven years of work funded by MAF Biosecurity New Zealand, the Foundation for Research, Science and Technology, the Forest Industries Development Agenda, the Sustainable Farming Fund, the New Zealand Farm Forestry Association and many small stakeholders.

The gum leaf skeletoniser is an Australian moth that is now widespread in the Auckland region, causing damage to eucalypt trees. The caterpillars also present a human health risk due to their stinging hairs. The moth has spread into the Waikato, Coromandel and Bay of Plenty regions and could thrive in all areas of New Zealand where eucalypts can grow. After extensive research, the most suitable biological control agent was found to be the Australian wasp, *Cotesia urabae*. The wasp is expected to be released early in 2011. The success of the release and ongoing impacts will be closely monitored over the next few years.

Until the effects of the new wasp are demonstrated, Auckland City Council are controlling the gumleaf skeletoniser using stem injection of pesticides directly into significant trees growing in public places. The details of this technique were developed by Scion to enable safe chemical use in urban areas where spraying is inappropriate.

Buddleia – The Chinese weevil, *Cleopus japonicus* was released in 2006 by Scion to control *Buddleja davidii*, a prominent weed in North Island forests estimated to cost the forest industry $3 million annually in lost production and control costs. Since the weevils' release, they have caused heavy defoliation of the weed in several areas of the Bay of Plenty. This promising outcome suggests that the Cleopus weevil may greatly reduce the impact of buddleia on new forest sites and areas of disturbance within natural forests, such as roadsides, slips and river banks.

"Scion and the Bay of Plenty Regional Council released Cleopus japonicus *weevils onto buddleia in forestry near Whakatane in 2006. The insects quickly established and caused significant feeding damage to Buddleia plants. Insects were collected from this site and further released into other areas. In March 2010 Cleopus weevils were found to have naturally spread onto Buddleia growing near Opotiki, 20 kilometres east of the release site. This biological control agent is establishing well in the Bay of Plenty and the project is an example of great collaborative work between the Regional Council and Scion."*
John Mather – Senior Biosecurity Officer, Bay of Plenty Regional Council

Protecting the landscape from fire
Fire represents a risk to New Zealand's forests and rural lands, as well as threatening lives and causing widespread property damage. Scion's rural fire research capability provides valuable support to fire management agencies. During 2009/2010, Scion conducted the first New Zealand fire simulation training course.

This training course was a key step in the contract funded by the Department of Conservation and other fire end users to develop a tool that predicts the growth of fires across the landscape specifically for New Zealand conditions. A number of past New Zealand fires were successfully modelled using data on vegetation (fuel) types and associated fire behaviour collected by Scion over many years. The new tool, developed in Canada and called "Prometheus" will enhance the ability of fire managers to predict the likely spread of wildfires and to make decisions on suppression and community safety.

Goal 2. Optimise the value of marginal land

Scion will lead specific opportunities to realise greater economic benefits from New Zealand's under-performing regional landscape. Scion's science and decision-support tools will enable marginal land owners and policy makers to make land use decisions that optimise economic benefits and mitigate environmental and social impacts. New fit-for-purpose forests and biomass processing technologies will be developed to increase returns from appropriate marginal land sites.

"Acres" of opportunity

Owners of land that is marginally economic for farming face difficult decisions about how to use their property for the best economic and environmental returns. Scion is developing a web-based tool, known as Acres designed to assist land managers and their advisers in making these decisions.

The tool models both the environmental and financial impacts of a variety of land management options, and the effect of integrating those options across a farm. For example, when converting a section of hard hill country to forestry, the financial and environmental outcomes of different forestry scenarios, such as species, planting densities, management, and harvesting dates can be compared. Users will also get a measure of how they may fare under regional emissions trading schemes.

This tool is being developed by Scion, AgResearch and the Ministry of Agriculture and Forestry. Visitors to the Scion site at the 2010 New Zealand National Agricultural Fieldays had the first public viewing of Acres, resulting in keen interest and valuable feedback. Testing and development of the tool will continue until its official release in 2011.

Web tool for eucalypt carbon estimation

Scion has developed a web-based tool that estimates the carbon sequestered by a forestry stand. The calculator focuses on *Eucalyptus fastigata,* which is likely to be an important species because it is relatively fast growing and less susceptible to pest problems than some other eucalypts. Funded by the Ministry of Agriculture and Forestry, the carbon web tool is the most robust method currently available in New Zealand for carbon estimates from a eucalypt forest stand. Investors can use the tool to help them determine the likely carbon value of a forestry stand, which can be gained in addition to the ultimate wood and fibre returns.

National forest productivity maps

The selection of appropriate sites is vital to maximising the value of new forest plantings in New Zealand. This capability will be increasingly important as areas of marginal land are considered for forestry. Scion has developed a model that shows the productivity of sites for radiata pine for any location in New Zealand. Scion has combined advanced statistical techniques with the latest mapping technology to predict volume and height growth for any location in New Zealand. These factors are combined with a number of climate, land use, terrain, and environmental variables to predict forest productivity under a range of conditions. This information is useful for forest owners, investors in new forest planting and policy makers. This tool is delivered to users through the Forecaster software (see page 9).

"We are very excited about the productivity surfaces, which we use for a number of applications including screening of land for planting. For example, if a client comes to us with a portfolio of properties they wish to check out for planting, we can quickly rank these properties in terms of their suitability for forestry."
Jeff Schnell – Forestry consultant, PF Olsen Ltd

Forestry and bioenergy in New Zealand
New Zealand's reliance upon imported liquid transport fuels is a major issue for its future energy security and supply. Currently 90% of transport fuel is imported at a cost of about NZ$6 billion per annum. Scion has conducted research that shows how New Zealand can replace oil imports with biofuel made from home-grown woody biomass on low productivity land. This opportunity has been explored in detail in the "*Bioenergy Options for New Zealand*" study, which was completed in the 2009/2010 year.

Scion has produced a scenario arising from this study that shows how New Zealand could gain a long-term, sustainable alternative to imported transport fuels by establishing 1.8 million hectares of energy forests, an area equivalent to the current plantation forest estate. This highly achievable goal would reap benefits for the economy, the environment and for national greenhouse gas reduction. By utilising some of the lowest value marginal land to produce low-carbon transport fuels, New Zealand can mitigate some of the risks of rising oil prices and reduced fuel availability.

New Zealand researchers aren't the first to recognise the potential of woody biomass for bioenergy production. The United States has committed over US$2.5 billion to the research and development of technologies to convert trees into transport fuels. In January 2010, a high profile delegation gathered in Rotorua to discuss research collaborations that will help New Zealand to leverage this investment.

Hosted by Scion, the meeting was part of the wider programme of the New Zealand-United States Joint Commission Meeting on Science and Technology Cooperation. Delegates met to explore United States and New Zealand research into the opportunities for new bioenergy products and to identify where researchers from the two nations might collaborate to speed their development and deployment (see page 20 for biofuel research).

Photo: Scion CEO Dr Tom Richardson (at right) with Dr Steven Koonin, Under Secretary for Science, US Department of Energy.

"The collaborative work we are conducting with researchers at Scion is a critical component of our work at the Joint BioEnergy Institute on woody biomass. The team at Scion has a comprehensive knowledge base on Pinus radiata *and world-class capabilities around the production of bioproducts and bioenergy from this robust New Zealand feedstock. By forming a research collaboration with Scion we have been able to greatly accelerate our efforts in biomass pre-treatment and hydrolysis of softwoods, and we are developing new technologies together that will benefit New Zealand and the United States."*
Blake A. Simmons, PhD, Vice-President, Deconstruction Division, Joint BioEnergy Institute, USA

Soil maps developed for Maori Trusts
Four Maori land trusts within the Te Arawa region formed an entity called Nga Whenua Oranga mo a tatou Whakatipuranga (NWO) to initiate a soil quality and resource assessment project for improved land use management and decision making. This resource assessment was funded by a Technology New Zealand – Techlink grant.

NWO own approximately 2000 ha of land within the Lake Rotorua district, most of it in pastoral agriculture and some in forestry. The project developed a framework that reflected Maori cultural aspirations and values associated with the land after a korero between Scion scientists and NWO. Scientific indicator groups (soil quality, water quality, and knowledge transfer) were integrated into the framework to support NWO's social and cultural values.

Scion mapped the soils in detail for each land trust, forming the basis for new farm-specific land use capability maps to guide improved land use management and decision-making. Soil quality and water quality was assessed under different land uses. NWO gained first-hand appreciation of the soil mapping and sampling procedures with a field day at each of the four land trusts and a final workshop held at Scion to present the results of the study. Improvements for NWO may relate to enhanced productivity from current land uses, a greater awareness of environmental risks, and better understanding of options for land use diversification.

Riparian land used for kahikatea plantings

An extensive property near Taupo owned by the Tuaropaki Trust has become home to the first known planting of kahikatea in family groups. The Trust operates a diverse range of businesses including dairy farming, and the property contains fenced off riparian areas along small streams and watercourses. The landowners offered a suitable riparian strip to Scion as a site to plant kahikatea for potential seed collection. Five blocks of trees were planted in 2009/2010 as a long term trial to observe family differences within the species. The aim of this project, conducted under Future Forests Research's diverse species programme, is to eventually establish kahikatea plantations for timber production, regeneration of native ecosystems and carbon sequestration.

Returning indigenous forests to marginal land

For marginal land that is remote, steep and not economic under current farming practices, indigenous forests are often a desirable land use. On these lands, the restoration of indigenous forest cover offers opportunities for carbon storage, soil stabilisation and biodiversity. Major limiting factors to achieving indigenous reforestation are lack of appropriate seed sources and early competition from introduced grasses.

To address the challenges presented by indigenous reforestation, Scion studied the dynamics of native plant successions on sites where these are known to be occurring naturally. Results show the potential for managing accelerated native plant establishment on marginal land by manipulating existing vegetation covers, possibly combined with the artificial seeding of desired native species. (For more information on this Capability Funded project see page 31.)

Scion completed a project in 2009/2010 to identify suitable areas for the establishment of indigenous forests. Using the appropriate spatial geographic information system layers, an area of 2,473,608 ha (including 681,502 ha of Department of Conservation land) was found to have potential to be converted into indigenous forest as the most appropriate land use option. Approximately 68% of this area is in the South Island.

Goal 3. Accelerate development of bioproducts from renewable resources

Scion will provide technologies and knowledge to assist the growth of innovative companies making products from forest resources. This work will include ensuring such knowledge is informed through awareness of consumer drivers and potential trade access barriers. With its national and international partnerships, Scion will provide leadership in New Zealand's developing bioenergy, biorefining and industrial biotechnology industries.

Wood processing

A large focus of the 2009/2010 year for Scion was the formulation of a Wood Processing Science and Sector Engagement Plan covering all aspects of product manufacture from wood components. A major feature of this plan was to carry out an assessment of future markets that are predicted to grow rapidly. This assessment enabled the reshaping of science programmes to focus and align research and development activity with future opportunities while maintaining relevant capability for near term industry developmental research. The planning process resulted in the establishment of five technology platforms and the identification of four areas of core science. The technology platforms have and will grow associated industry advisory groups and local and international research collaborations. A key feature of this process has been to identify and collaborate with innovative companies who wish to explore new opportunities for the use of wood fibre in developing new products.

Wood drying research heats up
Projects undertaken for the industry consortium Solid Wood Innovation have enabled Scion to revive its wood drying research programme. Past research has underpinned the growth of New Zealand sawn timber exports, now worth $700 million per annum. This new research promises fresh gains for New Zealand and Australian industry partners within the consortium.

Improvement of timber drying procedures is important for wood processors looking to reduce costs, or increase throughput and improve product quality. Many studies have looked at ways of optimising drying schedules in the past, but they often focused on specific aspects of the process. Over the 2009/2010 year, Scion has conducted studies for Solid Wood Innovation that take a broader view of the relationship between drying schedules, drying cost, drying quality and overall profitability using a "matrix" approach. Results from the study show the potential for significant cost savings and increased production for both high temperature and accelerated conventional temperature schedules.

Potential cost savings can also be gained through improved steam conditioning, which is the final step of the wood drying process undertaken to reduce drying stresses. Scion conducted a laboratory kiln study in 2009/2010 to better understand the stress relief process in wood. Improved understanding of steam conditioning practice will result in significant reductions in water consumption, energy use and processing time, as well as in improvements in product quality and uniformity.

Exploring wood at nano-scale
Drying and rewetting of wood was studied using the Australian synchrotron to understand the effects of moisture on cell walls at molecular level. The synchrotron technology enabled scientists to measure exactly what happens within the cell walls of radiata pine when it is oven-dried and then rehydrated. The results of this project show the crucial role of a very thin trapped water layer between the cellulose fibrils and the surrounding lignin and hemi-cellulose matrix. This fundamental knowledge about the interactions between wood and water is of real value in understanding the best conditions for wood drying.

This project, being completed as part of a PhD thesis, has resulted this year in a paper entitled "*Effect of drying and rewetting of wood on cellulose molecular packing*" published in *Holzforschung*, the International Journal of the Biology, Chemistry, Physics, and Technology of Wood.

Human factors in sawmills
Productivity in sawmills varies considerably both between and within mills, despite all the new technologies in today's mills. A key determinant of productivity is human performance. In 2009/2010 Scion completed the first ever investigation of factors that impact the mental workload of workers within a mill. This study was carried out under contract to Solid Wood Innovation.

