



Researching sustainable forest landscapes

ANNUAL REPORT 2008–09

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Annual Report 2008–09

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Executive summary

Achievements and activities of the CRC in relation to research, commercialisation/utilisation and education outcomes for the reporting period

The 2008–09 reporting period has been an eventful one for the CRC for Forestry. The CRC continued to expand its membership, with four new supporting partners joining the organisation: the University of the Sunshine Coast contributes additional research capabilities, while the Australian Forest Contractors Association and Timberlands Pacific add to the strength of the CRC's end-user engagement. Three of these organisations joined on 1 July 2009, while VicForests joined during the 2008–09 reporting period.

Many of the CRC's projects reached significant research milestones during the financial year, enabling testing and validation of these results in an industry context. Publication of the *CRC for Forestry Highlights & Achievements 2008–09* identified a cross-section of research achievements including:

- o application of airborne LiDAR for forest inventory, monitoring and mapping using CRC for Forestry protocols
- o uptake of CRC for Forestry decision frameworks relating to gene flow risk by the Tasmanian Forest Practices Authority (FPA) to regulate plantation establishment
- o discovery that key wood properties of *Eucalyptus nitens* are under strong genetic control—a precursor to breeding strategies that will increase value recovery from future *E. nitens* plantations
- o development and deployment of productivity and costing models for harvesting equipment and truck scheduling
- o completion and publication of four major reports on social and economic impacts of forestry, with evidence already emerging of strong public policy impact
- o ongoing incorporation of biodiversity research results into variable retention (VR) silvicultural strategies and reviews of the Tasmanian Forest Practices Code
- o improved methods for more cost-effective approaches to using near-infra-red (NIR) spectroscopy to predict wood properties in industrial applications
- o new controlled burning strategies, which are being taken up by forest managers, that will reduce adverse impacts on water quality
- o The Blue-gum Productivity Optimisation System (BPOS), which is currently being used by a significant number of CRC partners to predict plantation productivity and economic performance.

In response to demands identified by industry and other stakeholders, the CRC commenced work on one significant new research initiative during the year, and the Board endorsed planning for a further new initiative to commence in 2010. The first of these, a project to address knowledge gaps in relation to plantation water use and interaction with other land uses at hillslope to catchment scale, commenced operation during the reporting period. Negotiations commenced during the reporting period to establish a project examining management responses of production forests with respect to carbon stocks and flows, with a view to commencement late in 2009.

The CRC continued to achieve or exceed education enrolment and graduation targets during the financial year despite a general trend across universities of declining enrolments in research training programs. Distribution of enrolments across programs has, however, continued to be uneven. Because of limited supervisory capacity and inadequate numbers of undergraduates and honours graduates with the requisite skills, it has proved particularly difficult to recruit research students into the harvesting and operations program (Program Three).

The CRC has contributed staff time and funding to help establish the National Forestry Masters Program, a collaborative initiative shared amongst four participating universities. The CRC also helped facilitate industry participation in course development and delivery. The program enjoyed a largely successful first year during 2008.

Risks, opportunities and responses to the above

The majority of the CRC's research activities have reached the point where at least some of the research outputs are ready for trial and implementation in industrial or policy settings. While adoption strategies have been integral to project planning and implementation from the outset, greater emphasis is now being placed on approaches needed to maximise industry uptake and impact of research outputs. Some initial assumptions about the most effective means of delivering research discoveries to industry have been evaluated and modified. In particular, the CRC and our industry

partners have concluded that stand-alone decision support systems are less likely to result in widespread innovation than approaches that integrate with pre-existing decision processes in industry, despite the diversity of the latter.

The CRC has enjoyed strong engagement and participation from research, development and innovation managers from participating companies and government agencies. As part of the increasing emphasis being placed on adoption and operationalisation of research, we have encouraged greater participation in research planning and strategic oversight by operational managers in partner companies, particularly through participation in program coordinating committees (PCCs).

The appointment of an Industry Engagement Manager was highlighted by the third-year review panel as an important initiative that has also been welcomed by participating companies.

Impediments to achievement of the CRC's objectives experienced during the year and strategies adopted to address these

Economic challenges are being faced by the forestry industry across the board, including the collapse of two of the companies that were supporting partners and significant users of research results during the reporting period. This has led to a reduced rate of research uptake in some areas, particularly relating to plantation expansion and demand for new genotypes. Therefore, while the research remains relevant to industry, the overall economic impact will be reduced in the short term.

While the collapse of two of our partners has had some impact on the CRC's operating cash, this has largely been offset by the recruitment of new partners, and no research or education activities have been curtailed as a consequence. Furthermore, while these companies have been in administration and receivership, their forestry operations have continued, and there has been little impact to date on the CRC's day-to-day engagement with key personnel. Contact has been maintained with relevant parties during the transition of ownership and management of the relevant forestry assets, so that access to study sites and field experiments has been maintained. Once ownership issues have been finalised, the CRC will enter into negotiation with new owners with a view to continuing research engagement. This is likely to take place during the first half of 2010.

Low research student enrolments in some program areas have been reviewed and alternative strategies for addressing research shortfall have been considered. In response to difficulties in attracting research students in these areas, the CRC will divert funding resources to recruiting research fellows following a final student recruitment round in 2009.

Awards, special commendations, CRC highlights

The third-year review took place during November 2008, and served to highlight the CRC's achievements to date. The review examined in detail the research elements of each of the CRC's programs, considering issues such as science quality and benchmarking, national and international leadership and collaboration, feasibility and adequacy of resources for projects, pathways to adoption and the overall balance of research and research training activities.

The review of the CRC from the panel was extremely positive, containing praise for all core areas of the CRC's operation: outcome-focused research and high-quality science, adoption and communication, research training, governance and management. The panel's report states:

'Strategies to communicate the research ... are very effective as well as the ability to pass on to the public the image of a responsible, credible, independent and competent CRC.'

'The Review Panel was impressed by the quality of research being performed by the CRCF, the management structure underpinning this and the degree of interaction with end-users. The CRCF is performing extremely well and certainly justifies the investment made by the Commonwealth. The Panel does not recommend any major changes.'

The review panel made twelve recommendations to the CRC Board to ensure the CRC maintains and ultimately improves the high quality of research and its adoption by industry. The response to the review and further details can be found on page 49 of this Annual Report.

Numerous CRC researchers have been recognised in a variety of ways during the reporting period, but one worthy of special note is the award of the Clarke Medal to the Program Manager of Research Program Four, Professor Brad Potts. The Clarke Medal has been awarded by the Royal Society of New South Wales since 1878 for distinguished research in natural sciences performed in Australia and its territories and rotates through geology, botany and zoology. Professor Potts now joins distinguished past winners such as Sir Richard Owen for his famous studies of Australian vertebrate fossils, and Sir Douglas Mawson, Antarctic explorer and geologist.

Context and major developments during the year

Industry context

The overall trend since the CRC's establishment has been for rapid growth in the Australian hardwood plantation estate. An average of 72 000 hectares of new plantations was established in each of the five years to 2008, although activity slowed significantly during the 2008–09 financial year owing to a range of economic factors, including reduced investment and the collapse of two major managed investment scheme (MIS) companies, Timbercorp and Great Southern Limited (GSL). Both companies were partners in the CRC. While recent events fall outside the reporting period, it should be noted that the CRC is now in discussion with the new owners of the Timbercorp forestry assets at the time of writing this report. The future of GSL's forestry assets is presently unresolved, but it is likely that there will be continuing demand from the new owners of both sets of forestry assets for collaboration and research engagement with the CRC.

As both Timbercorp and Great Southern Limited went into administration during the financial year, they ceased their cash contributions to the CRC, and, from an administrative perspective, their partnership has been effectively suspended pending resolution at the 2008–09 Annual General Meeting (AGM) in November 2009. However, research collaboration has continued where possible, given the need for continuing access to research sites formerly managed by both companies, and interactions with key personnel who, for the most part, have continued to collaborate on the relevant research projects. Our strategy has been to minimise the loss of continuity of research activities and interactions as far as possible under the circumstances, and this has been largely successful. Impact of the loss of cash contributions has been offset by the recruitment of new industry partners to the CRC during the same period, so we have not been forced to reduce funding to any current projects.

During this period of global financial disruption, there has been general uncertainty in the forestry sector in relation to new investment. However, there has been an increasing recognition of the need to improve harvesting and transport efficiency as wood supply from a maturing hardwood plantation estate increases. Consequently, the level of industry interest in this aspect of the CRC's research has developed further, resulting in increasing levels of industry investment in the harvesting and operations program (Program Three). In particular, Hancock Victorian Plantations (HVP) and VicForests increased the level of their cash and in-kind involvement in the program, and a new investment of \$350 000 by Forest and Wood Products Australia (FWPA) has initiated an additional research activity focusing on monitoring harvesting machine productivity.

During the reporting period, the trend continued for increasing emphasis on the importance of both carbon sequestration and water quality and yield as environmental services resulting from forest management. The CRC's new project on plantation water use and interaction with other land uses at hillslope to catchment scale commenced in 2008–09, and a new project on carbon stocks and flows in relation to production forest management is planned for implementation in 2009–10.

Summary of outcomes to date

As part of the third-year review process, and in order to assist our research planning and implementation for the remaining half of the CRC's current seven-year term, we undertook a rigorous cost–benefit analysis of a subset of current research investments. The work was carried out by Agrans Research and eSYS development.

Agrans worked closely with CRC management and stakeholders to develop an economic impact assessment of seven CRC activities. Economic impact assessment considers the cost of research and of its implementation, the likelihood of uptake by industry, and the likely productivity gains if the research outputs are adopted. All activities analysed showed a positive internal rate of return, ranging from 8% up to 86% using economic methodology specified by the Australian Government CRC Program (see the table on page 4). The full report is available on the web at www.crcforestry.com.au/publications/annual-report/index.html.

Investment criteria for seven CRC investments (discount rate = 5%)

Investment	PVB (\$m)	PVC (\$m)	NPV (\$m)	B/C Ratio	IRR (%)
Improved forest inventory through high-resolution remote sensing	7.8	1.5	6.3	5.2	20
Association genetics for solid-wood properties: <i>Eucalyptus globulus</i> and <i>E. nitens</i>	6.1	3.3	2.8	1.8	8
Silviculture-processing studies on <i>Eucalyptus nitens</i> and <i>E. globulus</i>	6.9	0.8	6.1	8.4	85
Optimised log merchandising with mechanical harvesters	6.5	0.3	6.2	19.0	71
Evaluation of electric/diesel hybrid technology on a converted 6x6 truck	3.8	0.3	3.5	13.7	49
Identification and adaptation of leading technology for tracking and management of Australian forest operations	45.2	0.7	44.5	66.0	86
Trees in the landscape	106.6	35.7	70.9	3.0	12

Note: The Present Value of Benefits (PVB) and Present Value of Costs (PVC) were used to estimate investment criteria of Net Present Value (NPV), Benefit–Cost Ratio (B/C Ratio) and Internal Rate of Return (IRR) at a discount rate of 5%. PVC are the sums of the discounted streams of benefits and costs.

The economic impact assessment focused on areas of the CRC’s work most likely to produce measurable impact in the short to medium term. The table on page 5 outlines the expected economic and non-monetary outcomes of the CRC over the long term, many of which are not measurable over the short period that the CRC has been operating during the current funding cycle. For example, considering that the minimum period over which site selection and genetic improvement would result in a measurable economic return is at least one rotation (typically ten years), no empirical data is available on these economic outcomes. Economic gains and improvement in profitability from improved harvesting and transport practices will be captured over a much shorter period. However, the 2008–09 financial year was the first year for trial and implementation of harvesting and operations innovations, so empirical data on economic performance is not currently available. For these reasons, it is not realistic to ascribe dollar values to CRC outcomes at this point. The table on page 5 provides a summary of outcomes to date compared with the value outcomes identified in the Commonwealth Agreement with reference to the relevant section of this report, where more detailed outcomes against agreed milestones and deliverables are provided.

Maximising the value of outcomes over the remaining life of the CRC will be achieved primarily through greater emphasis on more widespread adoption and uptake of research results across the board. The CRC for Forestry has successfully sought to engage a wider range of industry and end-user partners, as demonstrated by the numbers of new company, SME (small-medium enterprises) and government business enterprise partners over the last two years. Widespread adoption and innovation is seen by the CRC for Forestry Board and management as a far more valuable pathway to economic impact than the direct commercialisation of intellectual property for the benefit of a much smaller number of stakeholders.

Coupled with the expansion of partnerships, adaptation and refinement of adoption strategies will yield greater overall impact of research results. In particular, we are finding that complementary approaches rather than stand-alone decision support systems are likely to lead to more widespread innovation across the sector.

Expected monetary (economic) and non-monetary outcomes of the CRC

Value outcomes: Commonwealth agreement	Summary of progress to date
1. Improved ability to select planting sites and manage for increased profitability of plantation investments, through higher yields and lower costs of production.	Widespread industry use of CRC decision tools, especially BPOS, in site selection and performance forecasting (Program One, Project 1.2). Operational trials of LiDAR-based inventory protocols are underway (Program One, Project 1.1). Forest health: Operational use of remotely sensed forest health assessment is currently being evaluated by two state forest agencies (Program One, Project 1.1). The Industry Pest Management Group continues to provide direct technology transfer services relating to management of potentially economically significant plantation pests (Program Four, Project 4.4).
2. Increased use of planting stock with improved genetic potential, managed to optimise production of high-value wood for fibre and solid-wood markets.	Research deliverables are on track, and ahead of target with respect to molecular genetics (Program Two, Project 2.1). Uptake has been slower than expected due to greater than anticipated use of coppicing in second rotations, and reduced overall rate of hardwood plantation expansion. Identification of genetic control of high-value wood properties likely to have greater impact over the next few years, although economic returns will be seen after one rotation (20 years approx.) following deployment. Solid-wood processing trials from plantation-sourced timber have refined processing techniques to the point where much higher value recovery from plantations has been shown to be possible—a first for these species (Program Two, Project 2.3).
3. Adoption of harvesting and logistical practices that reduce delivered wood costs, contributing to industry profitability, while maintaining conformity with codes of practice and certification standards.	Training workshops conducted across the country on latest methods and technology for value recovery in harvest operations (Program Three). Establishment of agreed Southern Hemisphere framework for machine evaluation and benchmarking, and delivery of machine-evaluation workshops to industry (Program Three). Industry partners are currently implementing CRC strategies to improve transport payload efficiency (Program Three). Increasing uptake by industry of CRC transport scheduling and machine productivity models (Program Three).
4. Improved security of access to land and forest resources for the forest industry, sustaining levels of investment in the establishment of new plantations, through demonstrated ability to manage in an environmentally and socially sustainable manner.	Significant use has been made of CRC research outputs in modifying policy settings for forest practices (Program Four, Project 4.2). CRC socioeconomic research outputs are regularly cited in Commonwealth and State policy statements and developments in relation to forestry and land use (Program Four, Project 4.3, Project 4.5). The CRC has been an active participant in evidence-based public debate on forestry issues.

Major developments and initiatives

A major development this year was the commencement of Project 4.6 which will build and test tools for quantifying both productivity and water use, and bridges the gap between the stand-scale work in Program One and the catchment-scale research in Project 4.1. The project was initiated in response to industry identifying water use by plantations as a major issue and potential source of conflict and adverse policy change relating to land use.

A further new project addressing the impact of different production forest management interventions on carbon stocks and flows was approved during the financial year, with commencement scheduled for late 2009.

The CRC's work on development of selection and implementation guidelines for the use of onboard machine evaluation systems for forest operations was significantly expanded by a \$348 000 cash contribution from Forest and Wood Products Australia (FWPA).

The third-year review of the CRC took place in November 2008. The Board response to the third-year review is detailed on page 49 of this report. Full copies of the review and Board responses, as provided to the Commonwealth in February 2009, are available on the CRC for Forestry website at <http://www.crcforestry.com.au/publications/annual-report/index.html>.

The CRC continues to canvas interest from potential new industry participants, and where appropriate and necessary, new research providers. During the reporting period, VicForests joined the CRC as a supporting partner. Three more supporting partners were signed up on 1 July 2009. The University of the Sunshine Coast will aid the expansion of our research into subtropical and tropical forestry, and brings extra research capability in performance prediction in new environments. New industry partners Timberlands Pacific and the Australian Forest Contractors Association provide additional opportunities to expand impact, and additional resources to support research, development and extension activities.

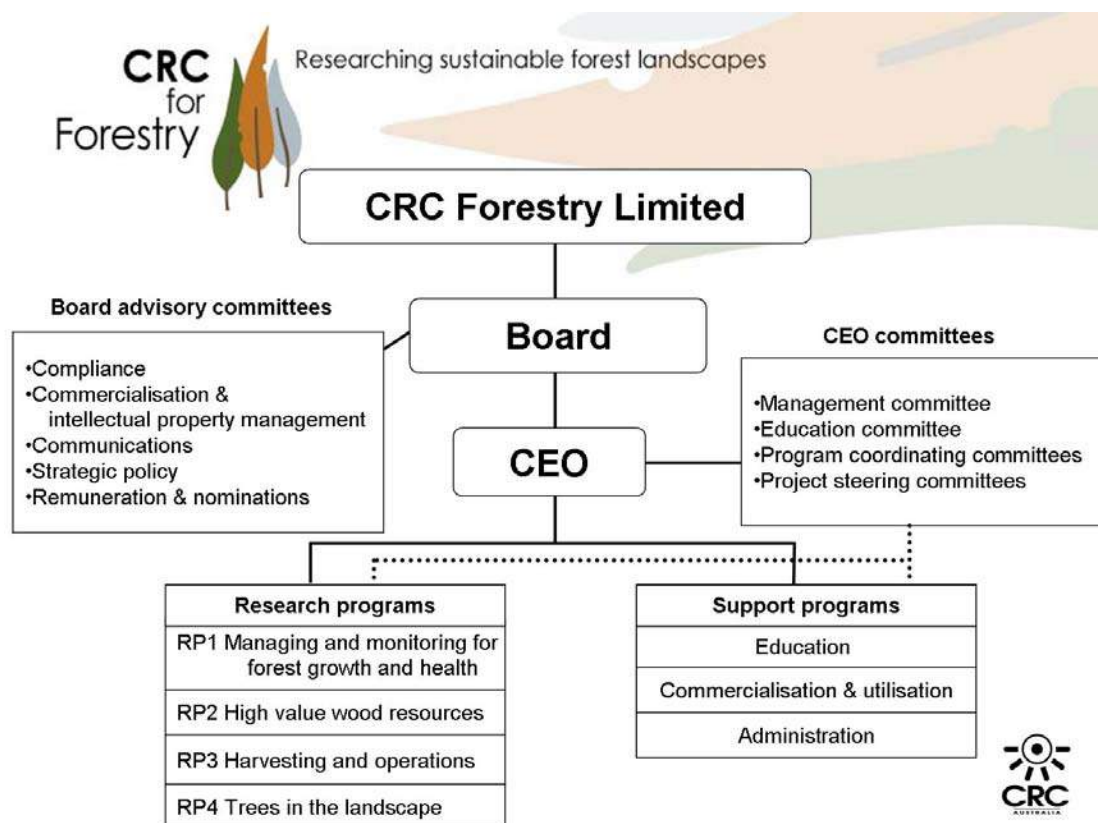
Two new Board members, Dr Lyndall Bull and Professor Geoff Wilson, joined the CRC during the reporting period, following the retirement from the Board of Dr Rick Ede and Mr Tim Browning. Dr Prue Loney was appointed as Communications Manager following the overseas relocation of Ms Taylor Bildstein.

National research priorities

National research priorities and CRC research

NATIONAL RESEARCH PRIORITIES	CRC RESEARCH (%)
AN ENVIRONMENTALLY SUSTAINABLE AUSTRALIA – Transforming the way we use our land, water, mineral and energy resources through a better understanding of environmental systems and using new technologies	
Water – a critical resource Strategies for optimising water use in plantation forestry (see Project 4.1) Prescriptions for improving water quality and or yield from managed forests (see Project 4.1)	6
Transforming existing industries Genetic and silvicultural techniques for maximising value recover from plantations (see Program Two) Improvements to harvesting and transport productivity (see Program Three)	25
Overcoming soil loss, salinity and acidity Enhancing the role of plantations in mitigating salinity (see Project 4.1)	2
Sustainable use of Australia’s biodiversity Developing prescriptions for maintaining biodiversity values in managed native forests and plantations – variable retention silviculture, other inputs into Forest Practices Code (see Project 4.2)	20
Responding to climate change and variability Refining predictive models for forest performance and forest health in the context of a changing climate (see Projects 1.2 and 1.3)	5
PROMOTING AND MAINTAINING GOOD HEALTH – Promoting good health and preventing disease, particularly among young and older Australians	
Strengthening Australia’s social and economic fabric Documenting socioeconomic impacts of land-use change in the context of regional economic development and policy development (see Project 4.3)	5
SAFEGUARDING AUSTRALIA – Safeguarding Australia from terrorism, crime, invasive diseases and pests, and securing our infrastructure, particularly with respect to our digital systems	
Protecting Australia from invasive diseases and pests Monitoring and predicting forest health, under current and future climatic scenarios (see Projects 1.2 and 4.4)	4

Governance and management



CEO and governing Board members

There were changes to the Board of Directors during the 2008–09 year, with Mr Tim Browning from Timbercorp being replaced on the Board of the CRC in November 2008 by Dr Lyndall Bull from Australian National University. In April 2009, Professor Geoff Wilson was appointed to the Board via a special resolution. The Board of Directors now has eight members, with an independent Chair and seven Directors, with six from the private sector. The table on page 9 outlines the membership of the Board and key skills of Board members.

Name	Organisation	CRC position/role	Particulars
Anne Katherine Carnell (Kate) (AO, B.Pharm, FAIM, FAIPM, MAICD)	Chief Executive Officer, Australian Food and Grocery Council	Chair of the Board Chair, Remuneration and Nomination Committee Member, Compliance Committee	Joined the Board at incorporation of the company on 30 June 2005 in a non-executive capacity.
Lyndall Bull (B For Sci (Hons), B Sc, PhD, MAICD)	Lecturer and National Convenor, National Forestry Masters Program, Australian National University	Member, Compliance Committee	Joined Board in November 2008 in a non-executive capacity.
Johannes Hendrick Drielsma (Hans) (B.Sc.For.(Hons), M.For.Sci, PhD)	Executive General Manager, Forestry Tasmania	Chair, Communications Committee Member, Remuneration and Nomination Committee	Joined the Board at incorporation of the company on 30th June 2005 in a non-executive capacity.
Gary Brian Inions (B.Sc(Hons), PhD)	Managing Director, Plantation International Pty Ltd and Hansol PI Pty Ltd	Member, Remuneration and Nomination Committee Member, Commercialisation & IP Committee	Joined the Board on 13 December 2005 in a non-executive capacity.
Robert John Pearce (Bob) (B.A., Dip. Ed., J.P.)	Executive Director, Forest Industries Federation of WA and Chair of the National Association of Forest Industries (NAFI)	Member, Communications Committee	Joined the Board in Oct. 2006 in a non-executive capacity.
James Balfour Reid (Jim) (B.Sc(Hons), PhD, D.Sc, FTSE; David Syme Research Medal (1989); Royal Society of Tasmania Medal (2000)	Dean, Faculty of Science Engineering and Technology, University of Tasmania	Member, Remuneration and Nomination Committee Chair, Commercialisation & IP Committee	Joined the Board at incorporation of the company on 30 June 2005 in a non-executive capacity.
Geoff Wilson (B.Sc. M.Sc. D.Sc. PhD, FTSE, FAIP FAIM MAICD, AM)	Currently a member of the Board of the Australian Maritime College (University of Tasmania) and Chairman of the Board of AMC Search	No committee membership at present	Joined the Board on 28 April 2009 in a non-executive capacity.
Robert Geoffrey Woolley (B.Ec, FCA)	Chairman of the Forests and Forest Industry Council of Tasmania (FFIC), Chairman of Tasmanian Pure Foods Ltd and Director of Tandou Ltd	Chair, Compliance Committee	Previously a partner in Deloitte Touche Tohmatsu and former Managing Director of Webster Ltd; has extensive experience in management, business recovery and a professional background in financial services. Joined the Board on 12 December 2005 in a non-executive capacity.
Gordon Anthony Duff (B.Sc. (Hons), PhD, FAICD)	CEO, CRC for Forestry Member of the Board of the Northern Territory Environment Protection Authority Chairman, Forest Practices Authority Tasmania (FPA)	Chief Executive Officer, CRC for Forestry Ltd	Previously CEO of the CRC for Tropical Savannas Management; joined the CRC for Forestry on 2 October 2006.
Mark Sheldon-Stemm (Cert. Comm, B. Soc. Sc, Grad Dip, Agr. Econ, M. Mgt, FPNA)	CRC for Forestry	Company Secretary, CRC for Forestry Ltd	Joined the CRC in Jan. 2008; previously Manager of the Burnie campus of the University of Tasmania; currently Chair of Kentish Regional Clinic Inc.

Program leaders

Name	Organisation	CRC position/role
Dr Mark Hunt	Queensland Department of Employment, Economic Development and Innovation/ University of the Sunshine Coast	Manager, Research Program One
Dr Chris Harwood	CSIRO	Manager, Research Program Two
Mr Mark Brown	University of Melbourne	Manager, Research Program Three
Professor Brad Potts	University of Tasmania	Manager, Research Program Four
Mr Tom Fisk	CRC	Industry Engagement Manager
Professor Peter Kanowski	Australian National University	Chair, Education Committee

Committee membership and meetings

The following table sets out the number of Directors' meetings (including meetings of committees of Directors) held during the year and the number of meetings attended by each Director (while they were a Director or committee member). During the year, four Board meetings, four Compliance Committee meetings, two Communications Committee meetings, and one Commercialisation and Intellectual Property Management Committee meeting were held. The Remuneration and Nomination Committee did not meet during the year.

	Board of Directors		Remuneration and Nomination Committee		Compliance Committee		Communications Committee		Commercialisation & IP Management Committee	
Directors	Held	Attended	Held	Attended	Held	Attended	Held	Attended	Held	Attended
Kate Carnell	4	4			4	4	2	1		
Timothy Browning	1	1			2	2				
Lyndall Bull	3	2			1	1				
Hans Drielsma	4	4					2	2		
Gary Inions	4	3							1	1
Bob Pearce	4	4					2	2		
Jim Reid	4	3							1	1
Geoffrey Wilson	1	1								
Robert Woolley	4	3			4	4				

Board advisory committees

o Compliance Committee

The Compliance Committee meets quarterly in advance of the Board meetings to receive the draft financial statements, budget and participants' report package, oversee risk management monitoring and reporting, receive and review reports from the auditors and address any other major financial impacts of the company's business.

Member	Position
Robert Woolley (Chair)	Board Member
Kate Carnell	Chair of the Board
Lyndall Bull	Board Member
Gordon Duff	CEO
Mark Sheldon-Stemm	Business Manager and Company Secretary (Secretary)
Shelley Caswell	Finance and Administration Manager

o **Commercialisation and Intellectual Property (IP) Management Committee**

The Commercialisation and IP Management Committee met once during the year. The Committee's purpose is to review company strategies for determining appropriate 'path to adoption' for each CRC research output, within the context of the CRC's IP portfolio, including use of external and in-house expertise; formulation of commercialisation plans for those outputs identified as having potential beyond own use by industry participants; and policies and associated training and documentation activities for management of IP generated by CRC for Forestry research.

Member	Position
Jim Reid (Chair)	Board Member
Gary Inions	Board Member
Charlie Day	University of Melbourne, Joint Ventures
Tom Fisk (Secretary)	Industry Engagement Manager
Gordon Duff	CEO
Mark Sheldon-Stemm	Business Manager and Company Secretary

o **Communications Committee**

The Communications Committee meets quarterly in advance of the Board meetings to review the company policy and strategies for communicating with management of CRC for Forestry participant organisations, staff and students of participant organisations actively engaged in conduct of CRC business, third-party organisations with an interest or potential interest in the outcomes of CRC research, and the media. The Committee will also receive and review quarterly reports of progress against the communications plan, together with the forward program, as a basis for ongoing advice to the Board; and provide advice to the CEO and Communications Manager on matters relevant to the Charter.

Member	Position
Hans Drielsma (Chair)	Board Member
Kate Carnell	Chair of the Board
Bob Pearce	Board Member
Gordon Duff	CEO
Prue Loney (Secretary)	Communication Manager

o **Strategic Policy Committee**

The Strategic Policy Committee is responsible for strategic planning and is convened as required. No meetings were held during 2008–09.

o **Remuneration and Nominations Committee**

The Remuneration and Nominations Committee membership is dependent on the type of business which needs to be transacted. The Chair will normally be the Chair of the CRC (unless the matter to be addressed relates to the Chair's appointment, performance appraisal or remuneration). The committee is convened, and membership determined, as necessary to address matters in relation to nominations for vacant Board positions; and determination of job specifications, advertising, selection, performance appraisal and remuneration of senior company executives. No meetings were held in 2008–09.

Member	Position
Kate Carnell (Chair)	Chair of the Board
Hans Drielsma	Board Member
Gary Inions	Board Member
Jim Reid	Board Member

CEO committees

The CEO, subject to the oversight of the Board, has established the following committees with relevant interests and expertise to advise on the management of the CRC for Forestry:

o **Management Committee**

The Management Committee is a decision-making body meeting in excess of six times per year to assist the CEO, and is the prime forum for managing the day-to-day activities of the CRC.

Member	Position
Gordon Duff (Chair)	CEO
Mark Hunt	Program Manager, Program One
Chris Harwood	Program Manager, Program Two
Mark Brown	Program Manager, Program Three
Brad Potts	Program Manager, Program Four
Tom Fisk	Industry Engagement Manager
Peter Kanowski	Education Chair
Mark Sheldon-Stemm	Business Manager
Prue Loney	Communications Manager
Shelley Caswell (Secretary)	Finance and Administration Manager

o **Education Committee**

Membership includes a representative from each participating university. Meetings are held as necessary to address issues of student recruitment, management, and leadership development; and development of short courses for industry.

Member	Position
Peter Kanowski (Chair)	Australian National University, Chair
Neil Davidson (Secretary)	University of Tasmania
Chris Weston	University of Melbourne
Mervyn Shepherd	Southern Cross University
Treena Burgess	Murdoch University

o **Program coordinating committees (PCCs)**

PCCs are chaired by an industry-based representative, and consist of representatives drawn from each participant that is active in the relevant program, plus the research program manager (who also acts as Secretary). Note: core participants and multi-core participants (acting as a group) can elect to be on each committee. Supporting participants nominate one of the four.

The PCCs meet at least twice-yearly to address any major issues arising from research work conducted within the relevant research program. In general the role of the PCCs is to assist the CEO in carrying out the CRC program as broadly defined in sections 16–21 of the Participants Agreement, in the best interests of all participants. Research program managers and PCC chairs organise the business of each PCC to most effectively achieve this aim.

o **Project steering committees (PSCs)**

PSCs are chaired by industry-based representatives, and consist of representatives drawn from each participant active in the relevant project, plus the project leader (who also acts as Secretary). Their role is to oversee implementation of the project as defined in the project agreement, and to oversee that the requirements of clause 18 of the Participants Agreement are met. Meetings are normally held at least quarterly.

Private sector representation on the Board and committees

Under the Participants Agreement, the composition of the Board must include a majority of members who have a background in the forest industry. All other committees (except the CEO's management and education committees) have at least one industry representative. Six of the eight Board members are drawn from the private sector, including one from a government business enterprise.