The study focused on headrig operators, who are responsible for sawing a log into planks, and whose decisions have enormous impact on the value derived from that log by the mill. Headrig operation is a complex task, requiring vigilance, decision making, coordination and concentration. Scion researched factors influencing operator mental workload and performance in a sample of headrig control cabins. A range of factors potentially impacting on operator performance were identified which, when addressed, could improve mill productivity. These findings are being communicated to Solid Wood Innovation's stakeholders.

Gluing and fingerjointing
The integrity of glued timber products is highly dependent on the skill and knowledge of the manufacturer. Glue bonds must be reliable and appropriate to the degree of exposure of the product. Scion has completed a guide that provides manufacturers with a summary of the latest information to ensure the quality and performance of glued products.

The guide is a compilation of existing knowledge and factors influencing quality of gluing and finger jointing which can be used to improve processing and quality of laminated and finger jointed products. This information assists in the development of detailed best practice operation procedures specific to each site/production unit. The "*Best Practice Guide for Gluing and Fingerjointing*" was produced under contract to Solid Wood Innovation, and was well received by the manufacturing industry.

Technologies to reuse waste

Gaining value from biosolids
The Government's waste minimisation initiative is creating incentives for local government councils to seek new disposal options for managing municipal wastes. Organic wastes from wastewater treatment plants account for up to 15% of all landfilled wastes in New Zealand, and Scion has joined forces with the Rotorua District Council to develop a new approach to the management of these waste streams.

In 2009/2010, Scion completed a study that showed the potential of managing biosolids (sewage sludge) through thermal deconstruction. This process "cooks" the biosolids and breaks them down into re-useable nutrients and a range of other added-value chemicals. In addition, methane can be produced for electricity production. The technology demonstrated the potential to reduce biosolid volumes 30-fold and also substantially reduce greenhouse gas emissions and leachates that arise from this type of waste.

On the strength of this study, the Rotorua District Council approved a proposal to build a pilot plant that will process biosolid wastes from Rotorua's wastewater treatment plant. If successful, a full-scale plant in Rotorua could remove large volumes of waste going to landfill, and ultimately achieve a significant benefit for the council and community. The pilot plant project will be partially funded from the Councils' share of the government's waste levy fund.

"We saw the potential of Scion's Waste 2 Gold technology to not only solve our waste disposal problem but to provide a revenue source from the converted waste. Rotorua has approximately 8,500 tonnes of biosolid waste going to landfill every year at a cost of $900,000. This project has the potential to further reduce all organic waste going to landfill."
Peter Guerin – Chief Executive, Rotorua District Council

Exploring options for biowastes

Scion, Environmental Science and Research (ESR) and Landcare Research facilitated a three day biowastes hui at Te Rununga o Kaikoura Takahanga marae in Kaikoura attended by major stakeholder and end-user group representatives. The purpose of the hui was to explore the local waste management options and sustainability commitment prior to determining community attitudes to reusing biosolids waste.

Kaikoura is an ideal locality for the biowastes project as it is the only local authority in the world to be Green Globe certified. This certification requires a strict sustainability approach to 12 individual environmental and community-based indicators. The hui was a major success because consensus and integration were achieved among key stakeholders and research providers, enabling the biowastes programme to begin the four year research term on a positive footing.

Developing new bioproducts

Greener future for kiwifruit industry

Scion is working closely with ZESPRI to make the New Zealand kiwifruit industry even greener by developing a bioplastic product using kiwifruit waste. A prototype bioplastic spife has been developed from corn-based bioplastics and residual kiwifruit. The spife (spoon-knife) is a clever tool sold with retail packs of fruit and used by consumers to cut and scoop kiwifruit. The bio-spife helps utilise waste kiwifruit and provides a unique selling point that can be marketed to eco-conscious consumers. Scion and ZESPRI are now looking to scale up production of the bio-spife for customer product trials.

Currently, thousands of tonnes of kiwifruit waste are dumped each year. These valuable raw materials could be converted into bioplastics and used to make a range of innovative new products, including packaging products. The bio-spife points to the potential for replacing conventional plastics used in kiwifruit growing and packaging with fully biodegradable or renewable bioplastics. Scion has partnered with ZESPRI and a packaging manufacturer to look at replacing petroleum-based plastics in the wider kiwifruit value chain.

"ZESPRI wants to make it easier for consumers to deal with waste from its products as part of our wider environmental awareness. Our aim is to create bioplastic packaging, including the spife, that can be disposed of with the skins. Customers are more conscious of where their food comes from and what its environmental footprint is, so it is vital for us to continue this type of research and development."
Alistair Mowat – Innovation Leader, ZESPRI

Packaging award

The Biopolymer Network is a collaboration between Scion, AgResearch and Plant & Food Research that demonstrates the power of scientific partnerships. An environmentally friendly biofoam product developed by Scion and AgResearch scientists under contract to the Biopolymer Network won an environmental packaging award from the Packaging Council of New Zealand in 2009/2010. This award recognises the polylactic acid foam as a technology that minimises the environmental impact of packaging through replacement of polystyrene. The Biopolymer Network has been working closely with three international plastics manufacturers as it moves towards commercialising this technology.

Wood fibre composite manufacturing

Bioplastics and wood fibres can be combined to create a large range of new product opportunities. A wood fibre plastic pellet produced by Scion as a feedstock for wood polymer composites underwent its first successful mill trials in 2009/2010 by a large producer of medium density fibreboard in Europe. Ongoing trials and evaluation of the technology hold promising commercial opportunities for New Zealand companies.

Partnerships in biofuel research
Technologies to convert New Zealand grown softwoods and hardwoods to transport fuels is rapidly progressing towards commercialisation driven by research investment overseas. New Zealand is linked to these efforts via a range of important partnerships and initiatives.

Early in 2010, Scion announced the signing of an agreement with Sandia National Laboratories in California aimed at focusing cooperative research on the development of low-carbon energy technologies. The new collaboration with Sandia will explore key research topics important to both organisations. Such topics include biofuels supply chain analysis, renewable energy and alternative transportation fuels, and modelling and systems analysis of energy resources. Sandia is engaged in a wide variety of transportation energy research activities. Sandia has worked extensively with General Motors and enjoys a long standing relationship with all the major US automakers. This collaborative agreement provides a tangible example of how New Zealand can contribute to and benefit from international efforts to solve global issues.

Also during 2009/2010, Scion reached an agreement with the Joint BioEnergy Institute, one of the three US federally funded bioenergy institutes. This agreement enables the first joint experiment relating to development of pre-treatment processes for lignocellulosic biorefineries, the manufacturing technology by which biofuels from woody biomass will be produced. This research is being supported by a New Zealand International Science and Technology Linkages award.

Biorefinery processes
Lignin is a major component of wood, and a significant by-product of wood processing. To develop commercial uses for lignin as a potential feedstock for new plastics and resins, Scion has commenced a research programme funded by the International Investment Opportunity Fund. Collaboration with the VTT Technical Research Centre of Finland and others has progressed over the past financial year with two joint projects. One project focused on using purified enzymes to break down different lignin materials, the other applies life cycle assessment techniques to examine the environmental performance of lignin-based products. For more information on this research programme see page 32 (Capability Funding).

Research by Scion into aspects of the pre-treatment process achieved a milestone this year by genetically identifying enzymes secreted from microbes living in a termite gut. This research on enzyme discovery offers potential new technologies that break down woody material as part of the biorefinery process.

Investigating bioenergy options
Scion has a new research programme focused on “torrefaction”, a technology for heating wood chips in an oxygen-free environment to create an energy-dense product. This research is conducted using a new facility for high temperature treatment of wood developed by Scion. The wood fuel resulting from this process does not absorb water and is easily broken down into smaller particles. It can potentially be used to replace coal in furnaces, thereby offering a carbon-neutral alternative to heating systems based on fossil fuels.

Measuring resource efficiency
Scion provides expertise on life cycle assessment that is increasingly used to guide policy and regulatory requirements aimed at resource efficiency and productivity.

Over the 2009/2010 year Scion, Victoria University of Wellington, and Environmental Resources Management Limited conducted an assessment of overseas lifecycle inventory database initiatives**.** Results of this study will guide the Ministry of Economic Development in creating a New Zealand-specific life cycle inventory database that will support New Zealand’s businesses to deliver more efficiently. In doing so, New Zealand businesses will be able to: identify and realise opportunities to improve their productivity; differentiate their products from competitors based upon environmental

credentials; and meet retailer demands for information on the environmental credentials of their goods and services, thus enabling them to trade in overseas markets.

Scion is an active member of the primary-industry-based Life Cycle Management Centre (hosted by Massey University) that has been funded by the Ministry of Agriculture and Forestry to support national-level capability growth in this area. Scion also participates in the Life Cycle Association of New Zealand, which will provide coordination of broader Life Cycle Assessment activities across all practitioners in this country.

Bioproducts for improved water quality

A modified mineral product developed by Scion and Blue Pacific Minerals for improving lake water quality was further tested over the past year. Lake Okaro received a second application of the modified zeolite product as part of the Bay of Plenty Regional Council's campaign to reduce algal blooms in Rotorua lakes. Scion's technology modifies the zeolite with a benign polymer that increases the mineral's ability to adsorb phosphorus and other nutrients. By applying the product as a sediment cap in the lake, it effectively traps the nutrients.

The latest full lake test used a finely ground powder version of modified zeolite and a different delivery mechanism to achieve better sediment coverage and longevity of performance. The initial results have been encouraging. The fine material has formed a comprehensive capping layer over the lake bed, which has been confirmed by NIWA and the University of Waikato monitoring, including video surveillance. The pattern of regular summer algal blooms in Lake Okaro has been broken for the first time in more than 20 years.

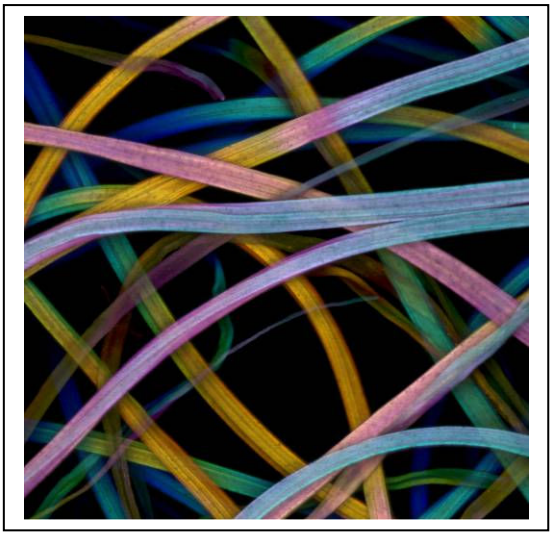
Goal 4. Maximise the quality and impact of Scion's science

Scion will invest in its high-performing individuals and teams. Scion will ensure its research environment and infrastructure supports collaborative arrangements and encourages open access to its own and others knowledge and facilities. Through targeted industry partners and innovators, Scion will maximise the uptake and transfer of science and technology outcomes.

Recognising high performance

Success in the Small World

Scion microscopy specialist, Dr Lloyd Donaldson received a winning place in the Nikon "Small World" international photographic competition. His image, which featured in the 2010 Nikon Small World promotional calendar, shows sharply defined cotton fibres at high magnification. Small World is regarded as the leading forum for showcasing the beauty and complexity of life as seen through the light microscope. The competition, which Nikon has been running for 30 years, is aimed at rewarding the world's best photomicrographers who make critically important scientific contributions to life sciences, bio-research and materials science.



Services to forestry recognised

Scion researcher Nick Ledgard received a Queen's Service Order for services to forestry in the 2010 New Year's Honours List. This honour recognises Nick's contributions through a career spanning over 40 years. His main area of interest lies in woody species in mountainlands, including production and protection of high country forestry, and the management of wilding conifers. While these skills are increasingly relevant in New Zealand as focus turns to the utilisation of marginal land, Nick has also made his mark among the highest mountains of the world. He has managed the Himalayan Trust's afforestation project in the Khumbu region of Nepal since 1989.

Outreach and communication

Scion welcomes Green President

In September 2009, Scion welcomed His Excellency Dr Laszlo Solyom, President of the Republic of Hungary, as part of the President's state visit to New Zealand. The President's visit was an important step in the process of building closer research, science and technology relations between New Zealand and the European Union. NZ-Hungarian research collaborations exist at the EU level through the Science and Technology Cooperation Agreement (COST). Scion collaborates with Hungary on the COST Action FP0602, Biotechnology for Lignocellulosic Biorefineries. The Hungarian President is deeply committed to sustainable development, which led to the Hungarians' request to include Scion in his itinerary.

International Phytophthora gathering

The 5th International Union of Forest Research Organisations (IUFRO) Phytophthora working party meeting was hosted by Scion, Landcare Research and Auckland Regional Council in Rotorua. This meeting brought together scientists from 14 countries, attracting higher interest than expected due to the growing impact of Phytophthora worldwide. A strong contingent from MAF Biosecurity New Zealand also attended the meeting, with special focus on preventing the spread of diseases between countries.

Forestry and energy take the world stage
A number of Scion staff presented at the XXIII IUFRO World Forestry Congress in Argentina, joining the large gathering of 7,500 delegates from 160 countries. New Zealand had a strong presence at the Congress with Hon David Carter, Minister of Agriculture and Forestry, in attendance. Scion's Dr Tim Payn was invited to chair the drafting committee that summarised the findings of the conference and delivered them to the full Congress at the closing ceremony.