Changes to participants

The CRC admitted one new member during the 2008–09 year: VicForests joined the CRC into Program Three ‘Harvesting and operations’. Other notable developments during the year included the placement of two of the CRC’s participants into administration and receivership. In April 2009, Timbercorp Ltd was placed into administration, with the CRC working closely with Timbercorp administrators to ensure research was maintained and research sites were secured for access. In May 2009, Great Southern Limited was placed into administration and receivership, with the CRC again working closely with the administrators and receiver/managers to ensure continuity of research. Developments are being monitored with both of these participants and the CRC is working with all parties to ensure research and participant contributions are maximised, to the benefit of all parties.

Changes to participants

Participant's name	Commonwealth approval Y (Yes) N (No)
VicForests	Y (09/09/2009)

Variation to the Commonwealth Agreement

In June 2009 a variation to the Commonwealth Agreement was submitted to the Department for approval. The variation to the agreement was in the area of milestone changes to Program Three and Program Four, as agreed to by all participants to those programs, as well as the admittance of VicForests to the CRC and schedules. This variation was signed off by the Department in September 2009 and reported against in regard to milestones and contributions for the 2008–09 year.

Research programs

Program One 'Managing and monitoring for growth and health'

Manager: Dr Mark Hunt

Summary

One of the key challenges for forest managers today is the capacity to turn increasing amounts of data and a myriad of technologies into valuable information and useful tools—preferably in the same package. This is the mission of Program One.

Forests are increasingly managed for a range of products and purposes. These include not only providing fibre and timber products but also water and carbon. Consequently, we need to understand how to optimise forest management and we must understand the effects of different management approaches on more than one outcome or output.

Furthermore, as our national forest industries are embracing new species planted in new environments where experience is limited, we also make predictions on the success of these forests and take into consideration the uncertainties of a changing climate.

Program One focuses on investigating questions that help us develop a much deeper understanding of the forest estate, developing models to make predictions and putting these models into decision-support systems to meet the needs of tomorrow's forest managers.

The program is structured around four research projects addressing four key themes:

- o **Project 1.1 'Monitoring and measuring'**

Project 1.1 aims to deliver new techniques and technologies for evaluating soil and site characteristics, for remotely sensing forest health and condition and for carrying out stand inventory.

- o **Project 1.2 'Managing and sustaining'**

Project 1.2 focuses on building an understanding of the climate, site and biotic factors that affect plantation productivity, and developing hazard and risk assessment techniques and robust management systems to reduce the probability of loss of production and ensure sustainable production through multiple rotations.

- o **Project 1.3 'Modelling and information integration'**

Project 1.3 will develop decision support tools for the prediction of genotype, site and management effects on stand production; end-use suitability of plantation-grown products; stand-scale fluxes of carbon and water; and risks inherent in plantation development.

- o **Project 1.4 'Modelling and risk assessment for new environments'**

Project 1.4 focuses on developing sufficient understanding of the physiological and environmental determinants of growth and profitable plantation development in new environments to predict forest performance.

Key research achievements

Project 1.1 'Monitoring and measuring'

The three subprojects within Project 1.1 'Monitoring and measuring' have all moved ahead during the past twelve months with substantial progress particularly being made in the area of remote sensing for change detection.

- o **Subproject 1.1.1 'Rapid site evaluation'**

Subproject 1.1.1 is focused on developing capability to predict soil physical characteristics (particularly depth) based on an understanding of topography, climate, geology and soil forming and transport processes and is the key area of work that is on track to deliver **Milestone R 1.1.2** next year. This objective is being approached through the building of one or more supply-transport models that can be used operationally by forest managers as part of their suite of mapping tools or can be used to provide inputs into various predictive growth models.

- o **Subproject 1.1.2 'Monitoring forest health with remote sensing'**

In Subproject 1.1.2, methods for interpreting forest health from time-series MODIS (Moderate Resolution Imaging Spectroradiometer) satellite images continue to be developed (**Milestone R 1.1.3**). Recent work regarding methods for

detecting, quantifying, and forecasting tree mortality and changes in forest health has been published in several peer-reviewed papers and was short-listed for the National Fresh Science awards in 2009. Two state forestry agencies (Forests NSW and the Victorian Department of Sustainability and Environment) are currently assessing ways to incorporate this research into operational systems within their own organisations. Canadian State Forest Services also expressed interest in implementing these methods, and the team has been invited to submit a paper on the CRC work to a special issue for the *Canadian Journal of Forest Research*.

o **Subproject 1.1.3 'Improved forest inventory using high resolution remote sensing'**

Subproject 1.1.3 is concentrating on the application of airborne laser scanning to forest inventory, building on work already delivered against **Milestone R 1.1.1**. Current work is focused on the capacity to acquire and process airborne laser scanning data to successfully extract forest metrics that can be used to derive inventory information. One stream of the research is concentrating on methods to extract stand- and tree-level metrics from the data. At the stand level, these metrics include height percentiles, measures of canopy density and canopy surface texture; and at the tree-level, metrics such as tree location, tree height and crown extent. The second stream of the research is concentrating on building allometric and spatial models for prediction of forest inventory from these stand- and tree-level metrics.

During 2008–09, progress on Subproject 1.1.3 was delayed by the loss or temporary unavailability of key staff and one research higher degree student. This delay will be addressed by additional time allocations and contract employment during the first half of 2009–10, and consequently these challenges have not compromised the project's ability to deliver milestones to industry partners and the Commonwealth.

Project 1.2 'Managing and sustaining'

Whereas Project 1.1 focuses more on assessing the state of the site or the forest at a point in time, and on how that changes through time, Project 1.2 is tasked with understanding the processes driving change and deriving responsive management strategies, both throughout a rotation and from one rotation to the next.

o **Subproject 1.2.1 'Sustaining site resources'**

One of the key Program One achievements for the year has been the release of a beta-version of the web-based decision support system BPOS, for testing by industry partners (**Milestone R 1.2.1**). Much activity and interest over the past year has been around delivery of models and model outcomes to industry, and the BPOS model is seen as an approach that may have broader application. Consequently, the testing and review time for industry partners to participate in fine-tuning BPOS was extended by 12 months in order to make the most of opportunities to consider this as a delivery platform for other modelling products within the program. Additional outputs have included a CRC report detailing the current state of knowledge around resource availability in second-rotation plantations (proceedings from a workshop held in late 2007), with best-bet management guidelines arising from the synthesis.

Soil–water relations continue to be monitored at key experimental sites, and information about changes in nutrition and water availability from first to second rotation is greatly enhancing an understanding of key sustainability issues. This information is due to be synthesised into a CRC report and scientific manuscripts in the coming year.

o **Subproject 1.2.2 'Forest health'**

This project continues to examine the damage caused by the exotic pine aphid *Essigella californica*, a key pest of *Pinus radiata* in south-eastern Australia. Glasshouse and field trials have been set up to investigate physiological responses to aphid attack and to further inform remote-sensing interpretation and the process-based model CABALA. There appears to be a general increase in the extent and severity of defoliation caused by this pest insect throughout Green Hills, NSW. However, during autumn of 2007, tree deaths associated with the drought (below average rainfall since 2001) and the introduced bark beetle *Ips grandicollis* resulted in a significant mortality event in the northern section of Green Hills. The tree mortality event was captured by the high temporal resolution MODIS imagery and has been analysed. Similar tree mortality reoccurred in northern Green Hills last summer and it is thought that this was related to the heat-wave conditions experienced in the Hume region during late January to early February in combination with the ongoing drought conditions. Both MODIS and Quickbird imagery are being analysed with respect to this particular tree mortality event and the work in this project is tied very closely to that in Subproject 1.1.2. Successful delivery of **Milestone R 1.1.3** relies on this collaboration of remote sensing and forest health expertise across the two projects.

The changes to CABALA to incorporate capacity to predict effects of defoliation on productivity (CABALA Health) have been validated for eucalypts, but further validation is in progress for *P. radiata*. The application of CABALA Health to assist operational decisions is now being explored and this is seen as a key component of delivering **Milestone R 1.2.2**. Forestry Tasmania is developing a case study, using CABALA Health to assist in management decisions related to risk of pest damage/productivity trade-offs between planting *E. globulus* and *E. nitens*. The model is also being used to explore the effects of *Essigella* attack on pine productivity in the NSW Green Hills estate, and to examine the impacts of pest disturbance on productivity in the Green Triangle. CABALA Health is also being used to examine pruning regimes/responses in eucalypts.

Project 1.3 ‘Modelling and information integration’

The work in Project 1.3 delivers both improvements to our process understanding of trees and forests (specifically, the effects of competition) and the incorporation of these and other important processes into the wider Program One modelling framework that is being used to understand and predict forest growth and productivity. The integrated modelling work in this project underpins the program’s ability to deliver several milestones that are based on research being done across several projects and subprojects. A number of significant advances have been made during the year. The paired plots network has expanded from approximately 10 to more than 40 sites throughout Tasmania and the Green Triangle, providing valuable data on the impacts of weeds on forest growth and productivity at a range of scales (an important component of **Milestone R 1.3.2**). In parallel, the network of vegetation survey sites has also been expanded with more than 30 sites surveyed for understorey composition in structure in two forest-age classes (0–3 year old and 6–9 year old). This will be an important database on which to develop a mechanistic understanding of understoreys and will form the basis of a ‘functional classification’ of understorey types in production forestry. We have also characterised spatial and temporal patterns of understorey leaf-area index and water use. This information will form an important component of the forest water-balance studies being conducted by Forestry Tasmania in the Florentine Valley in Tasmania. Furthermore, the information is being collected to build a better mechanistic understanding of the processes controlling understorey water use and the implication of this for forest growth and water balance.

Work on the integration of the cellular automata model into the CABALA framework continues and is due for completion in the coming year. A working prototype has been available for some time (**Milestone R 1.3.1**) and will be presented and discussed at a program modelling workshop and PCC meeting in November. Finalisation and industry partner feedback about the model has been delayed to accommodate assessment of the BPOS framework as a potential delivery system for this product.

Project 1.4 ‘Growth modelling and risk assessment for subtropical hardwood species’

The Australian subtropics and tropics are environments where there has been much recent plantation establishment but where empirical knowledge of productivity and risk for hardwood species is very limited. Project 1.4 is a response to this knowledge gap, aimed at extending and enhancing the process understanding that has been developed in temperate and Mediterranean Australia and applying it to these new environments and species. The parameterisation of the physiological model CABALA for some key northern species of industrial significance is the framework within which this task is being undertaken.

The last year has seen a focus on experimental work needed to capture year-to-year and seasonal variability. All fieldwork aimed at measuring necessary photosynthetic parameters for applying the model CABALA to *Eucalyptus dunnii*, *Eucalyptus pellita* and *Corymbia citriodora* is now complete. The coming twelve months will see field research completed and the effort will be focused on model parameterisation, dissemination of results to industry and integration of outputs into the broader Program One deliverables.

Nature of major consultancies and their contribution to the CRC

No major consultancies have been undertaken within Program One during the past year.

Nature of any grants and how they contribute to the CRC

Previous research grants have been important for the development of the BPOS and cellular automata models that are now integral to Program One deliverables within the CRC. Minor research grants (through the ARC and from state government departments, for instance) have been important for assisting with postgraduate recruitment into Program One during the past year.

Any changes proposed to future research directions

There are no proposed changes to future research directions.

Program Two 'High-value wood resources'

Manager: Dr Chris Harwood

Summary

Program Two integrates research in genetics, silviculture and wood quality assessment to increase the value and profitability of eucalypt plantations grown for pulp-wood or solid-wood products.

The program aims to:

- o develop tools and methods to improve the quantitative and molecular breeding of eucalypts utilised for both pulp-wood and solid wood products
- o develop empirical models of growth and size-class distribution in silviculturally managed stands that will link to the process-based models developed within the CRC's Program One
- o develop an improved understanding of how the scheduling of pruning and thinning affect log and wood traits, processing performance and consequent value
- o improve the assessment methods for key wood traits at the individual tree and stand levels
- o develop decision support systems that integrate information on germplasm, site, silviculture and stand assessment to enable plantation managers to maximise profitability for defined end uses.

The program is structured around five research projects addressing five key themes:

- o **Project 2.1 'Breeding for high-value wood products'**
- o **Project 2.2 'Silviculture for high-value solid and engineered wood products'**
- o **Project 2.3 'Impact of silviculture interventions on wood quality into plantation estate management'**
- o **Project 2.4 'Incorporating wood quality into plantation estate management'**
- o **Project 2.5 'High-value wood products from subtropical plantations'**

Key research achievements

Project 2.1 'Breeding for high-value wood products'

The processing and product assessment of over 500 family-identified logs from a large progeny trial of *Eucalyptus nitens* was completed. Internal checking of boards was demonstrated, for the first time, to be under significant genetic control, showing that breeding to reduce the prevalence of this value-limiting defect will be possible (**Milestone R 2.1.1**).

University of Melbourne researchers searched for associations between identified variants of candidate genes and economically important growth and wood quality traits in *E. globulus*. A number of associations have been identified, and validated in an independent population, and are being examined for their potential to increase genetic gain in breeding programs (**Milestone R 2.1.3**).

The University of Tasmania research team in collaboration with DArT P/L and international stakeholders have successfully developed an array of 7700 DArT markers. These markers are being used to identify the regions of the *E. globulus* genome which have the greatest control over growth and important wood properties.

Putative association between single nucleotide polymorphisms (SNP) and wood quality traits in *E. pilularis* have been identified by the researchers at Southern Cross University (**Milestone R 2.1.3**). A second stage of SNP discovery is underway, expanding the gene set from 5 to 48 genes. A range-wide study of geographic variation in *Eucalyptus pilularis* has been completed so that an adequate account of genetic structuring is possible in association testing.

Project 2.2 'Silviculture for high-value solid and engineered wood products'¹

A second *Eucalyptus nitens* thinning trial at Lisle in north-east Tasmania established in 1997–98 has had its final measurement ahead of harvesting. Samples for investigating the effect of thinning treatment on the development of wood microstructure properties have been taken. The parallel set of samples taken from the first *E. nitens* thinning trial at Goulds Country, also in north-east Tasmania, have been examined using SilviScan™ to determine the impact of thinning on commercially important properties such as microfibril angle and intra-ring variation in wood density.

This work has been complemented by the temporal, high-resolution measurement of stem growth and cambial activity in thinned and unthinned stands at the third *E. nitens* thinning trial at Creekton in southern Tasmania. This work will improve our current understanding of wood formation and how it is influenced by climate, local growing conditions and inter-tree competition. Data from this work will be used for validating process-based models of wood formation such as CAMBIUM.

A thinning x pruning x fertiliser experiment in *E. nitens* at Carrajung, Victoria, remains the focus for ecophysiological studies of growth responses to silvicultural treatments. Final-lift pruning treatments and measurements to two years post initial treatment have been completed. Above-ground biomass and canopy architecture measurements were collected three years after initial treatment.

Rotation-length growth data from eight stocking or stem density trials in *Eucalyptus globulus* plantations in Western Australian pulp-wood plantations were analysed to determine effects on growth, tree diameter distribution at harvest, recovery of marketable pulp-wood, harvesting cost and financial returns.

In Tasmania, Victoria and Western Australia, key silvicultural trials and permanent sample plots comparing thinning regimes in *E. nitens* and *E. globulus* plantations were remeasured. This data is being used in analysis of treatment responses and for growth and yield modelling.

A framework for the selection and timely application of decision support systems to the management of hardwood eucalypt plantations for high-value solid-wood products (that is, sawn timber and veneer free of value-limiting defects) was designed and discussed (**Milestone R 2.2.5**).

Thinning response trials in young plantations of *E. dunnii* and spotted gum in south-east Queensland and northern NSW were maintained and assessed. Glasshouse trials are in progress of physiological and growth responses to repeated pruning in a range of subtropical species.

The major silvicultural trial testing different thinning and pruning treatments for *Corymbia* hybrid established in May 2008 was written off because of poor survival resulting from the combined effects of drought, frost, disease, animal browsing and chemical spray drift.

Project 2.3 'Impact of silviculture interventions on wood quality'

The second major processing trial for checking and end-splitting in sawn boards of plantation-grown *E. nitens* was completed and results were analysed. A linear sawing system, the HewSaw R250, delivered improved sawing accuracy, and with controlled drying schedules there were marked reductions in board surface checking. Visible surface checking on back-sawn boards was reduced by more than 80%. Over 88% of boards in the Phase 2 study were free from surface checks. Internal checking was also reduced in the Phase 2 study, with 54% of boards having no internal checking (**Milestone R 2.3.1**). (**Milestone R 2.3.2** was covered in the previous annual report.)

Project 2.4 'Incorporating wood quality into plantation estate management'

Several 'technology-evaluation' pilot projects are being carried out in collaboration with CRC industry partners using near-infra-red (NIR) spectroscopy to predict wood cellulose content and pulp yield (**Milestone R 2.4.1**). These projects have made predictions from wood-meal samples prepared by grinding wood cores and disks, using the global calibrations developed by the CRC for Forestry and the CSIRO over recent years. We have also continued to develop in-field applications for hand-held NIR instruments, where the aim is to predict cellulose content in samples taken non-destructively from standing trees without the delay and expense involved in drying and grinding the samples to wood-meal. The hand-held NIR system has been evaluated and tested in the field by four industry partners (**Milestone C&U 2.4.1**).

We have also developed prototype radial-scanning calibrations for the prediction of pulp yield and cellulose content from *E. nitens* and *E. globulus* radial wood samples. We anticipate that the cellulose calibrations will enable the low-cost detection of tension wood by radial NIR scanning, so plantations can be screened for tension wood occurrence, which creates problems in processing *E. globulus* (**Milestone R 2.4.2**).

¹ Includes preparatory work for Project 2.5 'High-value wood products from subtropical plantations', which will commence formally as a separate project in July 2009.

Nature of major consultancies and their contribution to the CRC

A small consultancy for an external firm was undertaken to measure basic density of wood samples.

Nature of any grants and how they contribute to the CRC

No additional grants were made to the program during the year.

Any changes proposed to future research directions

The Program Coordinating Committee (PCC) at its November 2008 meeting determined that available resources would not be sufficient to conduct the major processing trials on plantation-grown *E. globulus* that had been scheduled as part of the work program for Project 2.3 (**Milestone R 2.3.2**). Because processing trials undertaken outside of the CRC indicate that tension wood is the primary cause of board degrade in pruned *E. globulus*, effort will instead focus on surveys of *E. globulus* plantations, using radial scanning of wood samples, to better understand and predict the occurrence of tension wood, as affected by site, silviculture and genetics (**Milestone R 2.3.2**).

Program Three 'Harvesting and operations'

Manager: Mr Mark Brown

Summary

One of the greatest cost components in the production of forest products is the cost of harvesting and transport. Therefore these operations must be efficiently planned and implemented to ensure that they are cost-effective and safe.

The primary objective of Program Three is to significantly improve the efficiency, effectiveness and safety of the forest harvesting and transport operations of the CRC's industry partners through the application of quality study results in harvesting and transport operations across a range of Australian industrial forest conditions. Through this research and the application of the results, a secondary objective of building capacity of technical expertise in forest harvesting and transport operations in Australia will be achieved.

Unlike our other core research programs, Program Three does not have any official projects. It is, however, structured around five key themes:

- developing a better understanding of the performance of different harvesting equipment in different conditions to make harvesting more efficient and cost-effective
- improving productivity and the cost of applying different harvesting systems across sites and operations in Australia
- improving value recovery and utilisation of the forest resource during harvest
- testing the application of technology in transportation for improved efficiency
- developing and testing improved logistics techniques for improved transportation efficiency.

Key research achievements

With most key staff members in place and strong contributions from international partners, Program Three has made significant progress over the last year.

Past work has been documented internally to facilitate the progress for ongoing activities including industry evaluations of usage of onboard systems and historical harvesting costs in plantation hardwood harvesting (**Milestone R 3.1.1 & Milestone R 3.2.1**). Due to the sensitive nature of the data, it was collected with confidentiality commitments and to inform our research activities and will not be published. We have also completed the documentation and reported back to industry on the evaluation of the growing harvest and haulage needs in the Green Triangle region and a series of harvest planning workshops done in 2007 (**Milestone R 3.2.10 & Milestone C&U 3.2.6**). With past milestones formally addressed, current activities have taken priority to keep the program on track with the current and future milestones.

Optimisation and value recovery

Initial work has taken place in the area of optimised product selection in pine plantation harvesting using onboard computer systems in mechanical harvesters. Initial discussions revealed that the limited use of the technology was due to both technical challenges that Program Three could help address with research work, and policy issues within the industry.

The first technical concern with the technology is the accuracy of the measurements being made by the harvester. This was addressed by a short research project that looked at the quality of manual measurements, the quality of harvester measurements and methods to quickly and effectively calibrate the harvester to deliver accurate measurements for the product optimisation function of the computer system.

With measurement quality established, the next technical issue was ensuring those measurements can be translated effectively for optimised log selection from the pine trees harvested. In doing the research to determine a good bark function for radiata pine in Australia, it was identified that none of the available functions on the harvester computers could be adapted to give a good fit. A literature search revealed similar conclusions had been reached in other areas of the world that grow radiata pine. A function has been developed through this published information, the bark-thickness data collected in Australia and an understanding of what measurements can be used in the harvester optimisation systems. CRC for Forestry Program Three researchers are now in discussions with the StandForD committee (which controls the standard functions and data collection with in-harvester computers), to introduce the function for radiata pine so optimisation can be more effectively introduced for the radiata pine harvesting industry (**Milestone R 3.2.2**).

To further expand on value recovery in harvest operations, Program Three has also been involved in evaluation of LiDAR technology, both ground based and aerial, for better pre-harvest value prediction and planning. The trial looked at new ground-based LiDAR technology to get detailed tree shapes to predict the best value products that could be harvested. The results were then compared to what was achieved with the harvester using optimisation and with general stocking information from aerial LiDAR. The trial has shown opportunity to increase value recovery with the combined use of this technology and additional trials are being done in comparison to manual sampling methods to identify the most cost-effective way to implement the ground-based LiDAR technology (**Milestone R 3.1.3**).

To further assist industry in engaging in optimisation and other value recovery techniques during harvest, Program Three delivered a series of four one-day workshops on the latest methods and technology for value recovery in harvest operations with international expert Dr Glen Murphy (**Milestone C&U 3.2.7**).

Onboard computers for effective operations management

With high capital investment in modern harvesting operations, getting maximum performance with high utilisation and productivity is critical for cost-effective operations. International management of forest operations has shifted to rely on different levels of onboard computer technology to collect and manage the data needed to effectively manage their operations. Published examples from Canada and Sweden show improvements in efficiency, productivity and utilisation as high as 30% in operations that make effective use of onboard computer systems to track and manage forest operations.

With increased mechanisation in Australian forest operations, the CRC for Forestry partners recognise that the introduction of onboard systems to their operations will be important to keep pace internationally on the costs of delivering wood fibre. The CRC for Forestry will play an important role in identifying the needs of the Australian industry and technology best suited to meet those needs.

Program Three has acquired a set of purpose-designed onboard computer systems and reporting software, Multidat, to support shift-level data collection in research projects. This approach aims to familiarise the research team with the technology and allow some controlled introduction of the technology in Australian operations. Over the last year, two research projects have been supported with the Multidats, providing information on machine utilisation, movement and work time.

Program Three has successfully obtained Forest and Wood Products Australia (FWPA) support to expand their work in onboard computer systems. The project will carry out three industry case studies implementing different levels of onboard computer systems and will provide the Australian forest industry with an onboard computer selection and implementation guide.

Harvest system productivity modelling

A major output for Program Three is a machine productivity and cost model. To effectively produce this model, extensive machine performance evaluations are required.

As a first step, the Program Three research team has established a standard approach to machine evaluation for the Australian forest industry that is equally applicable at a front-line industry level as well as in research projects. Further, through collaboration with groups in New Zealand and South Africa, countries with similar plantation forestry operations as Australia, the standard is set to be adopted more broadly in the Southern Hemisphere. This means that more evaluation results will be easily transferable to the Australian industry and potentially feed the Program Three model. The machine evaluation framework has been used to structure the many machine evaluations conducted by Program Three over the last year, and will be the foundation for a machine evaluation toolbox being developed for the CRC for Forestry industry partners. It was also used as the main structure for a series of five machine-evaluation workshops delivered to industry over the last year, equipping them to do basic evaluations compatible with CRC for Forestry methodology to address specific issues in their operations (**Milestone C&U 3.1.1**).

Five major machine-evaluation studies have been completed over the last year as well as a series of nearly 60 smaller machine-observation studies (**Milestone C&U 3.2.2**). First was the completion of a harvest system comparison study in native forest thinning that looked at two relatively common machine combinations, using either a mechanical harvester to produce logs, or using a combination of a mechanical feller and a mechanical processor to produce logs. The study concluded that the harvester approach was consistently less expensive across the conditions studied with cost savings of \$2 to \$14 per tonne of wood.

In the second detailed study, similar harvesting equipment was used with modified work methods for thinning eucalypt plantations. The study found that the two methods resulted in effectively the same machine productivity and cost.

The third study looked at a relatively complex harvesting system used in plantation eucalypt harvesting for the production of pulp chips. It found that while three of the four machine types in the system had a utilisation of 70% or more, the most expensive machine in the system had a utilisation below 50%, and over half of the unutilised time could be explained with operational delays of less than 15 minutes each. With significant cost savings possible, Program

Three is now working with this partner to identify the cause of delays to develop a better work method for this machine type that can be adopted by all our industry partners to get maximum utilisations and, as a result, reduced unit costs.

The fourth major study partnered with Forestry Tasmania to compare operator-selection thinning and pre-harvest-selection thinning. It was found that productivity was equivalent for the two methods. Forestry Tasmania found the quality of the resulting stand was much better with the pre-selection method.

The last major machine evaluation looked at the impact of different stocking levels (trees per hectare) and resulting tree size difference on harvesting productivity in eucalypt plantation final-felling operations. The study found that the productivity of the harvesting operation increased by more than 65% which reduced the unit cost to harvest by about 40%. The resulting models will be useful for predicting harvesting productivity across the range of tree sizes. These harvesting results can add to the water and land-use results to allow industry to make more informed decisions about managing their plantations and stocking levels.

Finally, in the area of machine evaluation and modelling, over 60 machine observations were completed in the eucalypt plantation industry. It was identified by Program Three that within the eucalypt plantation harvesting industry there was a relatively wide range of systems working in a wide range of operating conditions, yet there did not appear to be a strong connection between what system was used in a given condition. Program Three has conducted a series of short observation studies to determine general productivity and utilisation for a given machine and condition. The full range of results are being used to populate a matrix of machines versus harvest conditions so that trends can be investigated, productivity predictions can be made and critical combinations can be identified for more detailed productivity studies.

Based on all this progress in understanding machine productivity in Australian forest operations, a preliminary version of the Program Three machine productivity and costing model will be made available to our industrial partners over the next twelve months.

Transport payload efficiency

In any transportation operation one of the key drivers of efficiency is the load or the payload that can be transported each trip. Total weight allowed is limited, to protect the public infrastructure from undue damage, and to ensure the safety of all road users. In this controlled condition, once the most efficient configuration is selected, the only way to increase the weight of cargo transported per trip is to select vehicle designs to minimise the empty weight (tare weight) so more of the weight limit can be used for cargo.

As an initial evaluation of the payload efficiency, the weighbridge data for six to twelve months of deliveries from six Program Three industry partners were collected and the tare weights were analysed. Variations in tare weight of 22% to 41% were identified in the fleet, representing an increase in transport cost between \$1.60 to over \$5.00 per tonne transported, using 0.6 L to 1.4 L more fuel per tonne of wood transported. Based on the results of this analysis, industrial partners are working with their haulage contractors and Program Three to identify strategies to reduce the tare weight variation (**Milestone R 3.2.7**).

Truck scheduling and logistics management

In an attempt to improve the decision process in planning and scheduling transport activities, Program Three has developed a truck schedule optimiser that is able to provide an optimised truck schedule for a given number of harvest operations. By running different conditions, land-owners can make acute predictions on a strategic and tactical level about truck fleet needs and unloading infrastructure needs to limit operational bottlenecks. On an operational basis, daily schedules can be generated that make the best use of the fleet and infrastructure on the day. The prototype version of the tool has been provided to some of our industry partners for application assessment to identify changes that might be needed to make the tool operational. In one case a partner is using the tool to make tactical infrastructure decisions by examining truck fleet and transport efficiency with one or two unloading units at a new port facility. A second partner is looking at comparing their haulage performance using an expert-driven, real-time logistics management system and what could be obtained with an optimised solution.

Nature of major consultancies and their contribution to the CRC

No consultancies were undertaken during the year.

Nature of any grants and how they contribute to the CRC

Program Three has secured funding support from Forest and Wood Products Australia (FWPA) for a two-year project: 'Development of selection and implementation guide for the use of onboard systems for Australian forest operations'.

The CRC for Forestry, with this project, intends to:

- o explore the existing range of equipment and implementation methods for forest equipment tracking and management
- o identify those best suited to the Australian context through consultation with Australian forest industry stakeholders
- o conduct trial implementations with three collaborating industry partners and draw information from existing installation in the Australian forest industry
- o adapt data management and reporting software, combine appropriate data collection tools to address unique data needs and define an Australia-specific implementation strategy based on industry stakeholder feedback and trial results
- o develop and deliver to industry a machine tracking and management system selection guide, an implementation guide and basic supplemental data analysis spreadsheets/software for unique Australian needs.

This project will develop and deliver:

- o a machine tracking and management system selection guide (report and interactive web tool)
- o an implementation guide (report, job aids and reference cards)
- o basic supplemental data analysis tools for unique Australian needs (spreadsheets/software as appropriate)
- o four regional one-day workshops to introduce the outputs to the industry.

Forests and Wood Products Australia (FWPA) is contributing \$348 000 to the project which was leveraged with cash and in-kind contributions from Program Three and three industry partners totalling \$373 038 for a total project budget of \$721 038.

Any changes proposed to future research directions

No major changes to program direction during the year.

Program Four 'Trees in the landscape'

Manager: Professor Brad Potts

Summary

Program Four focuses on developing forestry practices that meet and improve upon agreed environmental certification requirements and foster constructive community engagement. These practices are important as they will provide security for the forest industry's long-term 'licence-to-operate' in the Australian landscape, and build international recognition of sustainable forest practices for product marketing.

The program is structured around six research projects addressing six key themes:

- o **Project 4.1 'Water quantity and quality'**

Changes to forest cover have the potential to alter catchment water balance, and there are community concerns that forestry operations such as harvesting and fertilisation can affect water quality, stream morphology and aquatic habitat. The overall aim of this project is improved prediction of water quantity and quality responses to a range of forestry practices.

- o **Project 4.2 'Biodiversity'**

This project provides research to inform the development of strategies, protocols and policy to ensure that biodiversity values are sustained and enhanced in the forest environment and landscapes.

- o **Project 4.3 'Communities'**

It is important to understand the social and economic implications of ongoing change within the forest industry, as well as the impact of changes in rural and regional areas on the forest industry. Research is therefore being conducted into the social dimensions of Australia's forest industries to ensure our forest and plantation management is socially as well as environmentally sustainable.

- o **Project 4.4 'Industry pest management group (IPMG)'**

This project coordinates regular monitoring of natural enemy and insect herbivore activity in blue gum plantations, develops protocols for assessment of insect pests for project partners and provides regular technology transfer through field days and training of company personnel.

- o **Project 4.5 'Land-use change'**

This project was largely funded through external sources (FWPA, DPI Victoria and the Green Triangle Regional Plantation Committee, GTRPC) and aims to develop a comprehensive understanding and quantification of land use, industry and socioeconomic change across the Green Triangle and Central Victoria region since 1991, and how different parts of the community perceive these changes. It is responsible for developing strategies to improve community engagement and develop modelling tools to assist in planning activities related to land-use change.