The World Congress provided the perfect forum for launching the revised criteria and indicators for the Montreal Process, an international initiative aimed at ensuring sustainable forest management worldwide. An overview report of the Montreal Process, produced by Scion on behalf of the 12 member countries, was distributed to delegates.

Scion bioenergy scientist, Dr Michael Jack was invited to review the Inter-Governmental Panel on Climate Change's special report on Renewable Energy. This report provides a comprehensive overview of potential renewable energy resources, technology status and renewable energy's potential contribution to climate change.

Supporting collaboration
A multi-organisation research team consisting of New Zealand's top gene mapping statisticians and geneticists has been formed by Scion to develop new statistical methods for gene mapping sciences in the medical and primary sectors. Known as the "Virtual Institute of Statistical Genetics" (VISG), its collaborating organisations include Plant and Food Research, Environmental Science and Research, the Universities of Otago and Auckland, ViaLactia Biosciences, AgResearch and Scion.

Although still in its early stages, the project has succeeded in developing a new model for multi-organisation collaborations and incorporated online eResearch-based tools to enable interaction using the KAREN network. In 2009/2010 VISG created a website to profile its activities (see www.visg.co.nz).

Building international networks
Scion actively participates in international networks aimed at building science capacity to underpin development of a bioeconomy. The 2009/2010 year has seen momentum build with "TRANZFOR" collaborations as part of the European Union International Research Staff Exchange Scheme (IRSES). Scion's exchange programmes in the TRANZFOR programme are focused heavily on Forests and Climate Change activity.

Scion hosted a number of important visitor groups during the year, including a delegation from the Chinese Ministry for the Environment; a Chilean delegation on Carbon Footprinting; and a delegation of three key staff from the Chinese Academy of Forestry and the Institute of the Chemical Industry of Forest Products in Nanjing.

Senior Scion staff received Ministerial funding support for collaborative visits to China and Chile focused on progressing bio-product opportunities. Scion also participated in a Focal Point Programme Renewable Energy Mission to the Republic of Korea.

Significant publication
Scion entomologist, Dr Eckehard Brockerhoff, co-authored a paper in *Ecology Letters*, one of the world's top ranking ecological journals. The research results enable a better assessment of the role of host range and host specificity of tree-feeding insects and assist with enhanced risk assessment of invasive insects or native insects colonising exotic trees.

The reference for this publication is: Bertheau, C., **Brockerhoff,** E.G., Roux-Morabito, G., Lieutier, F., Jactel, H. 2010. "*Novel insect-tree associations resulting from accidental and intentional biological 'invasions': a meta-analysis of effects on insect fitness*." Ecology Letters.

Scion produced a summary of a workshop sponsored by the Organisation for Economic Cooperation and Development (OECD) on managing global biosecurity threats to forests. This workshop was part of the International Forest Biosecurity Conference hosted by Scion in March 2009. This document, produced as a supplement to the *New Zealand Journal of Forestry Science*, provides recommendations to the OECD on mitigating global biosecurity risks. A key recommendation was to seek a worldwide ban on the movement of potted plants and develop safer processes for trading in live plants and plant products.

Education

Scion has formed a partnership with Nga Pae o te Maramatanga to jointly fund internships and a masters project for Maori students. The first two interns successfully completed their projects during the 2009/2010 year. One project involved designing a chair using biomaterials encompassing aspects of Maori culture for use on the marae. This project, completed by Maori intern Jamaine Fraser, won a student prize in the Waikato Sustainable BioEconomy Poster Conference. The other project investigated plants that could be established in riparian strips and used for traditional or craft purposes.

Scion signed a Memorandum of Understanding with the Waiariki Institute of Technology in April 2010. Together, Scion and Waiariki aim to identify joint research projects that provide hands-on experience for students and an additional research resource for Scion.

Sponsorship

Scion provides sponsorship for community and staff activities, with a particular focus on opportunities to promote science. Sponsorship highlights of the 2009/2010 year include:

- Scion supported the voice of youth at the Global Climate Change Conference in Copenhagen by sponsoring Rotorua High School student Phoebe Hunt to attend. Phoebe was one of five students selected throughout New Zealand by UNICEF to attend the Children's Climate Forum before the main conference of parties. The youth delegation included 160 representatives of 44 countries.
- Nicole Woodsworth from Rotorua Girls' High School, was selected as the 2009 Scion Suffrage Centennial Scholar. Scion offers its Suffrage Centennial Scholarship annually to encourage greater numbers of young people, particularly young women, into a career in science.
- Scion maintained its ongoing presence at the Bay of Plenty Science and Technology Fair in Rotorua. As well as providing judges, Scion annually awards a prize for the best wood or tree-related exhibit. This year it went to Christian O'Neill from Tauranga Intermediate for an exhibit entitled "Wood it be stronger?"
- Scion became a sponsor for the New Zealand Notable Trees Trust, a charitable trust dedicated "to acknowledging New Zealand's notable tree heritage". The New Zealand Notable Trees Trust has compiled a nationally-important register that locates and identifies New Zealand's venerable trees, both exotic and native. The New Zealand Notable Trees Trust continues work started by the New Zealand Forest Service to collect and preserve these important records. The register makes a major contribution towards an international seed bank.
- Scion supported the Tane's Tree Trust in holding their 10 year anniversary conference.
- University of Auckland students at the School of Architecture were recognised for their creative talent through three awards sponsored by Scion. The winning designs showed innovative use of timber in public building designs.

Managing Facilities

Infrastructure investment
Scion was proud to host Rotorua's mayor, Kevin Winters, and councillors from Rotorua District Council to mark the opening of a new laboratory for Waste 2 Gold research. The laboratory provides a focal point for research funded by the Rotorua District Council which aims to reuse biosolid wastes from the Rotorua Wastewater Treatment Plant (see page 18).

The new laboratory houses a high pressure reactor used to process the waste. This reactor is essential for running experiments at higher temperatures, so research can investigate end-products arising from the thermal deconstruction process. Much of the specialised equipment needed in this laboratory could not be purchased off the shelf, so was developed in-house by Scion staff.

Capital expenditure investment has seen an upgrade of equipment in Scion's chromatography laboratory. A new Gas Chromatography Mass Spectrometer was combined with a pyrolysis unit, making it possible to measure gases, liquids and solid samples. It can also examine the "head space" above a sample by measuring the vapours it is giving off, which is useful for certain liquids and packaging materials.

The installation of a new Ultra High Pressure Liquid Chromatography unit makes it possible to process samples more quickly and cost effectively. Widely used by a range of groups within Scion, the new instrumentation is particularly useful in the growing disciplines of biotransformation and green technology research to analyse the chemical makeup of substances.

Scion has also invested in a new high-resolution confocal microscope that expands important capability regarded as key to many projects. Confocal microscopy allows imaging of plant tissues and biomaterials at high resolution and in three dimensions. It is an integral tool to understanding the structure of wood and wood based materials, fibres, plant tissues, fungi, plastics, adhesives, paints and coatings, and contributes to many fields of research at Scion.

Scion's Environmental Performance for 2009/2010
Sustainability is a key component of Scion's strategy. The values and goals of the organisation face outwards to deliver economic, environmental, cultural and social benefit to New Zealand. The company's Sustainability Policy, put in place in 2009/2010, turns inward to address the effect of Scion's business activities on water resources, future land use, waste reduction, and the local community. Two full years of data collection now enable progress to be measured against the environmental indicators articulated in the policy.

As a result of recycling, overall waste to landfill has reduced by at least 50% since 2004 when an estimated 19 m^3 per staff member was landfilled. Over the past year, an average of 1470 kg of organic waste was diverted from landfill to on-site vermicomposting.

Scion's on-site recycling centre diverts plastic and glass drink and milk bottles, aluminium cans and more recently steel cans from landfill. Cardboard and paper are also recycled on-site. In the past year, a dedicated space was set up for recycled office stationary so staff can exchange stationary and office equipment without purchasing new or having to throw away unwanted office material. Full recycle schemes are also in place for all types of toners and replacement parts for printers, photocopiers, scanners and faxes.

On average, 3 m^3 of paper, 10 m^3 of cardboard and 1 m^3 of plastic drink bottles are recycled per month. During 2009/2010, 23 kg of aluminium cans and 74 kg of lead batteries were recycled. The vermicompost site continues to consume tearoom and café organic wastes and now produces worm juice and vermicasts for garden use.

Scion staff also focussed on energy, waste and consumables reduction in the past year. The focus on gas usage is the main reason that Scion's carbon footprint has reduced when compared with 2008/2009. The reduction in recycled paper is most likely due to the introduction of default double-side printing where possible.

Good Employer and Equal Employment Opportunities Reporting

Scion's strategic goal "Maximise the quality and impact of Scion's science" is underpinned by policies, programmes and practices that address:

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

Safe and Healthy Environment

Scion has an active Health and Safety Representative Committee supporting proactive workplace inspections, hazard identification, induction completion, incident reporting and injury prevention. Independent training is provided to representatives every two years, supported by internal coaching and updates by Human Resources. Personal responsibility is promoted through inclusion of health and safety objectives in all position descriptions and personal performance plans.

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

The table below shows figures relating to health and safety matters over the past year.

	Serious Harm	*Incidents/Injuries*	*Near-Misses*	*Return to work plans*	*Potential Hazard*
Total 2009/2010	**3 ***	**14**	**23**	**7**	**2**

* Scion reported these incidents to the Department of Labour, which investigated and deemed all three incidents to be not serious.

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). Robust recruitment and selection systems are in place to ensure an impartial, transparent process focussed on selecting the best person for the job.

Leadership, Accountability and Culture

Scion is committed to continuously improving leadership capabilities in alignment with the organisation's Strategic Business Plan, through fostering flexible, collaborative, high performing teams and individuals.

Throughout 2009/2010 Scion invested in an externally facilitated three-day workshop, "Radical Collaboration". The workshop aimed to strengthen skills and understanding relating to collaborative intention, truthfulness, self-accountability, self-awareness, negotiating and problem solving. All Scion's Executive Management Team and high-performing high-potential staff participated in this programme, which underpinned Scion's performance review process by raising self-awareness and strengthening collaborative behaviours among staff.

Understanding employees' levels of satisfaction and engagement at Scion was measured in the biennial Climate Survey conducted by John Robertson and Associates. Overall, the results indicated a consistent upwards trend, compared to previous surveys, across all sections. Particularly pleasing was the increase in the two target areas following the 2007 survey – employee alignment to vision and values and dealing with poor performance. An organisational action plan has been put in place to address focus areas identified in the 2009 survey.

Employee Development, Promotion and Exit

The development needs of all employees are identified during the annual performance review process. A range of in house learning and development opportunities were provided to employees including training courses on:

- Coaching skills for team leaders;
- Financial management;
- Negotiation skills;
- Getting organised;
- Presentation skills;
- Business case writing;
- Belbin team roles; and
- Myers Briggs Type Indicator.

Scion regularly supports employees to pursue ongoing education and achieve higher qualifications. A number of employees are currently progressing towards their PhD with one successfully completed in the past year, by Nod Kay. His thesis entitled "*An experimental evaluation of resource allocation in island plants with respect to their invertebrate herbivores*" explored how island ecosystems with relatively simple food chains protect themselves from insect invaders.

Scion supported a total of 74 employees to attend international conferences and 154 to attend domestic conferences during the year.

Remuneration, Recognition and Conditions

Scion's remuneration system applies a best practice approach to align key processes and create clarity and transparency. During 2009/2010 two initiatives focused on moving towards a consistent remuneration practice for all employees were implemented. The first initiative was the extension of three days of company holidays to all permanent employees. The second initiative was the buy-out of the at risk remuneration component for 18 non-executive employees.

Scion operates a job size review committee that comprises employees, management and union representatives from across the organisation. Each committee member is trained in job size methodology and together they ensure that job sizing reflects the institutional knowledge of job design at Scion. Forty jobs were sized by the committee this year.

Scion's remuneration system clearly reflects a link between pay and performance. Following consultation throughout 2008, Scion embedded a remuneration approach that links annual remuneration review to each employee's performance as assessed in their annual performance review.

Staff recognition includes long service recognition awards, long service leave, the biennial Chairman's Awards, and Emeritus Status, which honours retiring scientists for their distinguished long-term achievements and contributions to Scion.

The Scion life insurance scheme was drawn on during the year for the family of one staff member who died in 2009.

Flexibility and Work Design

Flexible work arrangements and work-life balance continue to be an integral part of Scion's employment brand. During the past year changes in working hours were agreed with 13 employees who requested reduction in working hours and five employees who requested an increase in working hours.

Thirty-two employees were given extended leave (leave without pay in excess of paid annual leave) to pursue non-work related interests such as overseas travel or child-care during school holidays.

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.

The measuring of collaborative behaviours in the annual performance review has further enabled Scion to address early indicators of unacceptable behaviour that may lead to harassment and bullying.

Scion has also established within its learning and development plan the provision of both in-house and external coaching services for any potential issues faced by employees and managers. Three working relationships with in-depth conflict issues were resolved using this coaching facility.

Scion employees are further supported with any workplace or personal concerns through the provision of Workplace Support Services (on site) and Employee Assistance Programme Services (offsite). There were 77 visits with the Employee Assistance Programme and 140 interactions with Workplace Support.

Workplace Profile

As at 30 June 2010:

- Total permanent employee complement of 337, consisting of 187 males and 150 females;
- Maori represent 5% of permanent employees;
- 4% of employees are recorded as disclosing a disability;
- 29% of employees are in the under 40 years age group, 33% are in the 40 to 49 years age group, and 38% in the 50 years and over age group; and
- 34% of employees are recorded as disclosing a nationality other than New Zealander or Maori, and represent 29 nationalities.

Scion's Capability Funding

Each year, the Minister of Research, Science and Technology provides each Crown Research Institute with funding *"to support the distinctive role of the Crown Research Institute to maintain the strategic organisational and scientific capabilities required for the provision of public good science and related activities in New Zealand".*

Scion's Capability Fund portfolio supports delivery of Scion's four strategic goals, particularly those activities where there is an identified need to build capability and no other support is available.

Harvesting
Forest harvesting operations comprise 46% of the overall cost of a log extracted on a hilly site. It is very labour intensive and physically very demanding. With an increasing amount of New Zealand's commercial forest resources on steep slopes (over 20 degrees) estimated to be 58% of forested land by 2020, the cost and complexity of tree harvesting in New Zealand will continue to rise unless there is successful intervention to reverse this trend.

The 2009/2010 Capability Fund Harvesting Project was designed to complement the Future Forest Research industry-led programme. The Scion programme directly addressed human capability development in the environmental aspects of harvesting, investigation into some operational interventions, gaining experience with remote machine management and supporting completion of a Doctoral project.

Looking ahead: This programme has been modified to complement the new programme funded by the Primary Growth Partnership and industry managed by Future Forests Research. It focuses on developing remote controlled machines that can function on slopes and high speed extraction systems. It will strengthen the interface between Scion and the industry whilst building a new relationship with the Mechatronics Group at the University of Canterbury.

Genetics and propagation
Scion needs an effective capability base in genetics and propagation to translate much of its tree development research into viable solutions. This capability is also needed to sustain a credible interface with important national and international collaborators and end-users such as ArborGen and Radiata Pine Breeding Company. With a growing emphasis on developing new commercial or amenity species in New Zealand such as Douglas Fir, Eucalypts and Cypresses this specialist capability is becoming increasingly important.

Capability Funding has been used to investigate techniques for propagating a range of exotic and indigenous species that cannot be scaled to meet significant increased demand for seed using current nursery techniques. The viability of using alternatives such as rooting cuttings, tissue culture and stool-beds for podocarps and hardwoods (e.g. Beech) has been investigated, with promising results for kauri.

Looking ahead: Capability Funding will continue to build new knowledge in propagation of non radiata species to support the Minister of Agriculture and Forestry's vision that by 2025 at least half of New Zealand's commercial forests will be species other than *Pinus radiata*.

Molecular biodiscovery
Better knowledge of genes involved in biotechnology applications converting biomass to useful end products can lead to significant commercial opportunities. Scion is conducting a discovery project to develop capability in identifying suitable genes based on sequence databases, followed by their isolation and subsequent characterisation of the function of the gene product. To test the concept, genes in *Pinus radiata* that are associated with the production of terpenes (hydrocarbons), have been isolated and examined. This project has developed capability in molecular techniques within Scion.

Looking ahead: This project will allow development of critical capability within Scion in the area of gene/enzyme discovery applicable to industrial biotechnology. The work will be extended to building capability in secondary metabolite and more particularly resin acid and terpene metabolic pathways and gene discovery.

LiDAR – the use of Light Detection and Ranging in forest inventory
Scion is building capability in the utilisation of LiDAR (Light Detection and Ranging) to develop new forest inventory methods with a particular focus on carbon stocks. Although already used internationally, LiDAR is an emerging technology in New Zealand. Having relied on external expertise in the past, Scion has recognised the need to develop LiDAR capability in-house, so New Zealand-specific metrics can be produced.

In 2009/2010, Scion used LiDAR to locate and measure individual trees without the need for ground measurements by field crews. Ultimately Scion will create an accurate inventory of stand tree volumes, carbon and future biodiversity indices across the entire landscape, a particular challenge for marginal land.

Looking ahead: The project will extend to inventory analysis in environmental and production forestry. An important outcome of this second year will be to strengthen Scion's association with industry and to gain direct industry support for continuing this work.

Dutch Elm disease
Dutch Elm disease is one of the most devastating tree diseases in the world and MAF Biosecurity New Zealand considers it to be one of the 20 worst pests to have arisen in New Zealand. In the absence of a control programme the disease would be expected to wipe out over 90% of elms in New Zealand. Capability Funding was provided for this project in recognition of a major research gap in New Zealand, namely the protection of New Zealand's urban forest.

Scion is using Dutch Elm disease as a model system to develop capability and evaluate options for novel biological control methods. The results from this year's work have been presented to the Dutch Elm Disease Committee, which includes representatives from SPS Biosecurity and City Councils.

This project has also created a national competency to consider non chemical pathways in biosecurity applications. The recent outbreak of fungus infecting a kauri tree just 500m away from Northland's iconic 2000-year-old kauri Tane Mahuta highlights the importance of finding alternative ways to control disease, and retaining capability within Scion to provide solutions when such problems arise.

Looking ahead: The programme will continue the proof of concept experimental programme and promote the research at a national level.

Sustainable economics
Scion is exploring ways of realising the potential economic benefits offered by environmental services of planted forests including carbon offset, recreational uses, increased biodiversity, avoiding erosion and improving water quality. This approach is consistent with the Government's desire to develop market mechanisms for environmental services such as the Emissions Trading Scheme and biodiversity offsets.

The University of Washington has developed an auction mechanism known as ECOSEL for enabling the sale of environmental services. This tool allows modelling of the ecosystem component to meet individual needs. ECOSEL has now been applied in New Zealand for the first time through this Capability Fund project. The key activity has been planning and execution of two mock auctions designed to explore the value people place on environmental services in a forestry context. The feedback from those who participated in the mock auction was encouraging as ECOSEL's suitability to provide environmental services was rated at a level somewhere between "highly recommended" and "use it in concert with other tools".

Looking ahead: A further mock auction will be held, based on knowledge obtained from the auctions held in 2009/10. The outcomes will be presented to key stakeholders.

Native forests on marginal land

Indigenous woody cover is an important land use option for marginal land in New Zealand that is steep and not easily accessible. To better understand the potential for re-forestation of remote areas, Scion carried out a preliminary investigation of the factors governing the successful establishment of indigenous forests on marginal land. This project aimed to develop capability in establishing long lasting indigenous woody vegetation covers on marginal land, with a particular emphasis on the use of artificial seeding (see page 16).

This work is linked to another Capability Fund project "Land use optimisation" and forms the basis for new funding in conjunction with Landcare Research within the Ministry of Agriculture and Forestry's Sustainable Land Management And Climate Change (SLMACC) Fund. The proposal "Development of resilient new indigenous forest systems to mitigate climate change" received funding to provide guidance to landowners, land managers and policy makers on how to establish indigenous forests on different types of marginal land; enhance carbon sequestration rates; and mitigate against potential climate change risks.

Looking ahead: The role of exotic nurse crops will be further evaluated and the outcomes of the work used to strengthen end-user engagement. A focus for this project will be to ensure effective succession planning for key staff.

Land use optimisation

Scion has recognised the potential value to New Zealand of defining the benefits from better utilising marginal land area within New Zealand (new biomass sector, environmental protection and social benefits). A Capability Funded project was initiated to identify needs and opportunities which would be used to build a detailed science and user engagement project.

The scope of marginal land use research was widely reviewed both within Scion and externally (with New Zealand Trade and Enterprise, Ministry of Agriculture and Forestry and the forest industry) to ensure there was sufficient impetus to develop a research platform in this area. An operational/capability plan was developed, with a focus on key client engagement.

Phase two focused on five key focus areas:

- development of a carbon toolbox;
- technologies for web-based knowledge transfer;
- establishment and growth of native woody species on marginal land (see above);
- small scale high tech distributed industries; and
- database infrastructure, spatial data, model libraries and geographic information systems.

The project has resulted in a much clearer understanding of what work relevant to marginal land use is being undertaken within Scion and which stakeholder groups require higher levels of engagement by the organisation.

Looking ahead: The focus of this project will shift from planning to implementation through increased engagement with stakeholders, identification of economic development groups, cementing of the collaboration with AgResearch and developing an opportunities pipeline.

Water footprinting
Scion has undertaken a project to develop new capability in water footprinting, which is a system used to consider the appropriate use and management of water resources for production systems. The initial focus was increasing Scion's understanding of methodologies available and how they might be applied in the forestry industry.

In the 2009/2010 year, the focus of the project has been to review available methodologies, and to apply appropriate methodologies to a hypothetical forestry supply chain in New Zealand. Scion has also built a relationship with Landcare Research in landscape/catchment end point considerations with Scion contributing knowledge around processing.

Scion can use this new capability, along with existing capability in life cycle assessment, to leverage strategic partnerships, embed environmental metrics in technology development and penetration, and to foster internal and external collaborations.

Looking ahead: The focus of this project will be on case studies, joint supervision of a PhD student with Landcare Research and promoting the capability across Scion to demonstrate its application to forestry and product research areas.

Lignin
The exploitation of lignin as a high value chemical is pivotal to the successful development of biorefining biomass from trees. With lignin representing about 25% of the mass of most woody biomass it is important that special opportunities be developed for this material.
Scion is using Capability Funding to find ways of manipulating lignin as a renewable resource and thereby discover opportunities for it as a high value chemical or material.

The project has explored three routes to developing bio-plastics from lignin. The first two are chemical and enzymatic routes to break down the lignin into component parts that can then subsequently be reassembled into bio-plastic, or bioplastic/resin precursors. The third route is to develop reactive material using what is essentially a one stage reactive extrusion approach.

Scion's skill base in enzyme applications, bio-discovery, lignin modification and bio-plastics performance has increased amongst several scientists, which has also resulted in two well received papers in Europe. Dr Aynsley Hickson was successful in gaining Foundation for Research, Science and Technology funding to explore novel ways to directly isolate specific enzymes associated with lignin degradation from forest ecosystems.

In addition to enhancing Scion's capability in this area the project has enabled Scion to formally partner with the Finnish Lignival programme led by VTT and the European Cooperation in Science and Technology Action on biotechnology for biorefineries. This participation in a large programme of research across multiple partners has allowed access to any new technologies developed. Scion has also been able to gain substantial new funding to support associated activities and development of a new leader.

Looking ahead: The project will build on work undertaken over previous years and sustain the explicit target of developing new value-added lignin products with commercial potential to support Scion's vision of strengthening the value proposition for biorefinery development in New Zealand.

Renewable energy
International and national activities demonstrate that bioenergy will continue to be an important strategic focus for New Zealand's future. However, this remains a highly dynamic area with respect to New Zealand research funding and policy development. External investment constraints for research leaders, such as Scion, have challenged its ability to maintain critical depth in this arena. For this reason, Scion has chosen to invest in bioenergy research and skills retention through the Capability Fund.

This investment has allowed Scion to strengthen New Zealand's knowledge base on the technical and commercial challenges for implementing a sustainable bioenergy sector. It has also allowed the assessment of specific technology opportunities, such as thermal stabilisation of biomass (i.e. torrefaction), and more fundamental science (i.e. thermodynamic and systems analysis) to be undertaken. These activities have ensured New Zealand's international reputation and credibility in important aspects of the bioenergy space is maintained and has provided strategic direction for further research and investment.

New partnerships have been developed with GNS Science in integrating geothermal energy and biomass in producing liquid fuels. International relationships with Sandia National Laboratories and the Joint Bioenergy Initiative in the USA have also strengthened process modelling and systems analysis capability.

A new Post Doctoral Fellow, Dr Katherine Challis, is investigating the fundamental limits to the thermodynamic efficiency of ethanol production from lignocellulosic feedstocks, an important approach to support process optimisation.

Looking ahead: The project will focus on two key areas. Firstly the application of exergy analysis to biofuel production chains with the aim of selecting promising technologies or identifying potential inefficiency hot spots for technology development. The second component is to further develop technologies for thermochemical upgrading of forest residues as a fuel for commercial development.

High throughput characterisation
Scion aims to identify radiata pine genotypes that will be used for the establishment of fit-for-purpose forests geared towards the production of bioenergy. This project was established as part of a collaborative research partnership between Scion and the BioEnergy Science Centre of the US Department of Energy. The research aligns with Scion’s strategic goals by providing information that will help select genotypes for biofuel and biorefinery applications; planting on marginal land for the establishment of forests for bioenergy production; and production of core feedstock for biorefinery operations and biofuel and co-product production.

Looking ahead: This project was completed in 2009/2010 and although further investment could create further desirable outcomes, investment has been prioritised into other Capability Fund projects.

Bioplastics
Scion is developing capability in the production and integrated conversion of new functional bioplastics into new packaging and plastic products. This important development platform ensures that New Zealand has the opportunity to actively participate in the global activities in bioplastic development and to develop relevant intellectual property.

The project has focused on lignocellulosic (woody) biomass as the key resource. Outcomes to date have included the development of biopolyesters and functional additives derived from the New Zealand relevant biorefinery operations with targeted performance attributes such as heat/flame resistance and toughness/strength.

Capability has also been developed to produce polyester polymers using solventless (green) technologies enabling initial comparisons to commercially available (petroleum-derived) polyesters.