- o **Project 4.6 'Water use and water-use efficiency of eucalyptus plantations: from stand to catchment scale'**

This new project commenced in December 2008 and aims to improve our understanding of the effects of plantation establishment and management on water use and water-use efficiency from the stand to catchment scale. This project will draw on outputs from Program One and Project 4.1.

The diverse portfolio of projects and activities in Program Four will be covered in this report under three headings:

- o Project 4.1 'Water quantity and quality' (linked with Project 4.6 'Water use and water-use efficiency of eucalyptus plantations: from stand to catchment scale')
- o Project 4.2 'Biodiversity' (linked with Project 4.4 'Integrated pest management group')
- o Project 4.3 'Communities' (linked with Project 4.5 'Land-use change').

Project 4.1 'Water quality and quantity' (linked with Project 4.6)

Project Leader: Dr Don White

Key research achievements: Project 4.1 and 4.6

This section reports activities and achievements for Projects 4.1 and 4.6 which are concerned with the effects of forest management on water quality and stream flow (water yield). Our work is delivered through six subprojects:

- o Subproject 4.1.1 'Integrating forestry and agriculture for productivity and environmental benefits in medium to low rainfall zones'
- o Subproject 4.1.2 'Impacts of forest harvesting and re-establishment on stream yield and water quality'
- o Subproject 4.1.3 'Impacts of forest management on stream yield, water quality and hydrological processes in the riparian zone'
- o Subproject 4.1.4 'Relating forest management to stream ecosystem condition in middle and lower catchment reaches in Tasmania'
- o Subproject 4.1.5 'Commercial forestry in the riparian zones of farms'
- o Project 4.6 'Water use and water-use efficiency of eucalyptus plantations: from stand to catchment scale'.

Collectively these projects aim to develop a process-level understanding of the relationships amongst forest management, productivity and water outcomes. The subprojects deliver to three main outcome areas or themes: (i) water yield, (ii) water quality, and (iii) growth and water use of plantations.

Water yield

Several of the subprojects in Project 4.1 are concerned with the effects of forest management (including plantation establishment) on catchment yield or stream flow (4.1.1, 4.1.2, 4.1.3 and 4.6). This work on water yield is augmented by a number of projects in Program One that are quantifying and building models of plantation water use at the stand scale.

Good progress was made during the year on work looking at the long-term effects of thinning on vegetation condition and structure and water yield. This work also adds to and benefits from ongoing University of Melbourne research into predicting hydrologic responses to native forest disturbance.

Work in Western Australia focuses on the role of commercial plantations in managing dryland salinity. An additional major site has been added this year making three in all. The project is now making significant progress towards addressing **Milestone C&U 4.1.1** which will be completed during the early part of 2010.

Twenty additional sites have been established in mature plantations in conjunction with the Strategic Tree Farming project in WA to examine the effects of dispersed tree plantings (belts) on water tables and the amount of lateral flow in groundwater induced by removal of water under the plantings, addressing **Milestone C&U 4.1.2**. A technical report on the hydrogeography of all the sites at plantation establishment is being prepared (partial fulfilment of **Milestone R 4.1.2**; also **Milestone C&U 4.1.1**). The work was underpinned by an extensive literature review of the current understanding of using plantations integrated into farming systems for salinity control, and the follow-on effects for carbon capture and accounting (**Milestone R 4.1.1**).

The Tasmanian work has focused on analysis of datasets from the Warra long-term experimental catchments. This work will explore the main factors determining rainfall-runoff relationships and thresholds, leading up to partial fulfilment of **Milestone R 4.1.3**, on track for completion by December 2011.

Early in 2009 two new PhD students were recruited to the project. One will explore the effect of changed rainfall patterns on stream-flow generation processes as a basis for analysing the possible effects of climate change and opportunities for management (linked to **Milestone R 4.1.3**). The other is seeking to develop practical tools for forest and water resource managers to assess the hydrologic effect of plantations in catchments (linked to **Milestone R 4.1.2**).

Last year we reported on an important study on the stand-scale growth, water-use efficiency and nutrient cycling of mixed *E. globulus* and *Acacia mearnsii* stands. This work has now been published and represents one of the first published studies of the water-use efficiency of wood production in plantations worldwide.

Finally, the Croppers Creek catchment in north-east Victoria that was burnt in the 2006–07 bushfires has given us an opportunity to measure and compare the early response of burnt mixed-species eucalypt forests and second-rotation pine plantations. Modelling of pre-fire radiata pine water use at both plot- and catchment-scales in a parallel project using the 3PG+/CAT modelling framework has proven successful (**Milestone R 4.1.2**; **Milestone C&U 4.1.3**).

Water quality

The effects of forest management on water quality remain a major thrust of Project 4.1. This work is being delivered through these major activities:

Research on the impact of controlled burning on water quality aims to provide management guidelines for protection of water quality from prescribed fire. Last year we reported the appointment of a new PhD student (Jane Cawson) and a 0.5 FTE postdoctoral fellow. In the past twelve months substantial progress has been made in this area of work, linked to **Milestone R 4.1.3**.

The fire in Croppers Creek provided an opportunity to measure the comparative effect of wildfire on water quality in a pine plantation (burnt then logged) and two mixed-species eucalypt catchments (one also subject to a fuel-reduction burn). All three catchments have long-term datasets for comparison. Considerable work has gone into infrastructure repair, re-instrumenting the catchments, and sediment and nutrient sampling. We expect to publish both the calibration and application of modelling within the next twelve months, as well as the sediment and nutrient export results (linked to **Milestone R 4.1.2**).

Collaboration between the CRC, Forest Practices Authority and Forestry Tasmania aims to assess the impact of clearfell, burn and sow (CBS) silvicultural practices on headwater streams within coupes where standard Tasmanian Forest Practices Code (2000) provisions have been applied. The original study is published in Joanne Clapcott's PhD and in Clapcott et al. 2008, (Forest Practices Authority Scientific Report No. 7) (linked to **Milestone R 4.1.3**; **Milestone C&U 4.1.4**).

Professor Dan Neary (US Forest Service, Rocky Mountain Research Station, Arizona, USA) visited the CRC for six months from February 2009. Dan Neary is a forest hydrologist with a particular interest in streamside management zones. Dan made a substantial contribution to designing the experiments and measurement protocols at experimental sites looking at management of riparian zones in relation to forest harvesting, and we anticipate several publications from this study during the next twelve months.

Water use and water-use efficiency of eucalypt plantations: from stand to catchment-scale

This new project commenced in December 2008 and will deliver outcomes related to **Milestone R 4.1.2** and **Milestone R 4.1.3**. Existing projects will improve our understanding of the effects of forest management at the plot or compartment scale (Program One) and at the catchment scale (Project 4.1). This project will maximise the impact of these existing projects by bridging these two scales of prediction. We will quantify the relationship between plantation growth, carbon sequestration and water use from the compartment to the catchment scale. Further, in partnership with CSIRO Sustainable Ecosystems we will link a process-based model of plantation growth with a hillslope-scale distributed flow model for intermediate-scale prediction of growth, carbon, and water trade-offs in plantations. The project includes collaboration with the Western Australian Department of Water (DOW), and the Tasmanian Department of Primary Industry and Water (DPIW).

The objectives are to:

- o test catchment-scale and aggregated stand-scale models of plantation water use using stream-flow data from two gauged catchments in which there has been large-scale plantation establishment
- o develop and field-test a model of plantation growth and water use linked to a hillslope-scale model of distributed flow
- o use these modelling approaches to quantify the water-use efficiency of carbon sequestration and wood production and the effect of site characteristics including landscape position.

The outcomes are expected to be:

- o shared understandings between water regulators and plantation growers of:
 - o the effect of plantation establishment and growth on water availability
 - o the wood and non-wood benefits accrued from plantation water use
- o a common approach to estimating trade-offs.

Expected outputs include:

- o a review of suitability of models that predict water movement within hillslopes for forestry applications
- o a model of plantation growth and water use linked to a hillslope-scale model of distributed flow
- o a report quantifying the trade-offs for two contrasting regions, landforms and establishment strategies and outlining best practice for estimating the trade-offs between wood and non-wood benefits and water use.

We are reviewing alternatives for hillslope-scale modelling of plantation productivity linked to models of distributed flow. This review will be released as a CRC technical report in late 2009. In September we will commence augmenting instrumentation in all three catchments with a view to commencing measurements in November.

Nature of major consultancies and their contribution to the CRC

No major consultancies were undertaken by the project during the reporting period.

Nature of any grants and how they contribute to the CRC

No direct grants have been awarded during the reporting period; however, three major grants were awarded to CRC for Forestry participants at the University of Melbourne, which will contribute directly to the CRC for Forestry's water research outcomes.

Any changes proposed to future research directions

Collectively, projects 4.1 and 4.6 represent a significant and coherent body of work on the effects of forest management on water quality and yield. When considered together with work in Program One (subprojects 1.2.1, 1.1.2 and Project 1.3), the CRC has a portfolio of research on forests and water that is measuring and modelling water impacts from leaf to catchment scales. It is distinguished from other activities on forests and water (National Water Commission projects, e-Water CRC, CSIRO Water for a Healthy Country Flagship) by a focus on the effects of forest management and climatic variability on water yield and quality in the context of other forest values including wood production.

Over coming months, the project team will be developing a three-year plan that will map out more precisely the path to delivery of the project research milestones and outputs as defined in the Commonwealth agreement and in the project agreements. This will identify the relationship between all project outputs, including journal papers, and higher level CRC deliverables. This plan will emphasise the delivery of:

- o process-based understanding of the effects of forest management on water yield and quality and relationship to other values, particularly wood production and carbon sequestration
- o translation of this fundamental knowledge into decision support for forest and water resource managers
- o publication in high-impact journals as a means of benchmarking our science
- o integration and meta-analysis of ecosystem-specific results.

Project 4.2 'Biodiversity' (linked with Project 4.4)

Project Leader: Professor Brad Potts

Key research achievements

Research in Project 4.2 'Biodiversity' is undertaken in ten subprojects grouped under three themes. The project also links with the Industry Pest Management Group (IPMG; Project 4.4) based in Western Australia, focusing on integrated pest management in *E. globulus* plantations in south-west Western Australia and the Green Triangle. IPMG is funded with additional industry contributions and has a strong focus on extension work.

The research project now includes 28 higher degree students, either on CRC-funded scholarships (14) or affiliated with the project. During the 2008–09 financial year, Project 4.2 ('Biodiversity') scientists and students published 31 refereed journal articles (12 in press) relevant to the project milestones. They also produced one book chapter, 43 conference presentations and eight media items, and held 14 field days/workshops during the financial year. A major communication achievement for the year was the publication *TreeFlip*, a second field guide in the format of the highly successful *EucaFlip* which is being widely used by forest practices officers, industry, schools and the general public in Tasmania. The new guide features other Tasmanian tree species, and school kits have been distributed to over 90 schools in Tasmania.

Key research activities and achievements are indicated below.

Monitoring and management of biodiversity in forestry landscapes

Alternative silvicultural systems to clearfelling in wet eucalypt forests are being explored as means of providing better biodiversity outcomes in production forest landscapes (leading to **Milestone C&U 4.2.1**). There are two research foci: (i) detailed studies conducted in the silvicultural systems trial (SST) at Warra, and (ii) monitoring/research of outcomes in operationally harvested variable retention (VR) coupes. Results of the responses in vascular plants, birds and ground beetles to treatments pre-harvest and 1–6 years post-harvest in the SST have been published. Surveys to assess changes in lichen and bryophyte assemblage composition in retained aggregates five years after harvesting and burning have been completed and all specimens identified in preparation for analysis. A study was completed on the early recolonisation of vascular plants into harvested areas adjacent to burnt and unburnt aggregates in operational VR coupes. It found species composition related strongly to pre-harvest vegetation, but, one year after harvesting, plants had largely regenerated from soil-stored seed rather than from seed originating from unharvested trees in adjacent retained aggregates. A PhD study examining the extent to which aggregated retention conserves mammal habitat has completed a large-scale community study and has progressed to a detailed study of two native species—the long-tailed mouse and the swamp rat.

The operational roll-out of VR in Tasmania is an example of adaptive management in contemporary Australian forestry. Over the three years since commencing VR operationally in Tasmania, refinements to coupe design and burning practices have seen a marked reduction in burn damage to retained aggregates and improvements in seedbed outcomes. A set of metrics has been developed to rate how well operations have achieved the ecological goals for VR (retention, influence and minimising machinery disturbance). Operational VR coupes were largely meeting the ecological goals for retention and influence but results were less clear for the goal of minimising machinery disturbance. A study has commenced to examine the effects of harvesting disturbance on soil properties and the regeneration of understorey species within aggregated retention coupes. A report to government (Forestry Tasmania 2009) has documented the major research and operational findings from the silvicultural systems trial and the first three years of the operational adoption of VR silviculture. Four papers from this research were part of a recent special edition of the journal *Forest Ecology and Management*, for which several CRC staff were guest editors. This edition stemmed from the 'Old Forests New Management' international science conference last year which was part of the Sir Mark Oliphant International Frontiers of Science and Technology Conference Series and was hosted by the CRC for Forestry and Forestry Tasmania.

The sustainable management of the coarse woody debris habitat in the production forest landscape is a key issue as interest in renewable bio-energy increases. Provisional prescriptions for the retention of coarse woody debris (CWD) during integrated harvesting of fuelwood have been developed (also leading to **Milestone C&U 4.2.1**). The prescriptions, built from several years of research, aim to ensure sufficient CWD is left on-site to cater for its dependent biodiversity. Several projects are documenting the successional patterns of various groups associated with decaying logs. A PhD project has documented the diversity and successional patterns of macrofungi on CWD and soil following natural disturbance. A long-term log decay project in the Warra Long Term Ecological Research site (LTER) has just completed a second five-year sampling to document patterns of colonisation of large and small *E. obliqua* logs by saproxylic beetles. A PhD project conducting detailed life-history studies on selected saproxylic beetle taxa will provide critical data for future population viability analysis.

The management of forest species of high conservation significance, including species listed in threatened species legislation, is an ongoing challenge for forest managers. An approach to the management of habitat for hollow-dependent fauna, including those that are threatened, was developed in 2008–09 (part of **Milestone C&U 4.2.4**). The CRC-funded PhD scholarship on the ecology of the threatened masked owl has identified areas where this species is most likely to be found. A PhD study of hydrobiid snails is nearing completion and preliminary results are being used in the revision of management prescriptions for these stream fauna. Research has also been undertaken into the effectiveness of management actions for the protection of wedge-tailed eagle nests. Several project participants were involved in the review of the biodiversity provisions of the Tasmanian Forest Practices Code.

The consequences of plantation expansion in agricultural areas on biodiversity within remnant vegetation, is being investigated by two CRC-funded postdocs and seven PhD students. This research encompasses field-based sampling in Tasmania, south-west WA, and the Green Triangle of SA/Vic. There are two research strands in this program. The first involves quantifying the influence of different landscape configurations (matrices of blue-gum plantations or pasture) and remnant quality on the biodiversity values of remnant vegetation. Results show that overall insect diversity tends to be positively correlated with remnant condition, when coarse measures of remnant condition (such as habitat hectares) are used. This argues that simple habitat assessments may be cost-effective surrogates for managing remnant vegetation in production landscapes. The second focus involves development of strategies to manage forest remnants and assist regeneration. A PhD study has shown that fire can interact with coarse woody debris (CWD) in interesting ways, promoting seedling regeneration. It appears that the increased intensity of fire around CWD removes the effect of water repellency in the soil, funnelling water into the ground, thereby providing a distinct advantage to seedlings located in ashbeds. Partly burnt logs also appear to provide shelter to seedlings. In WA, remnant restoration trials involving burning, weed control and revegetation have also been conducted and a PhD study on manipulating and monitoring soil microbiology in remnant restoration is underway. An output highlight was the CRC-sponsored workshop ‘Restoring degraded remnants in plantations’ held in Albany, WA at the Department of Agriculture and Food on 12 May 2009 (**Milestone C&U 4.2.4**).