Looking ahead: This project will continue to build on the platform established in 2009/2010, increasing the scale of production of sample materials for fuller evaluation and growing Scion’s underpinning capability in developing high value products from biomass and biorefinery operations.

Biodegradation
Biodegradation is the break down of a material to benign end-products utilising naturally occurring processes. It is becoming a particularly important characteristic when considering end-of-life options for consumer products with growing public concerns/limitations over the use of landfills.

Scion and its collaborators are currently undertaking several research programmes into bioplastics (bio-based and/or biodegradable polymers) and other biomaterials. There are currently no standard test facilities either in Scion or New Zealand to determine how long these new materials will persist in the environment or break down under ideal conditions.

To address this gap, a new biodegradation testing facility was designed. A small-scale unit has been completed and will assist in finalising the details of a larger facility. With the facility in place, Scion can offer complete characterisation of materials developed in collaboration with commercial partners. There are limited biodegradation facilities worldwide, and this facility will be unique in New Zealand, as one of only two in the Southern Hemisphere.

Looking ahead: The focus will move to testing products developed in Scion's new biodegradation facility and quantifying approaches and techniques to ensure this new capability enters mainstream activities within Scion.

Multi-phase metabolomics
Metabolomics is an approach that analyses the products of metabolism in a biological system. This analysis assists in identifying the functional roles of genes in response to changes in the cellular environment. A comprehensive understanding of metabolomics is important for Scion to develop its industrial and environmental biotechnology platforms.

The aim of this Capability Funded project is to develop a real time, multi-phase (i.e. solid, liquid and gaseous) metabolite profiling platform. Research to date has generated large volumes of data and parallel skills in bioinformatics have been developed to analyse these large data streams to determine critical pathways.

The team has also developed an important new relationship with the University of Auckland and the University of Manitoba in Canada, a leading international organisation in this area. These partnerships provide Scion with substantial leverage on the relatively small Capability Fund investment. The work forms part of the framework of the existing Scion/GNS Science/University of Manitoba project, which also leverages into a large new Genome Canada Biofuels Consortium.

Looking ahead: The suitability of the identified metabolites as biomarkers for biofuel and biopolymer end-product synthesis pathways will be assessed, metabolomics methodologies will be improved, and statistical analysis of the complex datasets refined.

Financial Performance

Directors' Report

Principal Activities

New Zealand Forest Research Institute Limited (trading as Scion) is a company registered under the Companies Act 1993. Our principal activity is to conduct research in accordance with the purpose and principles specified in Sections 4 and 5 of the Crown Research Institutes Act 1992 (the Act). Scion has met all the obligations under the Act for the year ended 30 June 2010.

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

Scion has two wholly-owned subsidiaries, Atlas Technology Limited and Te Papa Tipu Properties Limited, and is a shareholder in three associate companies – 25% ownership of Frontline Biosecurity Limited, 20% ownership of Beacon Pathway Limited, and 33.33% ownership of Biopolymer Network Limited. Scion is also a member of two research consortiums – WQI Limited with a 5.95% shareholding and Radiata Pine Breeding Company Limited with a 17.15% shareholding.

- Te Papa Tipu Properties Limited owns the Group's land assets.
- 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 25 shareholders and carries out research focused on wood quality, appearance and stability that can affect the performance of the wood, and to develop effective segregation methods and technologies that allow the industry to gain maximum value from their timber resource.
- The Radiata Pine Breeding Company Limited is a consortium with 19 shareholders and aims to develop and provide superior germplasm of radiata pine.

Summary of Group Financial Results to 30 June 2010

	2010 $000	2009 $000
Operating revenue	43,493	43,973
Surplus before taxation	3,240	3,396
Taxation expense	4,218	1,113
Net surplus attributable to the shareholders	**(978)**	**2,283**
Equity		
Issued and paid up capital	17,516	17,516
Retained earnings	6,556	8,643
Reserve	48	48
Total equity	**24,120**	**26,207**

Scion's Strategic Business Plan outlines the company's research capabilities as spanning four strategic goals.

- Increase the value and profitability of New Zealand's forests;
- Optimise the value of marginal land;
- Accelerate development of bioproducts from renewable resources; and

- Maximise the quality and impact of Scion's science.

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

Bands			Number in Each Band
$400,000	–	$409,999	1
$220,000	–	$229,999	1
$210,000	–	$219,999	2
$190,000	–	$199,999	4
$170,000	–	$179,999	2
$160,000	–	$169,999	1
$150,000	–	$159,999	4
$140,000	–	$149,999	2
$130,000	–	$139,999	4
$120,000	–	$129,999	2
$110,000	–	$119,999	10
$100,000	–	$109,999	7

During the year ended 30 June 2010, $58k was paid to three employees in relation to cessation of employment with Scion (2009: $125k to five employees).

Dividend

A dividend of $1,109k was recommended and paid during the year (2009: $1,500k).

Directors' Profiles

Dr Russell Ballard, CNZM, (Chairman) – is an independent, non-executive Director. Dr Ballard is Chancellor of Massey University, 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 Forest Industry Training and Education Council (FITEC) the New Zealand forest industry training organisation, a member of the Auckland Conservation Board, Chairman of Pentarch Forest Products Limited, Chairman of 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. In 2010 Mr Berg received the Kirk Horn award from the New Zealand Institute of Forestry.

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

Mr Chris 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.

Dr Brian Rhoades (Director) is a business advisor and professional director with extensive management and governance experience. Dr Rhoades started his career as a lecturer in mechanical engineering at the University of Canterbury, moved into manufacturing and company management with the AHI/Carter Holt Harvey Group, and is a former Chief Executive of Sealord Products Ltd. His widespread governance experience includes chairing the New Zealand Food and Beverage Exporters' Council, and serving on the boards of a broad range of listed and unlisted companies and not-for-profit organisations. He is currently Chairman of FITEC and Ngai Tahu Seafood Ltd, and director of Brian L Rhoades and Associates Ltd and Superlink Developments Ltd. Dr Rhoades holds BE (Hons) and PhD degrees in Mechanical Engineering and is a Fellow of IPENZ and the Institute of Directors.

Ms Alison Andrew (Director) has held leadership positions in industries that include chemicals, dairy, paper and forest products, and oil and energy. She has deep experience in operating businesses, growing businesses and turning businesses around. Based in Auckland she is the General Manager of Orica Chemnet NZ, a role she took on in October 2009 after almost two years as CEO of Lexicon Systems Ltd, an Australasian marketing and advertising company. Previously she held a number of senior executive positions at Fonterra Co-operative and Fletcher Challenge. She has an MBA and BE (Hons) in chemicals and materials. Ms Andrew will take on the role of Deputy Chair of the Scion Board as from 1 July 2010.

Changes in Directors

Dr Ballard and Ms Monopoli's term on the Board concluded on 30 June 2010. These Directors have been replaced by Mr Tony Nowell and Mrs Judith Stanway, who were appointed to the Board on 1 July 2010.

Mr Anthony (Tony) Nowell (Chairman from 1 July 2010) is a professional company Director and Founding Director of Valadenz Limited, a trade and export development company. Previously he was the CEO of Zespri International, and positions he held before then included Managing Director of Griffin's Food Limited and Regional Vice President of Sara Lee Asia. Mr Nowell brings extensive experience in governance and international trade and development to the Board. His governance experience includes roles such as Chair of the Food and Beverage Taskforce, Deputy Chair of Leadership New Zealand, Chair of NZ Packaging Accord Governing Board and he is a member of the Export Advisory Board of Business of New Zealand.

Mrs Judith Stanway (Director from 1 July 2010), a qualified accountant, is the Business Management Partner of BDO Rotorua. Mrs Stanway is Chair of BDO New Zealand, a large chartered accountancy and business advisory firm, and a Fellow of the NZ Institute of Directors. She has worked with the forestry sector for many years, including holding Director positions on companies involved with timber processing and distribution. She also has governance experience in tourism and charitable trusts.

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 2010	Te Papa Tipu Properties 30 June 2010	Total 30 June 2010
Russell Ballard	58,000		58,000
Bronwyn Monopoli	38,000		38,000
Brian Rhoades	28,500		28,500
Peter Berg	30,500		30,500
Alison Andrew	28,500		28,500
Michael Ludbrook	28,500	8,000	36,500
Chris Insley	28,500		28,500
Sheldon Drummond	28,500		28,500
External Director			
John Kahukiwa		4,000	4,000
Total	**269,000**	**12,000**	**281,000**

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
A Nowell
Chairman

19 August 2010

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 2010 fairly reflect the financial position and operations of the New Zealand Forest Research Institute Limited.

A Nowell
Chairman

M Ludbrook
Director

19 August 2010

Performance Targets

Scion's performance against the targets contained in the 2009–2012 Statement of Corporate Intent was:

	Actual 2009	Actual 2010	Budget 2010
Revenue ($000)	43,973	43,493	47,156
EBIT Margin (EBIT % of Revenue)	7.10%	6.93%	5.7%
Return on average equity	9.2%	-3.9%	6.4%
Return on average total assets	5.8%	-3.3%	4.6%
Equity ratio	71.4%	68.3%	74.3%
Quick ratio:1	1.37	1.49	0.93
Gearing	0.0%	0.0%	0.0%
Interest coverage	156.00	66.90	N/A
Free cash flow to average total assets	21.8%	9.3%	12.3%

Non-financial Performance Measures	Actual 2009	Actual 2010	Budget 2010
Science FTEs	220	216	236
Science Support FTEs	47	48	41
Other FTEs	60	57	63
Total FTEs	**327**	**321**	**340**
Revenue per FTE ($)	**134,474**	**135,492**	**135,547**
Research Application Metrics			
Commissioned reports to users	395	360	360
Presentations on technical information and research results	282	253	320
Publications on technical information and research results	156	81	250
Peer reviewed articles	76	86	130
New or improved processes, products, or services	8	2	12
Keynote and plenary presentations	19	7	15
Requests for information from databases and collections:			
- National Forestry Library	10,500	11,180	10500
- National Wood Performance Archive	180	165	175
- National Forest Health Database	135	57	130
- National Forest Herbarium and Database	502	396	350
- Permanent Sample Plot Database	400	480	500
Patents Granted			
- In New Zealand	2	1	3
- Overseas	1	0	2
Number of licensing arrangements	3	4	4
Joint Ventures or formal associations [1]	56	11	14
Corporate Social Responsibility	Report	Report	Report
Environment Responsibility	Report	Report	Report
Maori Relationships			
Consultation with Maori	Report	Report	Report
Maori internships	5	2	5
R&D proposals involving Maori	7	9	7
Benefit to NZ	Report	Report	Report
Good Employer	Report	Report	Report

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

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

Audit Report

AUDIT REPORT

TO THE READERS OF NEW ZEALAND FOREST RESEARCH INSTITUTE LIMITED AND GROUP'S FINANCIAL STATEMENTS FOR THE YEAR ENDED 30 JUNE 2010

The Auditor-General is the auditor of New Zealand Forest Research Institute Limited (the Company) and group. The Auditor-General has appointed me, Simon Brotherton, using the staff and resources of Ernst & Young, to carry out the audit of the financial statements of the Company and group, on her behalf, for the year ended 30 June 2010.

Unqualified opinion

In our opinion:

- The financial statements of the Company and group on pages 46 to 74:
    - comply with generally accepted accounting practice in New Zealand;
    - comply with International Financial Reporting Standards; and
    - give a true and fair view of:
        - the Company and group's financial position as at 30 June 2010; 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 19 August 2010, 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 2010 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 New Zealand Institute of Chartered Accountants.

Other than the audit, 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

Matters relating to the electronic presentation of the audited financial statements

This audit report relates to the financial statements of New Zealand Forest Research Institute Limited and group for the year ended 30 June 2010 included on the Scion website. The Board of Directors of New Zealand Forest Research Institute Limited is responsible for the maintenance and integrity of the Scion website. We have not been engaged to report on the integrity of the Scion website. We accept no responsibility for any changes that may have occurred to the financial statements since they were initially presented on the website.

The audit report refers only to the financial statements named above. It does not provide an opinion on any other information which may have been hyperlinked to or from the financial statements. If readers of this report are concerned with the inherent risks arising from electronic data communication they should refer to the published hard copy of the audited financial statements and related audit report dated 19 August 2010 to confirm the information included in the audited financial statements presented on this website.

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

Statement of Comprehensive Income

FOR THE YEAR ENDED 30 JUNE 2010

	Note	GROUP ACTUAL 2010 $000	GROUP BUDGET (unaudited) 2010 $000	GROUP ACTUAL 2009 $000	PARENT ACTUAL 2010 $000	PARENT ACTUAL 2009 $000
Revenue	2 (a)	**43,493**	47,156	43,973	**50,544**	43,977
Other Income	2 (b)	**77**	0	102	**77**	102
Expenditure	3 (a)	**(40,290)**	(44,668)	(40,684)	**(40,463)**	(42,224)
Finance Costs	3 (b)	**(45)**		(20)	**(44)**	(20)
Share of Profit of Associates	15 (b)	**5**	0	25	**0**	0
Profit/(Loss) Before Tax		**3,240**	2,488	3,396	**10,114**	1,835
Tax Expense/(Credit)	9	**4,218**	834	1,113	**4,162**	1,130
Profit/(Loss) after tax attributable to the shareholders of the parent company		**(978)**	1,654	2,283	**5,952**	705
Other comprehensive income						
Deferred tax on heritage assets	9	**0**	0	(2)	**0**	(2)
Total comprehensive income/(loss) for the period attributable to the shareholders of the parent company		**(978)**	1,654	2,281	**5,952**	703

The accompanying notes form part of these financial statements.

Statement of Changes In Equity

FOR THE YEAR ENDED 30 JUNE 2010

	Ordinary Shares 2010 $000	Asset Re-valuation Reserve 2010 $000	Retained Earnings 2010 $000	Total 2010 $000	Ordinary Shares 2009 $000	Asset Re-valuation Reserve 2009 $000	Retained Earnings 2009 $000	Total 2009 $000
GROUP								
Balance as at 1 July	**17,516**	**48**	**8,643**	**26,207**	**15,716**	**50**	**7,860**	**23,626**
Profit for the period	0	0	(978)	(978)	0	0	2,283	2,283
Other comprehensive income	0	0	0	0	0	(2)	0	(2)
Total comprehensive income	**0**	**0**	**(978)**	**(978)**	**0**	**(2)**	**2,283**	**2,281**
Transactions with owners in their capacity as owners:								
Shares issued	0	0	0	0	1,800	0	0	1,800
Dividends paid	0	0	(1,109)	(1,109)	0	0	(1,500)	(1,500)
Balance as at 30 June	**17,516**	**48**	**6,556**	**24,120**	**17,516**	**48**	**8,643**	**26,207**
PARENT								
Balance as at 1 July	**17,516**	**48**	**1,213**	**18,777**	**15,716**	**50**	**2,008**	**17,774**
Profit for the period	0	0	5,952	5,952	0	0	705	705
Other comprehensive income	0	0	0	0	0	(2)	0	(2)
Total comprehensive income	**0**	**0**	**5,952**	**5,952**	**0**	**(2)**	**705**	**703**
Transactions with owners in their capacity as owners:								
Shares issued	0	0	0	0	1,800	0	0	1,800
Dividends paid	0	0	(1,109)	(1,109)	0	0	(1,500)	(1,500)
Balance as at 30 June	**17,516**	**48**	**6,056**	**23,620**	**17,516**	**48**	**1,213**	**18,777**

The accompanying notes form part of these financial statements.

Statement of Financial Position

AS AT 30 JUNE 2010

	Note	GROUP ACTUAL 2010 $000	GROUP BUDGET (unaudited) 2010 $000	GROUP ACTUAL 2009 $000	PARENT ACTUAL 2010 $000	PARENT ACTUAL 2009 $000
Equity						
Share capital	5	**17,516**	16,016	17,516	**17,516**	17,516
Retained earnings	5	**6,556**	10,097	8,643	**6,056**	1,213
Revaluation reserve	5	**48**	50	48	**48**	48
		24,120	26,163	26,207	**23,620**	18,777
Non Current Liabilities						
Provisions	6	**526**	0	525	**526**	525
Defined benefit plan	7(a)	**1,246**	1,177	1,213	**1,246**	1,213
Deferred tax liability	9(e)	**2,394**	0	0	**2,381**	0
		4,166	1,177	1,738	**4,153**	1,738
Current Liabilities						
Trade and other payables	8	**7,201**	7,318	8,329	**7,165**	15,404
Provisions	6	**142**	0	74	**142**	74
Defined benefit plan	7(a)	**68**	0	65	**68**	65
Tax payable	9	**652**	524	945	**635**	919
		8,063	7,842	9,413	**8,010**	16,462
Total Equity and Liabilities		**36,349**	35,182	37,358	**35,783**	36,977
Non Current Assets						
Property, plant and equipment	11	**23,014**	25,460	22,782	**21,704**	21,439
Biological assets	12	**482**	405	405	**482**	405
Intangible assets	13	**438**	1,127	222	**438**	222
Deferred tax benefit	9	**0**	656	788	**0**	801
Investments in subsidiaries	14	**0**	0	0	**0**	52
Investments in associates	15	**146**	116	141	**35**	35
		24,080	27,764	24,338	**22,659**	22,954
Current Assets						
Cash and cash equivalents	16	**6,580**	472	7,014	**6,530**	7,012
Trade and other receivables	17	**5,394**	6,752	5,796	**6,299**	6,801
Inventories	18	**219**	118	125	**219**	125
Advance to associate	24	**76**	76	76	**76**	76
Equipment for resale		**0**	0	9	**0**	9
		12,269	7,418	13,020	**13,124**	14,023
Total Assets		**36,349**	35,182	37,358	**35,783**	36,977

The accompanying notes form part of these financial statements.

For and on behalf of the Board, who authorised the issue of these accounts on 19 August 2010.

Chairman

Director

Statement of Cash Flows

FOR THE YEAR ENDED 30 JUNE 2010

	Note	GROUP ACTUAL 2010 $000	GROUP BUDGET (unaudited) 2010 $000	GROUP ACTUAL 2009 $000	PARENT ACTUAL 2010 $000	PARENT ACTUAL 2009 $000
Cash Flows from Operating Activities						
Cash was provided from:						
Receipts from customers		**43,537**	46,723	44,570	**43,525**	44,570
Interest received		**274**	55	293	**274**	293
		43,811	46,778	44,863	**43,799**	44,863
Cash was applied to:						
Payments to employees		**24,209**	25,088	23,054	**24,209**	23,053
Payments to suppliers		**14,791**	16,527	13,846	**14,990**	14,035
Interest paid		**45**	0	20	**44**	20
Income tax paid		**1,329**	904	330	**1,264**	330
		40,374	42,519	37,250	**40,507**	37,438
Net cash flows from operating activities	20	**3,437**	4,259	7,613	**3,292**	7,425
Cash Flows from Investing Activities						
Cash was provided from:						
Proceeds from sale of property, plant and equipment		**0**	0	7	**0**	7
		0	0	7	**0**	7
Cash was applied to:						
Purchase of property, plant and equipment		**2,423**	4,515	2,690	**2,435**	2,690
Purchase of intangibles		**339**	1,034	184	**339**	184
		2,762	5,549	2,874	**2,774**	2,874
Net cash flows used in investing activities		**(2,762)**	(5,549)	(2,867)	**(2,774)**	(2,867)
Cash Flows from Financing Activities						
Cash was provided from:						
Increase in capital		**0**	0	1,800	**0**	1,800
Net advances from subsidiaries		**0**	0	0	**109**	211
		0	0	1,800	**109**	2,011
Cash was applied to:						
Payment of dividend		**1,109**	1,000	1,500	**1,109**	1,500
		1,109	1,000	1,500	**1,109**	1,500
Net cash flows from financing activities		**(1,109)**	(1,000)	300	**(1,000)**	511
Net Increase (Decrease) in Cash Held		**(434)**	(2,290)	5,046	**(482)**	5,069
Add opening cash brought forward		**7,014**	2,762	1,968	**7,012**	1,943
Ending Cash Carried Forward	16	**6,580**	472	7,014	**6,530**	7,012

The accompanying notes form part of these financial statements.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS

FOR THE YEAR ENDED 30 JUNE 2010

1. Statement of Accounting Policies

REPORTING ENTITY

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

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

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

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

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

1.1 Summary of Significant Accounting Policies

a) Basis of Preparation

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

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

b) Statement of Compliance

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

c) Basis of Consolidation

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

d) Associate Companies

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

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

e) Intangible Assets

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

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

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

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

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

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

	Software
Useful lives	Finite
Method used	4 years – Straight line
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 profit and loss when derecognised.

f) Biological Assets

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

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

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

g) Property, Plant and Equipment

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

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

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

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

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

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

h) Recoverable amount of non-current assets

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

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

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

i) Trade Receivables

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

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

j) Inventories

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

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

k) Research Costs

Research costs are expensed in the period incurred.

l) Provisions and Employee Benefits

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

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

(i) Wages, Salaries and Annual Leave

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

(ii) Long Service Leave

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

(iii) Defined Benefit Plan

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

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

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

m) Leases

Group as a Lessee

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

Group as a Lessor

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

n) Cash and Cash Equivalents

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

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

o) Goods and Services Tax (GST)

The financial statements are prepared on a GST exclusive basis.

p) Foreign Currencies

Functional and presentation currency

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

Transactions and balances

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

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

q) Revenue Recognition

Research Revenue

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

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

Sale of Goods

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

Interest Revenue

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

r) Taxation

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

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

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

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

t) Interest-bearing Loans and Borrowings
All loans and borrowings are initially recognised at the fair value of the consideration received net of issue costs associated with the borrowing.

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

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

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, milestones achieved and actual results to date.

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

Due to the nature of some heritage assets, management does not believe they can be valued reliably. These assets have been identified as disclosed. Details of heritage assets can be found in note 11 and 22.

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

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

1.3 Accounting Standards Issued but not yet Effective

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

- NZ IAS 24 Related Party Disclosures — 1 January 2011
- NZ IFRS 9 Financial Instruments — 1 January 2013

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

1.4 Changes in Accounting Policy and Disclosures

The accounting policies are consistent with those of the previous financial year except for the adoption of the following new or amended New Zealand Equivalents to International Reporting Standards and interpretations.

NZ IAS 1 Presentation of Financial Statements (Revised) – The revised standard separates owners and non-owner changes in equity. The statement of changes in equity includes only details of transactions with owners, with non-owner changes in equity presented in a reconciliation of each component of equity and included in the new statement of comprehensive income. The statement of comprehensive income presents all items of recognised income and expense, either in one single statement, or in two linked statements. The Group has elected to present one statement.

NZ IAS 23 Borrowing Costs (Revised) – The revised NZ IAS 23 requires capitalisation of borrowing costs that are directly attributable to the acquisition, construction or production of a qualifying asset. The Group's previous policy was to expense borrowing costs as they were incurred. In accordance with the transitional provisions of the revised NZ IAS 23, the Group has adopted the standard on a prospective basis. Therefore, borrowing costs are capitalised on qualifying assets with a commencement date on or after 1 January 2009. The Group did not capitalise any borrowing costs in the current year.

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

- NZ IAS 1 Presentation of Financial Statements
- NZ IAS 8 Accounting Policies, Changes in Accounting Estimates and Errors
- NZ IAS 10 Events after the Reporting Period
- NZ IAS 16 Property, Plant and Equipment
- NZ IAS 19 Employee Benefits
- NZ IAS 23 Borrowing Costs
- NZ IAS 28 Investment in Associates
- NZ IAS 36 Impairment of Assets
- NZ IAS 38 Intangible Assets

	GROUP		PARENT	
	ACTUAL 2010 $000	**ACTUAL 2009 $000**	**ACTUAL 2010 $000**	**ACTUAL 2009 $000**
2. Revenue and Other Income				
(a) Revenue				
Government research revenue	**21,054**	21,144	**21,054**	21,144
Commercial research revenue	**22,146**	22,516	**22,134**	22,520
Distribution on wind up of subsidiaries	**0**	0	**7,063**	0
Royalty	**20**	17	**20**	17
Interest revenue	**273**	296	**273**	296
	43,493	43,973	**50,544**	43,977
(b) Other Income				
Change in fair value of plantation trees	**77**	83	**77**	83
Net realised exchange fluctuations	**0**	19	**0**	19
	77	102	**77**	102

	GROUP		PARENT	
	ACTUAL 2010 $000	ACTUAL 2009 $000	ACTUAL 2010 $000	ACTUAL 2009 $000
3. Expenditure and Finance Costs				
(a) Expenditure				
Personnel remuneration and expenses	**24,219**	23,791	**24,219**	23,790
Other personnel related costs	**657**	704	**657**	704
Contractors and subcontractors	**4,738**	5,329	**4,712**	5,312
Consumables	**925**	1,057	**925**	1,057
External services	**2,924**	2,859	**2,924**	2,870
Travel and accommodation	**1,247**	1,509	**1,246**	1,508
Lease and rental costs	**743**	699	**1,098**	1,055
Depreciation	**2,130**	2,131	**2,109**	2,111
Amortisation	**123**	97	**123**	97
Loss on disposal of fixed assets	**65**	173	**65**	173
Impairment of assets	**0**	115	**0**	115
Reversal of impairment	**(34)**	0	**(34)**	0
Impairment of intercompany advance	**0**	0	**0**	1,353
Inventory written off	**0**	16	**0**	16
Premises	**1,790**	1,528	**1,668**	1,341
Director's fees	**281**	300	**269**	289
Restructuring costs	**65**	(119)	**65**	(119)
Bad debts written off	**7**	0	**7**	0
Doubtful debt provision	**(39)**	101	**(39)**	101
Unrealised exchange fluctuations	**1**	0	**1**	0
Other	**448**	394	**448**	451
	40,290	40,684	**40,463**	42,224
(b) Finance Costs				
Bank loans and overdraft	**45**	20	**44**	20
	45	20	**44**	20

4. Auditor's Remuneration				
Amounts paid or due and payable to the auditors for:				
Auditing financial statements				
Parent entity auditor	**142**	140	**142**	140

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

5. Equity

New Zealand Forest Research Institute Limited has authorised, issued and paid up capital of $17,516,000 (2009: $17,516,000) ordinary shares. Shares do not have a par value.

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

During the period dividends recognised as distributions to shareholders totalled $1,109k representing 6.33 cents per share (2009: $1,500k @ 8.56 cents per share).

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

Capital Management

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

6. Provisions

The group has provisions for long service leave and restructuring. The long service leave provision totals $620k at June 2010 (2009: $599k) and was valued by an actuary.