Sustainable management of key pests

Research is being undertaken on viable alternative strategies to manage browsing marsupial herbivores in forestry, especially in light of the banning of 1080 use in State forests in December 2005 (**Milestone R 4.2.2; Milestone C&U 4.2.2 and Milestone C&U 4.2.3**). Captive feeding trials identified the repellent Sen-tree as the most effective of the commercially available browsing repellents as well as showed that the response of different possum populations to genetic-based variation in palatability was stable. This work has now been published. In the past year much of this research has focused on running large-scale pilot trials on operational coupes to test the best combination of non-lethal strategies to reduce browsing impacts in the field (this work is in conjunction with Tasmanian Community Forest Agreement (TCFA) funding from the ‘Research into Alternatives to the Use of 1080’ Fund). The final report from this work has now been made available to CRC partners and the public. Further enhancements to operational non-lethal tactics are the subject of future milestones.

Lethal trap trees are being investigated as a more effective and environmentally friendly alternative to control eucalypt leaf beetles than aerial spraying with insecticides. Field bio-assays of insecticide-treated *Eucalyptus regnans* and *E. delegatensis* trees, of size comparable with that expected of the planted trap trees, found the foliage remained lethal to leaf beetle adults for the duration of the season. Operational deployment of lethal trap trees will depend on finding ways of making trees attractive to leaf beetles. A pilot study screened volatile compounds released by juvenile foliage of *E. regnans* and *E. nitens* and male/female leaf beetles to isolate and identify compounds eliciting antennal response in leaf beetles. Several volatile chemicals were isolated from leaf beetle elytra, including some implicated as attractants in other Chrysomelidae.

Project 4.4 ‘Industry Pest Management Group’ (IPMG)

IPMG was established as a CRC project in June 2006, co-funded by additional industry contributions. This project links with the ‘sustainable management of key pests’ theme of Project 4.2 ‘Biodiversity’, but has a strong focus on extension work aimed at adoption of research results for integrated pest management in *E. globulus* plantations in south-west WA and the Green Triangle. Funding currently supports a postdoctoral position that is based in Albany, WA (a major *E. globulus* plantation node).

This project coordinates regular monitoring of natural enemy and insect herbivore activity in *E. globulus* plantations, develops protocols for assessment of insect pests for project partners and provides regular technology transfer through field days and training of company personnel. In 2008–09, the industry partners of the IPMG called for a restructuring of the IPMG and a change in focus which has now been implemented.

In the last year, the IPMG project held two workshops, two executive and six operational meetings. Eight training sessions were conducted in the field in WA and Victoria, in addition to regular monitoring and inspection of plantations with company staff.

Nature of major consultancies and their contribution to the CRC

No major consultancies were undertaken.

Nature of any grants and how they contribute to the CRC

Research in this project is facilitated by close interaction with several Bushfire CRC projects and ARC grants held by participating scientists.

An ARC linkage grant studying fundamental aspects of exotic gene flow is contributing basic information to CRC for Forestry projects aimed at on-ground implementation of risk management strategies (Subproject 4.2.6).

An ARC linkage project on the genetics of defensive chemicals and resistance breeding interacts with the CRC for Forestry Subproject 4.2.8 aimed at development of improved strategies from browsing control that integrate lethal and non-lethal options. This research is also aided by two grants received by researchers with the CRC from the TCFA Research into Alternatives to the Use of 1080 Fund.

Two recent grants focused on supporting landscape-level biodiversity studies will contribute to CRC for Forestry projects that are developing in-coupe prescriptions for maintaining biodiversity. An ARC linkage project using molecular methods to examine the persistence of populations of saproxylic beetles in a production forest landscape interacts with CRC for Forestry Subproject 4.2.3, which aims to develop improved strategies for managing habitat for the CWD-dependent biota. A FWPA grant awarded to Forestry Tasmania—which is examining the effectiveness of Comprehensive, Adequate and Representative (CAR) reserves and complementary off-reserve management in maintaining biodiversity in production forestry landscapes—interacts with CRC for Forestry subprojects 4.2.1, 4.2.3 and 4.2.5.

The project also collaborated on a FWPA grant obtained by Associate Professor Greg Nolan of the School of Architecture at the University of Tasmania to review processes for incorporating biodiversity impacts into life-cycle assessments. This grant forms a unique interface between CRC for Forestry Research Program Two ‘High-value wood resources’ and Program Four ‘Trees in the landscape’.

Any changes proposed to future research directions

There are no proposed changes to current subprojects but there is increasing emphasis on landscape-level carbon budgets in student projects.

Project 4.3 'Communities' (linked with Project 4.5)

Project Leader: Dr Jacki Schirmer

Key research achievements

Key research achievements of the 'Communities' project (Project 4.3) during 2008–09 included the publication of research on:

- o community attitudes to plantations in WA and Tasmania (Subproject 4.3.2), reporting the results of a questionnaire sent to 6000 residents in these states asking their views about plantation forestry, fulfilling **Milestone R 4.3.2**
- o the employment and spending generated by the forest industry in WA (Subproject 4.3.1) and
- o the socioeconomic impacts of the plantation forest industry in WA (Subproject 4.3.1), together completing fulfilment of **Milestone R 4.3.1**.

This research was published in five reports, including two short booklets summarising research in an easy-to-understand format and three longer technical reports. The reports have been distributed widely in WA and Tasmania to ensure dissemination of the research to both regional communities in which plantation forestry is a key industry, and to members of the industry to further their understanding of the implications of plantation expansion for rural communities.

Considerable attention was focused during 2008–09 on disseminating research results to as wide a range of stakeholders and interested members of the public as possible. The release of the reports described above was associated with wide coverage in the rural media, with articles in a number of newspapers and some radio interviews, primarily on ABC radio. Several public seminars were held, disseminating results of the reports listed above, and were well attended.

In addition, a series of community engagement workshops were held in Tasmania in 2008, to work with industry members on improving community engagement skills, building on the publication of the report 'A brief guide to effective community engagement' in *The Australian* in May 2008 (Subproject 4.3.3). These workshops were attended by more than 40 participants from the industry, and were also used to inform further development of a handbook on community engagement to be produced in 2009–10.

A major community initiative was started in northern NSW (Subproject 4.3.4), with a participatory advisory committee of community members established to examine issues of concern over plantation forestry and to develop a shared understanding of these issues through participatory modelling. This study will be used to evaluate the potential of applying this technique more broadly in other regions of Australia in which controversy or concerns occur about land-use change, such as expansion of plantation forestry.

Project 4.5 was largely completed during 2008–09, with several reports of research released and a series of public seminars held to disseminate project results in December 2008. This research has involved development of innovative approaches to understanding land-use change in regional areas of Australia, and to using participatory approaches to sharing and generating knowledge about land-use change. The results of the project attracted wide regional media coverage in late 2008.

Nature of any grants and how they contribute to the CRC

Project 4.5 was funded with support from Forest and Wood Products Australia (FWPA).

Any changes proposed to future research directions

No changes are proposed to future research directions.

Research activities and achievements, outputs and milestones

Research Program One 'Monitoring and managing for growth and health'

Output / Milestone number	Description	Contracted achievement date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
Current milestones					
Milestone R 1.2.1	Climate and site-specific strategies for intra- and inter-rotational management to maximise sustainable production from blue gum plantations.	June 2009	Partially	Model is developed. Period for industry comment and feedback extended due to challenging industry environment over past twelve months.	Workshop date now set for November 2009, with completion due in March 2010.
Milestone R 1.3.1	Extension of cellular automata model to predict development of social hierarchies in forest stands to include the effects of weeds.	June 2009	Partially	Model is developed. Period for industry comment and feedback extended due to challenging industry environment over past twelve months.	Due for completion in December 2009 following industry feedback in November 2009 workshop.

Research Program Two 'High-value wood resources'

Output / Milestone number	Description	Contracted achievement date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
Previous milestones					
Milestone R 2.1.1	Breeding objectives for solid-wood and veneer production developed for <i>E. nitens</i> .	June 2008	Partially	Not possible to determine economic weights of objective traits because functioning solid-wood industry not available for study.	Genetic control of relevant objective traits determined from processing studies will be reported to industry by June 2010.
Milestone R 2.2.5	Empirical growth and yield functions developed and parameterised for <i>E. globulus</i> and <i>E. nitens</i> .	June 2008	Yes		
Milestone R 2.3.1	Levels of decay and other important wood properties in response to pruning and thinning treatments determined in silvicultural trials of <i>E. nitens</i> in Tasmania.	June 2008	Partially. Detailed study of levels at two sites completed, third site processing study scheduled for Sept. 2009.	Delay in scheduling and implementing processing studies (dependent on availability of sawing and veneering facilities).	CRC technical report on first two studies to be issued late in 2009. Further trials on trees from third site will be reported by June 2010.
Milestone R 2.3.2	Degree of silvicultural control of tension wood determined for <i>E. globulus</i> in southern mainland Australia (Vic. and WA).	June 2008	Partially. CRC Tech Report No. 182 reports tension wood occurrence in three trials in WA.	Technology developments have required a change in the approach to detection of tension wood.	Further surveys of tension wood occurrence in WA and Vic will be undertaken by June 2010.

Output / Milestone number	Description	Contracted achievement date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
Milestone R 2.4.1	Improved sampling protocols developed for pulp-wood value prediction for <i>E. globulus</i> , <i>E. nitens</i> and <i>E. dunnii</i> based on radial scanning of pith-to-bark wood samples.	June 2008	Partially. Radial calibrations developed for <i>E. nitens</i> and <i>E. globulus</i> .	Suitable sets of wood samples for subtropical species not yet obtained.	Calibrations for <i>E. dunnii</i> and <i>Corymbia</i> will be completed by June 2010.
Milestone R 2.5.1	Strategy document linking Project 2.5 to other relevant subtropical research.	June 2007	No	Delays due to major changes in subtropical forestry/wood quality research external to CRC for Forestry.	
Milestone R 2.5.2	Register of <i>Corymbia</i> research trials and routine plantings established.	June 2007	Yes		
Milestone R 2.5.3	Plan and establish a pruning and thinning trial for <i>Corymbia</i> hybrid.	December 2008	Yes		
Current milestones					
Milestone R 2.1.3	Quantification of the effects of allelic variants of at least five candidate major genes on key wood quality traits in <i>E. globulus</i> , <i>E. nitens</i> and <i>E. pilularis</i> for breeding populations of these species.	June 2009	Partially	Slight delays in genotyping association and validation populations. Collaboration with CSIRO Plant Industry (external to CRC effort) has supported their achievement of the goal for <i>E. nitens</i> .	Will be completed by December 2009 for <i>E. globulus</i> and <i>E. pilularis</i> , with a total of at least 15 genes examined.
Milestone R 2.4.2	Sampling protocols for prediction of solid-wood and engineered wood log value from non-destructive sampling methods on standing trees developed for <i>E. globulus</i> , <i>E. nitens</i> and one subtropical eucalypt species.	June 2009	Partially. Yes for <i>E. nitens</i> , no for other species.	Prediction of damaging levels of tension wood in <i>E. globulus</i> is being refined. Subtropical protocols will be developed in coming year to allow more cost-effective linking to processing studies in Project 2.5.	Researchers will further refine the protocols and test them in pilot projects with industry project partners by June 2010.
Milestone R 2.4.3	Cost-effective sampling protocols developed for estimating stand value based on returns from pulpwood for <i>E. globulus</i> and <i>E. nitens</i> .	June 2009	Partially	Radial scanning calibrations for density and kraft pulp yield have only recently been developed to allow the studies required.	Researchers will refine the protocols and test them in pilot projects with industry project partners by June 2010.

Research Program Three 'Harvesting and operations'

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
Current milestones					
Milestone R 3.1.1	Evaluate electronic data capture in forest equipment including accuracy limitations, data transmission and applicability to Australian conditions.	November 2006	Yes		
Milestone R 3.1.3	Evaluation of aerial and ground-based LiDAR for increased site recovery and harvest optimisation.	March 2009	Yes		
Milestone R 3.2.1	Historical review of plantation hardwood costs.	December 2006	Yes		
Milestone R 3.2.2	Define harvester head calibration procedures for harvesting.	May 2008	Yes		
Milestone R 3.2.7	Evaluation of industry transportation inefficiency related to truck weights and load management.	August 2008	Yes		
Milestone R 3.2.10	Evaluation of the growth in blue gum forest harvesting and haulage requirements in the Green Triangle 2007–2020.	December 2006	Yes		

Research Program Four 'Trees in the landscape'

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
Previous milestones					
Milestone R 4.1.1	Review long-term hydrological data for selected experimental forest catchments.	December 2007	No	Researcher not employed.	Employed postdoc July 2007 and review is nearly complete.
Milestone R 4.3.2	Analysis and explanation of community attitudes and values in two regions.	June 2008	Yes		
Current milestones					
Milestone R 4.2.2	Identification of cost-effective options for non-lethal control of marsupial damage in plantations and native forests.	December 2008	Yes		

Research collaborations

The CRC for Forestry is characterised by high levels of collaboration amongst research providers, and between research groups and end-users. We have worked successfully to achieve greater levels of international collaboration during the reporting period. The third-year review panel noted:

‘From its discussions with end-users and providers, and its observations during the annual conference of the CRCF, the Panel has concluded that there are excellent levels of collaboration that reflect the good relationships across the CRCF.’

Cross-program collaboration

Cross-program linkages within the CRC for Forestry occur in all areas. For example, research in Program One on an empirical analysis of the effect of stocking (planting density) on growth and yield, harvesting costs and financial return in *Eucalyptus globulus* plantations was undertaken in collaboration with Program Two and Program Three. Additional collaboration between Program One and Program Two has occurred through joint field work and between Projects 1.4 (Mila Bristow), 2.2 (Kevin Glencross) and 2.5 (Kevin Harding). Project 1.3 (Tony O’Grady) is currently collaborating closely with Sandra Roberts (Forestry Tasmania) in a study of the water balance of *E. nitens* forests and this is a strong point of intersection with the work being undertaken in Project 4.1 (‘Water quality and quantity’). Further linkages with Program Four include the work of Neil Sims (Project 1.1) through co-supervision of PhD student Sandra Hawthorn, and Project 1.2 leader Dr Caroline Mohammed co-supervising two students in Subproject 4.2 (on biodiversity of insects and fungi).

Collaborative linkages with other programs and projects with Program Four are continuing to evolve. Within Program Four, a new student project under Project 4.2 on carbon flows at Warra is jointly supervised with Project 4.1 staff, and a combined project on stream biodiversity is underway. Cross-program links include links with Program One on disease risk and disease genetics in the Biodiversity project (4.2), and the provision of germplasm and advice for physiological work being undertaken on water-use efficiency in Program One. Strong inter-program collaboration is also well developed, linking the expertise in the Biodiversity gene pool management area with work being undertaken in Program Two on association genetics.

Linkages with research users and external linkages

In Project 1.1, collaborative links with the Mathematics and Statistics Department at Melbourne University (through Andrew Robinson) are continuing to grow, through joint publications and student supervision. Project 1.3 continues its close ties with the Climate Change Cluster (C3) at the University of Technology, Sydney and strong links are being developed with David Tissue and David Ellsworth at the University of Western Sydney (especially important for understanding processes associated with elevated carbon dioxide).

In Program Two, the collaborative arrangement with CSIRO researchers (working outside of the CRC for Forestry) continued, with information on associations between gene variants and phenotypic traits being exchanged; the CRC for Forestry focusing on *E. globulus* and the CSIRO on *E. nitens*. Research collaboration with the company Diversity Arrays Pty Ltd, and CRC for Forestry co-investment along with other funds from an ARC Discovery Grant awarded to Dr René Vaillancourt were used to successfully develop a system of DArT molecular markers for *Eucalyptus*.

A formal collaboration with the University of Tasmania ARC linkage grant ‘Unravelling the links between growth and wood density’ continued to benefit the association genetics study in Project 2.1 (‘Breeding for high-value wood products’).

On the strength of the results that have been generated in Program Three, four new partners have been added to the program, including plantation managers ITC Ltd and HVP Plantations Ltd, native forest managers VicForests Ltd and the Australian Forest Contractors Association. In addition, we have also fostered three important collaborations in Australia.