The group has a restructuring provision of $48k in 2010 (2009: nil).

The provisions are made up as follows:

	GROUP AND PARENT ACTUAL 2010 $000	ACTUAL 2009 $000
Current Provision	**142**	74
Non Current Provision	**526**	525
	668	599

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

	Long Service Leave	Restruct-uring	TOTAL	Long Service Leave	Restruct-uring	TOTAL
	2010			2009		
	$000	$000	$000	$000	$000	$000
Balance 1 July 2009	**599**	**0**	**599**	235	181	416
Provision reversed during the period	**0**	**0**	**0**	0	(181)	(181)
Amounts used during the period	**(64)**	**0**	**(64)**	(118)	0	(118)
Provisions made during the period	**94**	**48**	**142**	425	0	425
Discount rate adjustment	**(9)**	**0**	**(9)**	57	0	57
Balance 30 June 2010	**620**	**48**	**668**	599	0	599

7. Pension Plans

a) Defined Benefit Plan

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

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

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

	GROUP AND PARENT ACTUAL 2010 $000	ACTUAL 2009 $000
Net plan expense		
Current service cost	**46**	43
Interest cost on benefit obligation	**78**	71
Net actuarial (gains)/losses recognised in the year	**(57)**	114
Net plan expense	**67**	228

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

	Defined Benefit Plan				
	2010 $000	2009 $000	2008 $000	2007 $000	2006 $000
Benefit liability included in the Statement of Financial Position					
Present value of defined benefit obligation	**1,314**	1,278	1,099	1,160	1,188

7. Pension Plans (cont)

a) Defined Benefit Plan

	GROUP AND PARENT ACTUAL 2010 $000	ACTUAL 2009 $000
Changes in the present value of the defined benefit obligation are as follows:		
Opening balance	**1,278**	1,099
Current service cost	**46**	43
Interest cost	**78**	71
Actuarial (gains)/losses recognised in the year	**(57)**	114
Benefits paid	**(31)**	(49)
Closing balance	**1,314**	1,278
Current provision	**68**	65
Non-current provision	**1,246**	1,213
	1,314	1,278

The history of experience adjustments is as follows:

	2010 $000	2009 $000	2008 $000	2007 $000	2006 $000
Experience adjustments on plan liabilities	**(41)**	(38)	(126)	0	68

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

	2010 $000	2009 $000
Discount rate	**5.87%**	6.14%
Future salary increases	**4.50%**	4.50%

b) Defined Contribution Plan

During the period defined contributions totalling $142k (2009: $113k) were made to the Government Superannuation Fund.

8. Trade and Other Payables

	GROUP ACTUAL 2010 $000	GROUP ACTUAL 2009 $000	PARENT ACTUAL 2010 $000	PARENT ACTUAL 2009 $000
Trade payables	**2,817**	3,790	**2,788**	3,762
Other payables	**6**	19	**6**	19
Employee payables and accruals	**2,665**	2,696	**2,665**	2,696
Intercompany payables (refer note 24)	**0**	0	**0**	7,114
Payable to associates	**68**	40	**68**	40
Payable to directors	**10**	10	**10**	10
Revenue in advance	**1,635**	1,774	**1,628**	1,763
	7,201	8,329	**7,165**	15,404

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 2010 $000	ACTUAL 2009 $000	ACTUAL 2010 $000	ACTUAL 2009 $000
9. Income Tax				
(a) Income Tax Expense				
The major components of income tax expense in the Statement of Comprehensive Income are:				
Current income tax				
Current income tax charge	**1,037**	1,225	**980**	1,248
	1,037	1,225	**980**	1,248
Deferred income tax				
Deferred tax expense/(income) related to prior year	**61**	70	**62**	72
Relating to origination and reversal of temporary differences	**(39)**	(182)	**(40)**	(190)
Amount of deferred tax expense/(income) related to a change in the building depreciation rate	**3,397**	0	**3,397**	0
Amount of deferred tax expense/(income) related to changes in tax rates	**(238)**	0	**(237)**	0
	3,181	(112)	**3,182**	(118)
Income tax expense/(income) reports in the Statement of Comprehensive Income	**4,218**	1,113	**4,162**	1,130
(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	**0**	(2)	**0**	(2)
(c) Reconciliation between the aggregate tax expense/(income) recognised in the Statement of Comprehensive Income to tax expense/ (income) calculated at the statutory income tax rate.				
Accounting profit/(loss) before income tax	**3,240**	3,396	**10,114**	1,835
Tax at the statutory income tax rate of 30% (2009: 30%)	**972**	1,019	**3,034**	551
Adjusted by:				
Prior year income tax	**1**	19	**1**	70
Deferred tax adjustment for change in building depreciation rates	**3,397**	0	**3,397**	0
Deferred tax adjustment for tax rate change	**(238)**	0	**(237)**	0
Entertainment	**7**	4	**7**	4
Non-deductible legal fees	**4**	1	**2**	1
Intercompany receivable	**0**	0	**0**	406
Other	**75**	70	**77**	98
Distribution on wind up of subsidiaries	**0**	0	**(2,119)**	0
Income tax expense	**4,218**	1,113	**4,162**	1,130

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

The significant increase in the tax expense and deferred tax liability when compared to prior year is predominantly a result of the removal of the allowable tax depreciation deductions for buildings with an expected life of 50 years or more. This was announced in the New Zealand Government's 2010 Budget and is effective for income years starting on or after 1 April 2011. This significantly reduced the tax base of buildings, thereby creating a large taxable temporary difference, which in turn has resulted in a large deferred tax liability. The movement in deferred tax in the 2010 financial year has been recognised as a tax expense in this Statement of Comprehensive Income.

9. Income Tax (cont)

(d) Recognised deferred tax assets and liabilities

	GROUP				PARENT			
	2010 $000 Current Income Tax	2010 $000 Deferred Income Tax	2009 $000 Current Income Tax	2009 $000 Deferred Income Tax	2010 $000 Current Income Tax	2010 $000 Deferred Income Tax	2009 $000 Current Income Tax	2009 $000 Deferred Income Tax
Opening balance	**(945)**	**788**	(71)	680	**(919)**	**801**	0	685
Charge to income	**(1,037)**	**(3,181)**	(1,225)	112	**(980)**	**(3,182)**	(1,248)	118
Prior period adjustment	**(1)**	**(1)**	(1)	(2)	**(2)**	**0**	(23)	0
Resident Withholding Tax paid	**2**	**0**	22	0	**2**	**0**	22	0
Charge to equity	**0**	**0**	0	(2)	**0**	**0**	0	(2)
Other payments	**1,329**	**0**	330	0	**1,264**	**0**	330	0
Closing balance	**(652)**	**(2,394)**	(945)	788	**(635)**	**(2,381)**	(919)	801

	GROUP		PARENT	
	ACTUAL 2010 $000	ACTUAL 2009 $000	ACTUAL 2010 $000	ACTUAL 2009 $000
(e) Deferred income tax relates to the following:				
Deferred tax liabilities				
Property, plant and equipment	**(3,488)**	(302)	**(3,475)**	(289)
Nursery inventory	**(46)**	(17)	**(46)**	(17)
Standing timber	**(145)**	(122)	**(145)**	(122)
	(3,679)	(441)	**(3,666)**	(428)
Deferred tax assets				
Patents and trademarks	**130**	119	**130**	119
Payroll provisions	**1,053**	895	**1,053**	895
Provision for doubtful debts	**21**	32	**21**	32
Income in advance	**0**	115	**0**	115
Other	**81**	68	**81**	68
	1,285	1,229	**1,285**	1,229
Net Deferred Tax Asset/(Liability) per Statement of Financial Position	**(2,394)**	788	**(2,381)**	801

The group has no unused tax losses (2009: $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.

Te Papa Tipu Properties Limited, a wholly owned subsidiary of New Zealand Forest Research Institute Limited, has an imputation credit account with a balance of $65,302 at 30 June 2010 (2009: $Nil).

10. Bank Debt

The group had no borrowing as at 30 June 2010 (2009: $0). The total facility available to the group is $2,000,000 (2009: $3,500,000). The bank facility maturity date is 31 October 2010.

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 2009								
Carrying amount net of accumulated depreciation and impairment at 1 July 2009	**1,668**	**15,238**	**5,032**	**164**	**101**	**244**	**335**	**22,782**
Additions	0	318	1,211	30	0	0	845	2,404
Transfers from CWIP	0	49	265	0	0	0	(319)	(5)
Reclass to intangibles	0	0	0	0	0	0	5	5
Disposals	(12)	(43)	(21)	0	0	0	0	(76)
Reversal of impairment provision	0	21	13	0	0	0	0	34
Depreciation expensed	(37)	(494)	(1,554)	(32)	(13)	0	0	(2,130)
Carrying amount net of accumulated depreciation and impairment at 30 June 2010	**1,619**	**15,089**	**4,946**	**162**	**88**	**244**	**866**	**23,014**
At 30 June 2010								
Cost or fair value	1,821	20,077	32,165	1,590	216	244	866	56,979
Accumulated depreciation and impairment	(202)	(4,988)	(27,219)	(1,428)	(128)	0	0	(33,965)
Net carrying amount	**1,619**	**15,089**	**4,946**	**162**	**88**	**244**	**866**	**23,014**

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 22 regarding other heritage assets. The heritage asset library books have been valued at $75,000.

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 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 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**
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**

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 2009								
Carrying amount net of accumulated depreciation and impairment at 1 July 2009	**325**	**15,238**	**5,032**	**164**	**101**	**244**	**335**	**21,439**
Additions	0	318	1,211	30	0	0	845	2,404
Transfers from CWIP	0	49	265	0	0	0	(319)	(5)
Reclass to intangibles	0	0	0	0	0	0	5	5
Disposals	0	(43)	(21)	0	0	0	0	(64)
Reversal of impairment provision	0	21	13	0	0	0	0	34
Depreciation expensed	(16)	(494)	(1,554)	(32)	(13)	0	0	(2,109)
Carrying amount net of accumulated depreciation and impairment at 30 June 2010	**309**	**15,089**	**4,946**	**162**	**88**	**244**	**866**	**21,704**
At 30 June 2010								
Cost or fair value	441	20,077	32,165	1,590	216	244	866	55,599
Accumulated depreciation and impairment	(132)	(4,988)	(27,219)	(1,428)	(128)	0	0	(33,895)
Net carrying amount	**309**	**15,089**	**4,946**	**162**	**88**	**244**	**866**	**21,704**

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 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**
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**

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 2010 $000	ACTUAL 2009 $000	ACTUAL 2010 $000	ACTUAL 2009 $000
Carrying amount 1 July	**405**	322	**405**	322
Gain/(loss) from changes in fair value less estimated point-of-sale costs	**77**	83	**77**	83
Carrying amount 30 June	**482**	405	**482**	405

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 2010.

(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 2010 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.

13. Intangible Assets

	GROUP		PARENT	
	ACTUAL 2010 $000	ACTUAL 2009 $000	ACTUAL 2010 $000	ACTUAL 2009 $000
Software				
Opening balance				
At cost	**2,920**	2,785	**2,920**	2,785
Less accumulated amortisation	**(2,698)**	(2,649)	**(2,698)**	(2,649)
Opening net carrying amount 1 July	**222**	136	**222**	136
Opening carrying amount 1 July	**222**	136	**222**	136
External additions	**339**	183	**339**	183
Current year amortisation	**(123)**	(97)	**(123)**	(97)
Closing carrying amount 30 June	**438**	222	**438**	222
Closing balance 30 June				
At cost	**3,227**	2,920	**3,227**	2,920
Less accumulated amortisation	**(2,789)**	(2,698)	**(2,789)**	(2,698)
Closing net carrying amount 30 June	**438**	222	**438**	222

	PARENT	
	30 June 2010 $000	30 June 2009 $000
14. Investments in Subsidiaries		
Opening shares in subsidiaries	**52**	52
Acquired in current year	**0**	0
Closed in current year	**(52)**	0
Closing shares in subsidiaries	**0**	52

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

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

Atlas Technology Limited does not trade.

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

During the period subsidiaries Liro Limited, Scion Australasia Limited and Forest Research (Australasia) Pty Limited were closed and their retained profits distributed to New Zealand Forest Research Institute Limited. They were removed from the Companies Office Register.

All subsidiaries are incorporated in New Zealand.

	GROUP		PARENT	
	ACTUAL 2010 $000	ACTUAL 2009 $000	ACTUAL 2010 $000	ACTUAL 2009 $000
15. Investments in Associates				
(a) Investment Details				
Frontline Biosecurity Limited	**0**	0	**0**	0
Beacon Pathway Limited	**9**	40	**20**	20
Biopolymer Network Limited	**137**	101	**15**	15
	146	141	**35**	35

New Zealand Forest Research Institute Limited has a 25% (2009: 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% (2009: 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% (2009: 33.33%) shareholding in Biopolymer Network Limited, a company carrying on research, development and commercialisation of biopolymers.

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

All of the companies are incorporated in New Zealand.

15. Investments in Associates (cont)

	GROUP		PARENT	
	ACTUAL 2010 $000	ACTUAL 2009 $000	ACTUAL 2010 $000	ACTUAL 2009 $000
(b) Movements in the carrying amount of the group's investments in associates				
Opening share of increase/(decrease) in net assets	**96**	71	**(10)**	(10)
Current year share of increase/(decrease) in net assets of associates	**5**	25	**0**	0
Closing share of increase/(decrease) in net assets	**101**	96	**(10)**	(10)
Cost of investments	**45**	45	**45**	45
Carrying amount of investments to 30 June	**146**	141	**35**	35

(c) Summarised financial information

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

	GROUP	
	ACTUAL 2010 $000	ACTUAL 2009 $000
Extract from the associates' Statement of Financial Position:		
Current assets	**1,594**	1,707
Non-current assets	**27**	16
	1,621	1,723
Current liabilities	**1,148**	1,198
	1,148	1,198
Net assets	**473**	525
Share of associates' net assets	**150**	141
Extract from the associates' Statement of Comprehensive Income:		
Revenue	**5,020**	5,620
Net Profit	**(59)**	92

There are no known contingent liabilities relating to Associates.

	GROUP		PARENT	
	ACTUAL 2010 $000	ACTUAL 2009 $000	ACTUAL 2010 $000	ACTUAL 2009 $000
16. Cash and Cash Equivalents				
Cash on hand	**1**	7	**1**	6
Bank	**773**	277	**723**	276
Call deposits	**765**	1,730	**765**	1,730
Short term deposits	**5,041**	5,000	**5,041**	5,000
	6,580	7,014	**6,530**	7,012

Cash at bank earns interest at 0.33% on daily credit balances over $250,000 (2009: 0.33%). Deposits earn interest at rates ranging from 2.75% to 4.29% (2009: 2.50% to 3.60%). For the purposes of the Statement of Cash Flows, Cash and Cash equivalents are equivalent to cash and cash equivalents presented in the Statement of Financial Position.

	GROUP		PARENT	
	ACTUAL 2010 $000	ACTUAL 2009 $000	ACTUAL 2010 $000	ACTUAL 2009 $000
17. Trade and Other Receivables				
Trade receivables	**3,382**	3,650	**3,381**	3,644
Allowance for impairment loss	**(69)**	(108)	**(69)**	(108)
Other debtors	**14**	103	**14**	103
Prepayments	**686**	601	**686**	598
Accrued revenue	**537**	417	**537**	417
Related party receivables:				
Associates	**151**	131	**151**	131
Other related parties	**693**	1,001	**693**	1,001
Subsidiaries	**0**	0	**906**	2,367
Allowance for impairment loss	**0**	0	**0**	(1,353)
Carrying amount 30 June	**5,394**	5,796	**6,299**	6,801

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

(b) Allowance for Impairment Loss
Trade receivables are non-interest bearing and are generally on 30–60 day terms. A provision for impairment loss is recognised when there is objective evidence that a trade receivable is impaired. A reduction in the allowance for impairment loss of $39k (2009: impairment loss $101k) has been recognised for the Group and a reduction of $39k (2009: impairment loss $101k) 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 2010 $000	ACTUAL 2009 $000	ACTUAL 2010 $000	ACTUAL 2009 $000
Opening balance 1 July	**108**	7	**108**	7
Reversal of prior year provision	**(105)**	(7)	**(105)**	(7)
Charge for the year	**66**	108	**66**	108
Closing balance 30 June	**69**	108	**69**	108

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
2010	Consolidated	3,382	2,769	0	464	0	51	0	29	69
	Parent	3,381	2,768	0	464	0	51	0	29	69
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

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

(c) For related party terms and conditions refer to Note 24.

	GROUP		PARENT	
	ACTUAL 2010 $000	ACTUAL 2009 $000	ACTUAL 2010 $000	ACTUAL 2009 $000
18. Inventories				
Consumable stores (at cost)	**66**	68	**66**	68
Nursery stock	**153**	57	**153**	57
Closing carrying amount	**219**	125	**219**	125

Consumable stores recognised as an expense for the year are $45k (2009: $118k) for the Group and $45k (2009: $118k) 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 $1k (2009: $16k).

19. Financial Instruments

Financial Instruments include:

Loans and Receivables
Trade Debtors
Other Debtors
Intercompany Receivables

Other Financial Liabilities
Trade and Other Payables
Related Party Payables

All the above financial instruments are measured at amortised cost.

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

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

The group's debt facility is with the National Bank of New Zealand Limited. As at 30 June 2010 no borrowings were drawn down (2009: 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.

19. 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 2010 $000	ACTUAL 2009 $000	ACTUAL 2010 $000	ACTUAL 2009 $000
Current account	**773**	277	**723**	276
Call deposits	**5,806**	6,730	**5,806**	6,730
Receivables	**3,864**	4,062	**3,863**	4,056
Intercompany receivable	**0**	0	**906**	1,014
Associated trade receivables and advances	**227**	207	**227**	207
Other related parties	**693**	1,001	**693**	1,001

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

Market Risk

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

Interest Rate Risk

The groups exposure to market interest rates relates primarily to the groups long term debt and cash deposits. Scion has had no banking debt over the reporting period and cash and cash equivalents have been maintained during that period to a year ended 30 June 2010 group balance of $6,580k (2009: $7,014k).

	GROUP		PARENT	
	ACTUAL 2010 $000	ACTUAL 2009 $000	ACTUAL 2010 $000	ACTUAL 2009 $000
Cash in hand	**1**	7	**1**	6
Current account	**773**	277	**723**	276
Call deposits	**765**	1,730	**765**	1,730
Short term deposits	**5,041**	5,000	**5,041**	5,000
	6,580	7,014	**6,530**	7,012

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 2010 bank call deposits were earning interest at rates between 2.75% and 4.29% (2009: 2.50% and 3.60%).

At 30 June 2010, if interest rates moved as indicated in the table below, with all other variables being held constant, post tax profit and equity would have been affected as follows:

	GROUP AND PARENT			
	2010		2009	
Judgement of reasonably possible movements in interest rates:	Change in Interest Rate	Effect on Post Tax Profit & Equity $000	Change in Interest Rate	Effect on Post Tax Profit & Equity $000
	+3%	**122**	+ 5%	236
	-1%	**(41)**	-1%	(47)

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

19. 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 2010 $000	ACTUAL 2009 $000	ACTUAL 2010 $000	ACTUAL 2009 $000
20. Reconciliation of operating surplus after taxation with cash flows from operating activities				
Reported surplus/(loss) after taxation	**(978)**	2,283	**5,952**	705
Add (less) non cash items:				
Depreciation (Refer note 3 and 11)	**2,130**	2,132	**2,109**	2,111
Amortisation	**123**	97	**123**	97
Impairment provision	**(34)**	117	**(34)**	117
Doubtful debts	**(32)**	101	**(32)**	101
Movement in deferred tax (Refer note 9)	**3,182**	(110)	**3,182**	(118)
Revaluation of biological assets	**(77)**	(82)	**(77)**	(82)
Distribution on wind up of subsidiaries	**0**	0	**(7,063)**	0
Write off provision intercompany advance	**0**	0	**0**	1,353
	5,292	2,255	**(1,792)**	3,579
Add (less) items classified as investing activity:				
(Gain) loss on disposal of property, plant and equipment	**65**	173	**65**	173
Share in associate company profit	**(5)**	(25)	**0**	0
Capital related items in creditors	**39**	157	**39**	157
	99	305	**104**	330
Movements in working capital items:				
(Increase)/Decrease in debtors and prepayments	**433**	281	**1,888**	425
(Increase)/Decrease in inventories	**(94)**	105	**(94)**	105
Increase/(Decrease) in creditors and accruals	**(1,022)**	1,510	**(8,134)**	1,572
Increase/(Decrease) in taxation payable	**(293)**	874	**(284)**	919
Increase/(Decrease) in intercompany debtors	**0**	0	**(1,462)**	(141)
(Increase)/Decrease in intercompany creditors	**0**	0	**7,114**	(69)
	(976)	2,770	**(972)**	2,811
Net cash flows from operating activities	**3,437**	7,613	**3,292**	7,425

21. 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.

22. Heritage Assets

The company has identified its library, herbarium and germplasm collections as heritage assets. For the herbarium and germplasm collections the Directors believe that there is no practical basis upon which to reliably value these collections. For the library refer to note 11.

23. 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 2010 $000	ACTUAL 2009 $000	ACTUAL 2010 $000	ACTUAL 2009 $000
Lease commitments under non-cancellable operating leases:				
Within one year	**398**	484	**398**	484
One to five years	**410**	278	**410**	278
	808	762	**808**	762

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

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

	GROUP		PARENT	
	ACTUAL 2010 $000	ACTUAL 2009 $000	ACTUAL 2010 $000	ACTUAL 2009 $000
Within one year	**287**	287	**200**	199
One to five years	**725**	509	**376**	161
Greater than five years	**1,067**	1,102	**51**	0
	2,079	1,898	**627**	360
Capital Commitments: Capital expenditure contracted for at balance date but not provided for	**127**	611	**127**	611

24. Transactions with Related Parties

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

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

24. Transactions with Related Parties (cont)

	PARENT	
	30 June 2010 $000	30 June 2009 $000
(b) Subsidiary Companies		
Te Papa Tipu Properties Ltd		
Charge for services	**76**	76
Payment of Rent	**(356)**	(356)
Net Paid on behalf	**171**	148
Amount (payable)/receivable at balance date		
– Intercompany account	**906**	1,014

	GROUP AND PARENT	
	30 June 2010 $000	30 June 2009 $000
(c) Associates		
Beacon Pathway Ltd		
Contribution to research outputs	**(200)**	(200)
Supplied goods and services	**17**	179
Receivable/(Payable) at balance date	**(19)**	(16)
Outstanding unsecured shareholders advance from New Zealand Forest Research Institute Limited to Beacon Pathway Ltd	**76**	76
Biopolymer Network Ltd		
Supplied goods and services	**1,436**	1,383
Received goods and services	**0**	(1)
Receivable/(Payable) at balance date	**151**	108
(d) Other Related Parties		
Radiata Pine Breeding Co Ltd		
Contribution to research outputs	**(111)**	(115)
Supplied goods and services	**352**	727
Receivable/(Payable) at balance date	**12**	177
WQI Ltd		
Supplied goods and services	**604**	704
Received goods and services	**25**	7
Receivable/(Payable) at balance date	**150**	154
The balance includes $7k for research to be completed in the next financial year.		
Future Forests Research Ltd		
Services provided	**6,118**	6,102
Receivable/(Payable) at balance date	**482**	671

New Zealand Forest Research Institute Limited has a 17.15% shareholding in Radiata Pine Breeding Company Limited and a 5.95% shareholding in WQI Limited. For Future Forests Research Limited refer to note 14. Refer note 15 for Associate shareholdings.

24. Transactions with Related Parties (cont)

Other

During the year the group provided services to the New Zealand Forest Owners Association Incorporated totalling $363k (2009: $605k), FITEC $51k (2009: $113k), New Zealand Farm Forestry Association Incorporated $19k (2009: $6), New Zealand Forestry Limited $2k (2009: $4k), Pentarch Forest Products Limited $0k (2009: $1k) and Tane Tree Trust $33k (2009: $60k).

The group also received services totalling $5k (2009: $11k) from the New Zealand Forest Owners Association Incorporated, $7k from New Zealand Forestry Limited (2009: $0) and $4k (2009: $5) 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. Mr Brian Rhoades, a director of New Zealand Research Institute Limited, was appointed Chairman of FITEC on 10 September 2009.

Dr Russell Ballard, who was Chairman of New Zealand Forest Research Institute Limited up to 30 June 2010, was appointed Chancellor of Massey University on 5 December 2008 and prior to that was a council member. Services provided to Massey University to 30 June 2010 totalled $60k (2009: $44k) and services received totalled $304k (2009: $107k).

Dr Tom Richardson, CEO of New Zealand Forest Research Institute Limited is Deputy Chairperson of Science NZ, a Director of the Foundation for Research, Science and Technology and a council member of Waiariki Institute of Technology. During the period Scion provided services totalling $32k (2009: $0), $16,962k (2009: $18,011k) and $6k (2009: $7k) respectively to the aforementioned companies. Scion also received services totalling $45k (2009: $51k) from Science NZ and $6k (2009: $1k) from Waiariki Institute of Technology. No services were received from the Foundation for Research, Science and Technology in 2010 (2009: $45k).

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 (2009: Nil) and no impairment allowance has been raised for any of these debts.

	GROUP		PARENT	
	ACTUAL 2010 $000	ACTUAL 2009 $000	ACTUAL 2010 $000	ACTUAL 2009 $000
25. Key Management Personnel				
Short term employee benefits	**2,120**	2,173	**2,112**	2,165
Long term employee benefits	**0**	0	**0**	0
Termination employee benefits	**0**	13	**0**	13
KiwiSaver employer contributions	**0**	11	**0**	11
	2,120	2,197	**2,112**	2,189

26. 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 (resigned 30 June 2010)

Ms Bronwyn Monopoli – Deputy Chair (resigned 30 June 2010)

Ms Alison Andrew

Mr Peter Berg

Mr Sheldon Drummond

Mr Chris Karamea Insley

Mr Michael Ludbrook

Mr Brian Rhoades

Ms 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

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

Dr Trevor Stuthridge – Group Manager, Sustainable Design

Mrs Keri-Anne Tane – Group Manager, Human Resources

Mr Rob Trass – Chief Financial Officer

AUDITORS

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

BANKERS

National Bank of New Zealand

SOLICITORS

Bell Gully, Auckland

Registered Office

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