In the area of biomass utilisation there is significant interest in exploring the use of woody biomass as a carbon dioxide-efficient alternative in steel production by the Australian steel industry, and significant research is being funded at CSIRO Minerals. Program Three has established a working relationship with the group leading the research in this area and is seeking funding opportunities to carry out a project to explore the feasibility of using forest harvest residue in the production of steel—with Program Three looking at supplying the biomass from forest operations, and CSIRO Minerals looking at converting that biomass for use in the steel-making process.

In transport efficiency, Program Three has established a working relationship with ITS Electric, a technology developer who has technology to convert existing diesel driver trucks to diesel/electric hybrid trucks for a significant reduction in fuel use. This technology can be adapted to most applications that use internal combustion engines, so it shows promise

for operations such as forest harvesting that use large amounts of mobile equipment. As a proof of concept, we are building a six-wheel-drive truck for use in operations in one of the Program Three partners, and we hope to have this running over the next year. If the results of the proof of concept trial are positive, we have agreed to work with ITS Electric to develop solutions for other forestry equipment for significant fuel and cost savings.

Finally we have developed a funding proposal with a technology commercialisation organisation—Steerable Wheel Group Australia—that has a trailer-wheel technology that offers the opportunity to significantly increase the payload of forest haulage operations and, as a result, potentially reduce cost by up to 50%. As this is new technology, just out of prototype testing, the next stage is to build a pre-production unit and test it in real operations to verify its performance. As forestry is seen as one of the harsher conditions for trailer technology, our industry is ideal to test the technology and verify reliability at the same time as performance. Program Three and Steerable Wheel Group Australia, with the support of three industry partners and a port operator, have made a joint funding proposal. If successful, it will see a trial trailer built from October 2009 and going into a forest haulage operation by October 2010.

The CRC's research on Water quality and quantity (Project 4.1) has strong linkages with research users in the Victorian Department of Sustainability and Environment (DSE), Forestry Tasmania, and plantation companies such as Hancock Victorian Plantations and Gunns Ltd. These are direct links that are routinely activated through workshops, seminars and publications. The project members have links to the eWater CRC, the CRC for Future Farm Industries and Bushfire CRC. More recently, and particularly through Project 4.6, the project has sought linkages with State water authorities and formalised these through establishment of technical advisory groups that include staff from the WA Department of Water and the Tasmanian Department of Primary Industry and Water. Members of Project 4.1 are also part of the steering committees of National Water Commission-funded projects being undertaken by CSIRO.

In addition, Project 4.1 has a number of partner collaborations that are of benefit to the CRC including:

- o University of Melbourne research projects for the Victorian Department of Sustainability and Environment (DSE)
- o a University of Melbourne project funded by Melbourne Water on predicting bushfire risk to water supply
- o a University of Melbourne CSIRO Flagship Collaboration Fund project on native mixed-species water use
- o CSIRO is leading two projects funded by the National Water Commission that address the effects of plantations on surface and groundwater systems. These are exclusively about water but are very closely aligned with the CRC for Forestry's Project 4.6—which extends this to an analysis of the relationship between water use and plantation growth
- o in Tasmania, Project 4.1 ('Water quality and quantity') has also established collaboration with the CERF project 'Landscape Logic' and the Tasmanian Community Forestry Agreement plantation hydrology project.

Bushfire CRC projects studying the effects of fire on forest health and establishing a wildfire chronosequence link with CRC for Forestry projects in the area of management of forest remnants and biodiversity impacts of alternatives to clearfelling, respectively. Several scientists involved with Project 4.2 (Biodiversity) are also members of the ARC Environmental Futures Network. Project 4.2 staff also interact with the Threatened Species Unit of DPIW to enhance Tasmania's threatened species and risk assessment database, and co-supervise PhD projects. The project also collaborates on TCFA research into alternatives to the use of 1080, and with Bayer Environmental Sciences on systemic insecticides.

Research in the Communities project (4.3) is also linked to a major project being undertaken by the Fenner School of Environment and Society for the Victorian Department of Primary Industries (DPI), in which the socioeconomic characteristics of the forest industries of Victoria are being studied. This consultancy is producing data which will be made available for analysis by Communities researchers.

A linkage has been developed with Forest and Wood Products Australia, with a PhD student funded by FWPA formally affiliating with the Communities project. Edwina Loxton is studying the socioeconomic impacts of change in access to native forestry by the forest industry, and her work is now being informed and undertaken in consultation with Communities researchers. This research fills a key gap in knowledge about the impacts of the changes in use of native forests.

International collaboration and linkages

Dr Steve Verryn of CSIR Environmentek, South Africa, continued as the external science reviewer for the research program. Dr Verryn attended the third Annual Science Meeting in November 2008.

Dr David Forrester, CRC postdoctoral fellow at the University of Melbourne, was awarded an Alexander Humboldt Research Fellowship at the Institute of Silviculture, Freiberg University, Germany where he will spend a year researching the topic 'Are mixed species and uneven-age forests better than uniform forests at dealing with climate change?'.

Program Three has been active in building international collaborative relationships. Over the last year we have continued to strengthen our relationship with Oregon State University's Department of Forest Engineering. We have arranged for Professor Loren Kellogg to be a consultant on our machine evaluation and biomass harvesting work. Building on from this association, we also hosted Dr Glen Murphy for five months to help us initiate research projects using new land-based LiDAR technology to generate accurate pre-harvest prediction of optimal product mix in a forest stand that will help land-owners extract the most value possible from their resource at the time of harvest.

In the area of machine tracking and machine evaluation, we have identified that similar issues to those faced by the Australian industry are being dealt with in New Zealand, South Africa and some areas of South America. In this light, we initiated discussions with organisations in those areas to see if we could collaborate to reach viable solutions more quickly. As a result we have an agreement with Forestry Solutions Ltd in South Africa and Forme in New Zealand to collaborate on developing and introducing machine-tracking technology for forest operations, collaborate on the establishment of a standard machine evaluation framework for the Southern Hemisphere, and to develop a common approach to forest operations research in the Southern Hemisphere.

In New Zealand, an organisation has been established called Future Forest Research. Its operations research interests have many parallels with Program Three. We have agreed to share information between the organisations and where possible participate in each other's industry consultation process. As one of the research providers to Future Forest Research, we have established a relationship with the Forestry Faculty at the University of Canterbury. In the last year they successfully obtained funding to explore biomass harvesting from pine plantations in New Zealand. As part of the funding agreement Program Three was included as a collaborative partner with an agreement to share knowledge between the two groups on biomass harvesting. Funding was also provided for the participation of a Program Three researcher in a biomass harvesting workshop to launch the project this year.

CRC for Forestry partners, the (Tasmanian) Forest Practices Authority and the CSIRO, have collaborative links with the United States Department of Agriculture (USDA) through Dr Dan Neary (Project Leader, Watershed and Riparian Ecosystems) of the USDA Forest Service. Dr Neary visited Australia (based in Hobart) on a six-month McMaster Fellowship. Dr Neary worked primarily on collaboration with Subproject 4.1.5 and the Landscape Logic CERF. He made important contributions to the science, and several papers and a book chapter are already in preparation. Dan also visited WA and Victoria and provided advice to scientists and students as well as giving public seminars under both his USDA and CRC for Forestry affiliations.

The collaborations indicated here maintain the CRC for Forestry's strong linkages with international science networks. In the case of the EUCAGEN (International Eucalyptus Genome Network), in-kind scientists have been involved in the preparation of an international submission for the USA Department of Energy to undertake a public domain sequence of the *Eucalyptus grandis* genome that has now had a draft sequence released. The involvement of Project 4.2 (Biodiversity) scientists in this network allows information relevant to managing eucalypt genetic resources to flow back to Australia, and University of Tasmania scientists are now providing DNA for a *E. globulus* sequence which is more relevant to Australia. Collaboration with the University of Tsukuba, Japan, is allowing a large-scale molecular study of pollen dispersal in *E. globulus*. The collaboration with scientists funded by the TCFA working at the University of Tasmania has allowed expansion of pilot projects to test 'best bet' non-lethal strategies for reducing marsupial browsing. Collaboration with Bayer Environmental Science has allowed greater testing of systemic insecticides for use in the development of trap tree technology. The disease research group at the Forestry and Agricultural Biotechnology Institute (FABI) of the University of Pretoria (South Africa) are amongst the leaders in eucalypt fungal taxonomy and genetics, and collaboration with this group is enhancing progress with research on disease spread and fungal communities, particularly involving *Mycosphaerella* species.

Within Project 4.4 we've developed a research collaboration with Dr Rolf Oberprieler from CSIRO Entomology and Tendai Mapondera (honours student Murdoch University) on the diversity and distribution of the eucalypt weevil. The work has been completed and a manuscript is currently being prepared. Eight distinct species can be recognised based on morphology and DNA sequence data.

The Warra long term ecological research (LTER) site, where silvicultural treatment studies are being undertaken, is part of the International LTER network. Several scientists in the project are also members of the International Eucalyptus Genome Network (EUCAGEN). Collaboration on eucalypt pest and disease research also occurs with the University of Pretoria, South Africa.

New linkages were formed between Project 4.3 (Communities) and researchers at Yale University, through an exchange program in which a Communities researcher worked with Yale colleagues on joint papers during February–March 2009. This will result in collaborative papers to be published in 2010. In addition, a range of linkages have been developed with researchers examining social dimensions of forestry in both the USA and the United Kingdom. These will be developed further over the next two years.

Commercialisation and utilisation strategies and activities

As the CRC for Forestry enters the second half of our seven-year funding term, we have stepped up the commitment of resources to adoption and utilisation, paying particular attention to sustaining and growing already high levels of industry engagement. Utilisation and adoption matters were carefully explored by the third-year review panel, who concluded:

‘The main measure of value-adding to business was that end-users were content and that the businesses had every intention of continuing funding. It was difficult to get information more specific than this. Companies are unlikely to adopt unless it adds value. There were some well defined and immediate adoptions, some that were likely but a little down the track and some that were more distant and less certain. End-users saw the CRCF as being a community of scientists that had credibility and public respect and therefore could be used as a marketing tool as well as a reservoir of scientific expertise. End-users saw a major output of the CRCF as provision of postgraduates, some of which would flow to the companies.’

The commercialisation and utilisation (C&U) program has worked to confirm appropriate paths to adoption for the research outputs of the CRC for Forestry. During the reporting period, Board policy was implemented that recognised that all industry partners in the CRC for Forestry expect to take major value from their investment via direct application of new technology to their existing businesses, demonstrating the importance of the CRC’s extension activities. The Industry Engagement Manager has continued to work in a cross-program capacity, to add value to existing pathways to adoption and to identify and implement new opportunities to achieve research impact. This initiative was recognised by the third-year review:

‘A pleasing new initiative is the appointment of an Industry Engagement Manager who is obviously improving some already high levels of industry and end-user engagement across the CRCF and its portfolio of Programs.’

During the reporting period most C&U milestones were achieved, with the exception of a number of milestones in Research Program Two. Delays to some Program Two research milestones arose from complications in the development of detection methods for wood quality. This problem has now been resolved with the development of radial NIR scanning protocols, so **Milestone C&U 2.4.1** will be achieved by December 2009. Delays also occurred in setting up in-kind resources for major processing trials. There have been corresponding delays in some of the corresponding C&U milestones, specifically **C&U 2.1.2**, **C&U 2.3.1** and **C&U 2.3.2**. Finally, **Milestone C&U 2.2.3** has been postponed while the principal investigator has been overseas on an externally funded fellowship, and will be completed by the end of 2009.

Within the first year of operation of the CRC it became apparent that project agreements contained insufficient detail to adequately manage projects at an operational level, and did not allow sufficiently for changing circumstances, unforeseen events or shifting priorities. In 2007 we introduced a new project management system centered around project operating plans (POPs). The system came into effect for the 2008–09 financial year. POPs identify annual activities, milestones, deliverables, key responsibilities, pathways to adoption and resource requirements at a subproject level. Particular emphasis has been placed on pathways to adoption at the program, project and subproject levels. The CRC Management Group reviews project operating plans annually, to ensure that adoption strategies are appropriate, that sufficient emphasis is placed on these in the planning process, and that adequate resources have been identified for their implementation.

The CRC Management Group maintains a discretionary fund to support C&U activities. Guidelines for accessing these funds were developed and ratified by the Commercialisation Committee and Board in 2007. The Management Group considers applications for funding support for C&U initiatives quarterly. Twelve such initiatives—including major workshops, conferences, demonstration projects, field days and community information events—were supported during the reporting period.

Industry partner staff are actively involved in one or more field-based research programs and so they are well-positioned for rapid technology transfer. More structured sharing of information is carried out through field days, seminars and workshops. The C&U plan for 2008–09 included several workshops and pilot projects, during which staff of most industry partners were trained in technologies that are likely to improve various aspects of their businesses (see the ‘end-user involvement’ section of this report, pages 44–6).

A number of early research results were shared with and adopted by industry partners to assist them in their businesses during the reporting period.

No patents were filed during the reporting period.

Commercialisation and utilisation outputs and/or milestones

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
Previous milestones					
Milestone C&U 2.1.2	Training provided in solid-wood breeding objectives and assessment techniques for <i>E. nitens</i> incorporated into STBA TREEPLAN® genetic assessment software, and into alternative delivery platforms for non-STBA industry.	June 2008	Partially	Not fully completed because <i>E. nitens</i> processing trials not yet completed.	Now anticipate completion by March 2010.
Milestone C&U 2.3.1	Members trained in silvicultural prescriptions that will minimise tension wood formation in <i>E. globulus</i> plantations in southern mainland Australia.	June 2008	No	Delayed because surveys of site and silviculture effects on tension wood occurrence in <i>E. globulus</i> not yet completed (see Milestone R 2.3.2).	To be completed and training provided by June 2010.
Milestone C&U 4.3.1	Engagement strategies implemented as pilot projects with industry members in two regions.	June 2008	Yes		
Current milestones					
Milestone C&U 2.2.2	Pilot program initiated in collaboration with at least one industry practitioner in thinning strategies for <i>E. globulus</i> and <i>E. nitens</i> that incorporate the effects of site quality on the capacity of trees to respond to thinning.	June 2009	No	Insufficient industry interest to implement program for <i>E. globulus</i> .	Pilot program on <i>E. nitens</i> currently being developed in collaboration with Forestry Tasmania.
Milestone C&U 2.2.3	Workshop on wood quality impacts of form factor, aspect ratio, crown-symmetry and architecture, and individual tree responses to high-lift pruning in <i>E. globulus</i> and <i>E. nitens</i> .	June 2009	No	Principal investigator absent from Australia on international fellowship until July 2010.	Workshop rescheduled to September 2010 after principal investigator returns to Australia.
Milestone C&U 2.3.2	In-field training for members on silvicultural prescriptions to minimise levels of decay and other defects in response to pruning and thinning treatments for <i>E. nitens</i> in Tasmania.	June 2009	No	Delayed while <i>E. nitens</i> processing studies are completed.	Training will be provided by June 2010.
Milestone C&U 2.4.1	Workshop on implementation of improved pulp-wood sampling protocols.	June 2009	No	Delayed while protocols being refined.	In-field workshops to demonstrate protocols will be undertaken by December 2009.
Milestone C&U 3.1.1	Operation-level machine evaluation and costing workshop (three-hour workshops).	May 2008	Yes		

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
Milestone C&U 3.2.2	Publish time and motion studies (TMS) of harvest machine/site combinations results to date.	December 2008	Yes		
Milestone C&U 3.2.6	Harvest planning workshop series (three two-hour sessions + one day-long workshop).	December 2007	Yes		
Milestone C&U 3.2.7	Workshop/seminar of CRC results (three day-long sessions) with topic to be determined based on industry need.	May 2009	Yes		
Milestone C&U 4.1.1	Provisional strategies for locating and managing tree crops to optimise productivity and water outcomes workshopped with industry members.	December 2008	Partially	Postdoc responsible actively engaged in hydrology and in setting up research plots (26 sites) in coordination with FPC Strategic Tree Farming Project.	Strategies to be added to Strategic Tree Farming Project technical report as extended introduction; report in advanced draft manuscript stage.
Milestone C&U 4.2.1	Revised prescriptions for native forest silviculture and management of coarse woody debris workshopped with industry members.	December 2008	Yes		
Milestone C&U 4.2.2	Pilot projects completed to test cost-effective options for non-lethal control of browsing marsupials.	June 2009	Yes		
Milestone C&U 4.2.3	Prescriptions for non-lethal strategies for controlling marsupial browsing integrated into pest management strategies of Tasmanian forest managers.	June 2009	Yes		
Milestone C&U 4.2.4	Workshop on biodiversity management options.	June 2009	Yes		

Intellectual property management

The CRC manages its intellectual property (IP) through a set of formal processes, policies and registers and maintains scrutiny on all areas of activity for commercialisation opportunities. IP management within the CRC consists of:

- o IP principles and management policies and procedures
- o IP register
- o Commercialisation and IP Management Committee.

A detailed IP register is maintained regularly. The Commercialisation and IP Management Committee normally meets once a year to review the IP developed and any commercialisation opportunities that may arise from the IP.

As part of the IP procedures, all research is screened prior to project start-up and during the research phase for the type of IP to be generated; for example, for confidential information/trade secrets, copyrights, tangible research property, and patents. Where IP has been identified as potentially commercialisable, specific commercialisation assessments were undertaken.

Day-to-day management of IP, commercialisation and utilisation is provided by the Management Group under the direction of the CEO. The Industry Engagement Manager has also been closely involved with IP management issues, but with an emphasis on utilisation, and enhancing uptake and overall economic impact. Refinements to the public website have been undertaken, and the intranet and content management system are being further developed, which is expected to improve delivery of information and services.

In 2008–09, 33 individual pieces of IP were generated across all programs. Each of these was evaluated but none was considered suitable for licensing or patenting. Rather, the IP will be incorporated into participants' ongoing commercial operations.

As a general rule, the CRC is creating IP for use by participants, who represent a very large majority of potential users of the information. The forestry sector in Australia consists of a relatively small number of medium-to-large companies, and a larger number of small contractors—so, outside the CRC's membership, there is a very small potential market for licensing or commercialisation. Because the CRC's research priorities are largely determined by this end-user group, licences or patents are likely to be incidental to the main thrust of the majority of our research programs. There were no developments of this type made during the 2008–09 year.

The CRC for Forestry Board remains firmly of the view that the greatest impact of the CRC will rarely be achieved through direct commercialisation or licensing, but rather through widespread uptake of CRC research outputs leading to innovation amongst CRC participants. This method of utilising IP provides maximum benefits to the participants and, at the same time, legal and contractual arrangements ensure that this IP can only be utilised by the participants and will not be licensed on or used outside their operations without the express permission of the CRC management. In 2008–09 the CRC was unaware of any breaches by any participants in regard to IP.

There were no licences of IP provided from previous CRC work, but the register maintains background IP and this is dealt with in project agreements with each participant.

Communication strategy

Appointment of new Communications Manager

Taylor Bildstein left the CRC for Forestry in August 2008 and Prue Loney was appointed as the new Communications Manager in November 2008.

Communications strategy

Communication is integral to all areas of the CRC's activities and responsibilities. All CRC participants have a role in communication. Communication functions include:

- o sharing information between research partners, enhancing collaboration and synergy
- o exchanging knowledge between research providers and research users enabling uptake of relevant knowledge by various sectors of the industry
- o ensuring the CRC's research, education and communication activities are relevant and responsive to stakeholder needs
- o making science-based knowledge relating to forests and forestry accessible to the wider community.

A new communications strategy was developed early in 2009 and was approved by the Communications Committee. The new strategy is designed so that progress against the strategy is easier to report against.

Communication objectives

To increase and improve knowledge exchange between research providers and industry

To be recognised among the scientific and general communities as a trusted broker of scientific information relating to the forest industry and the sustainable management of forest landscapes

To increase collaboration and sharing of information between research partners

To increase awareness of the CRC amongst partners at all levels in their organisations including executives and key decision makers

To consolidate a sense of community and common purpose among CRC members, by establishing sustainable and active knowledge sharing networks amongst our participants

To increase student involvement and to retain students in the short term and long term as ongoing participants in the CRC network

To increase the accessibility of science-based knowledge relating to forests and forestry to the wider community

To increase the relevance and responsiveness of the CRC's research, education and communication activities to stakeholder needs by enhancing knowledge delivery in both directions

Communication initiatives

The communications strategy consists of the following communication initiatives (each with a target audience, goals, timeline, budget, and targets to be achieved) which are designed to meet the broad communications objectives listed above, as well as to ensure effective internal communications and management of communications processes.

Communications initiatives include:

- | | | |
|--|---|---------------------------------------|
| o research program newsletters and a whole-of-CRC newsletter | o Highlights & Achievement Report | o Annual Report |
| o members' website | o public website | o seminars and workshops |
| o industry bulletins, for specific technology transfer | o technical reports | o industry engagement |
| o media releases | o forest education promotion | o maintenance of contacts database |
| o PhD scholarships | o telephone and email general inquiries | o welcoming of new staff and students |
| o Annual Science Meeting (2010) | o 'Science meets Parliament' (2010) | o procedures and guidelines |
-

Progress on selected communications initiatives

Annual Science Meeting

The CRC's Annual Science Meeting was held at the Grand Chancellor in Launceston, Tasmania during the first week in November 2008. The meeting was the CRC's biggest Annual Science Meeting ever, with over 170 attendees from all over Australia representing our industry partners and researcher providers, as well as our postgraduate students. The meeting provided a fabulous opportunity to get all of our stakeholders together to discuss our research efforts to date, pathways to adoption of the research, and areas where future research will focus. The next Annual Science Meeting is scheduled for May 2010.

Highlights & Achievements Report

It was decided, due to the timing of the appointment of the new Communication Manager and the desire to get the Highlights & Achievements Report out mid year, to change the timing of the production of the Highlights & Achievements Report so that it covers each financial year. By the close of the financial year, the content of the 24-page Highlights & Achievements Report had been written and the report was in design stage. It was distributed in September 2009 to our mailing list of approx. 500 individuals representing industry partners, affiliated organisations and the general public, as well as to federal and Tasmanian politicians and media contacts.

Summary reports

The communications team has been involved with the production of two summary reports: *Community attitudes to plantations: survey of the views of residents of South-West Western Australia, 2008* and *Community attitudes to plantations: survey of the views of residents of Tasmania, 2008* that are an output of the Communities project in Program Four. The summary booklets were produced in the same format as our Highlights & Achievements Report and were distributed to CRC members and the public.

Newsletters

Several electronic newsletters have been produced through the last financial year, updating CRC members and the public on our research activities and achievements:

- o Whole-of-CRC newsletter—*CRC for Forestry News* (March 09)
- o Program One—*The Monitor* (April 09)
- o Program Three—*The Log* (March 09)
- o Program Four—*BioBuzz* (August 08, November 08, March 09), *Uptake* (Water project, November 2008)

Newsletters are distributed electronically to subscribers who represent our industry partners, research providers, students and interested members of the general public.

Bulletins

In 2008–09 five industry bulletins were produced to rapidly communicate developments and research outcomes of Program Three to industry partners in a short, accessible format. Research bulletins are not intended to replace longer scientific reports but provide a concise summary of major findings in a format we believe busy operational managers will appreciate. Other CRC for Forestry programs are likely to increasingly adopt this communication method.

Media

Media coverage aims to ensure that not only our research partners and industry members but also the broader public are able to access science-based knowledge relating to forests and forestry and understand the role of the CRC. Six media releases were distributed throughout the financial year. Four of the six were related to reports released by Program Four's Communities project and promoted the public seminars that were held in Western Australia and Tasmania to promote the research and allow for public comment and discussion of the results. Media coverage from the media release regarding Brad Potts's Clarke Medal resulted in Tasmanian coverage by newspaper (*The Mercury*), radio (studio interview on ABC 936) and television (a 5-minute feature on Brad Potts on ABC's *Stateline*).

End-user involvement and CRC impact on end-users

During the second half of our current funding term, the CRC's strategy has been to progressively increase the level of emphasis and resourcing to end-user engagement, implementation of adoption strategies and communication with stakeholders. The CRC currently employs an Industry Engagement Manager, a Communications Manager and Communications Officer. Our program coordinating committees are chaired by people from industry, and each project steering committee is populated by representatives of stakeholder organisations and research end-users. Research adoption is assisted by a steady stream of specialist workshops, field days, research bulletins and technical reports, but it is the personal contact between scientists and practitioners and the close involvement of industry people in all stages of a project that ensures the right research will find the mark. As noted by the third-year review:

'The strategic direction and alignment with current company end-users generally is very good. End-users were both pleased and involved but end-user expectations were often non-specific. This may well be the nature of forestry research where outputs are largely the incremental sharing of information.'

End-users are systemically involved in all CRC projects involving field or operational trials. The table below lists end-user participants actively contributing on a project-by-project basis, through involvement of personnel in research and development activities or project oversight, provision of field trial sites and logistic support, or participation in operational trials. Note that at an organisational level, some organisations (e.g. state agencies) participate both as research providers and research users.

Project	End-users directly involved in project execution and delivery
1.1	DSE, FEA, FPC, FT, GSL, Gunns, HVP, ITC, Midway, Norske Skog, DPI NSW, Timbercorp, WAPRES
1.2	DSE, ForestrySA, FPC, FT, GSL, Gunns, HVP, ITC, Midway, DPI NSW, Timbercorp, WAPRES
1.3	DSE, FEA, FPC, FT, GSL, Gunns, Midway, Norske Skog, DPI NSW, Timbercorp, WAPRES
1.4	FEA, GSL, DPI NSW, QDPIF, Timbercorp
2.1	FPC, FT, GSL, Gunns, ITC, DPI NSW, STBA
2.2	DSE, FEA, FPC, FT, GSL, Gunns, HVP, ITC, Midway, STBA
2.3	FEA, FPC, FT, GSL, Gunns, ITC, DPI NSW, STBA
2.4	FPC, FT, GSL, Gunns, ITC, Midway, Timbercorp, WAPRES
2.5	FEA, ITC, DPI NSW, QDPIF, Timbercorp
3.1	FEA, ForestrySA, FPC, FT, GSL, Gunns, HVP, Midway, Norske Skog, Oji, SEFE, Timbercorp, WAPRES, VicForests
4.1 & 4.6	DSE, ForestrySA, FPA, FPC, FT, Gunns, HVP, WAPRES
4.2	DSE, DPI Vic, ForestrySA, FPA, FPC, FT, Midway, Gunns, DPI NSW, STBA
4.3 & 4.5	FFIC, FPC, FT, Gunns, DPI Vic, Gteen Triangle Regional Plantation Committee
4.4	APFL, ForestrySA, FPC, GSL, ITC, Timbercorp, WAPRES

The table on pages 45–6 focuses primarily on end-user involvement in project outputs.

End-user involvement in CRC activities

End-user name and relationship with CRC	Type of activity and location of activity	Nature and scale of benefits to end-user (e.g. exports, productivity, employment)	Actual or expected benefit to end-user (\$ terms)
Partners: Industry partners across Australia Others: Forestry professionals from non-partner organisations and harvesting contractors and their employees	Two half-day workshops on machine evaluation in Tasmania and Victoria, November 2008 and February 2009.	Demonstrated the tools and methods that are available to effectively evaluate the performance of highly capital intensive forestry equipment.	A better understanding of the efficiency, costs and performance of operational activities allowing for the implementation of continual improvement programs targeting better utilisation of high-value equipment and resources, ultimately resulting in reduced costs of production.
Partners: Industry partners across Australia Others: Forestry professionals from non-partner organisations and harvesting contractors and their employees	Four one-day workshops on value recovery from harvest operations in Tasmania, South Australia, Victoria and Western Australia, June 2009.	Demonstrated the tools and methods that are available to effectively manage forest operations for improved value recovery for land-owners and demonstrate how important the difference in value can be.	A better understanding of what can be done at all levels of the operation to ensure maximum value is extracted from the resource and a better understanding of the magnitude of the potential value loss so potential investments for improvements can be better justified.
Partners: Representative from one industry partner Others: Forestry professionals from non-partner organisations and postgraduate students	Teaching module on Forest Operations as part of the National Forestry Masters Program at the Creswick Campus of the University of Melbourne, June/July 2009.	Increased knowledge of forest operations management across a number of industry organisations.	More effective and efficient management of forest operations leading to greater economic productivity. Utilising international expertise to improve the operational skills of Australian forestry professionals.
Partners: Four research providers, STBA, Gunns Ltd, Forestry Tasmania, Forests NSW	Workshop in association genetics/ molecular breeding, attended by 24 participants, Southern Cross Uni, Lismore Campus, 3–4 Sept. 2008.	Industry can evaluate the prospects and examine the methodology for integrating quantitative and molecular breeding of plantation eucalypts.	Molecular breeding offers prospect of accelerating genetic gain in industry breeding programs, particularly in hard-to-measure and late-expressed traits such as pulp-wood traits. Not yet possible to quantify benefits of CRC research in \$ terms.
Partners: Tasmanian timber processing companies associated with Forests and Forest Industry Council of Tasmania (FFIC)	Seminar presenting Project 2.3 research results, attended by approx 20 participants, Forest Industries Association of Tasmania (FIAT), Hobart.	Industry now aware of the prospects and requirements for economically viable sawing and drying of plantation-grown <i>E. nitens</i> sawlogs.	Information on wood product recovery and quality from processing of Tasmanian <i>E. nitens</i> plantation sawlog estate, and influence of processing methods on value recovery. Of major importance as plantations will soon comprise a major component of Tasmanian sawlog supply.
Partners: Industry partners from Western Australia Others: Representatives from government agencies, community groups and research institutions	Workshop on 'Restoring degraded remnants within plantations', Department of Agriculture and Food WA, Albany, WA.	Improved knowledge of native forest management techniques among land-owners and the integration of these techniques with other farm management activities.	Better management of remnant forests in the plantation landscape.

End-user name and relationship with CRC	Type of activity and location of activity	Nature and scale of benefits to end-user (e.g. exports, productivity, employment)	Actual or expected benefit to end-user (\$ terms)
Partners: Industry partners in Industry Pest Management Group	Workshop on relationships between damage and tree growth, Casterton, Victoria, 29 August 2008.	Increased understanding of the impact of insect damage on the growth of plantation trees and yield by research foresters, field coordinators, tree farm supervisors, and plantation managers.	Improved plantation management practices. This might include reduction in unnecessary use of insecticides which would result in savings. Even when insecticides are used, the use of insecticides would be more effective and efficient. Thus, this would involve greater increases in yield per \$ spent applying insecticides.
Partners: Industry partners in Industry Pest Management Group	Workshop on statistical analysis of trials, Albany, WA, 21 and 22 October 2008.	Increased knowledge of field data analysis.	Increased capacity of industry partners for statistical analysis of field trial data.
Partners: Industry partners in Industry Pest Management Group	Field day on identification of <i>Paropsisterna m-fuscum</i> near Albany, WA, 4 December 2008.	Improved insect pest monitoring in WA blue gum plantations.	Improved pest management practices in WA plantations, leading to reduced economic impact of pest outbreaks.
Partners: Industry partners in Industry Pest Management Group	Workshop on assessments of insect populations and CDI, Casterton, Vic., 13 February 2009.	Improved monitoring of insect pests and pest damage in Victorian blue gum plantations.	Improved pest management practices in Victorian and South Australian plantations, leading to reduced economic impact of pest outbreaks.
Partners: Main industry partner managing native forest in Tasmania	Workshop on implications of genetic research on ash eucalypts to native forest seed zones, with Forestry Tasmania, Hobart, Tasmania, 19 June 2009.	Transfer of knowledge on genetic diversity and processes in key dominants of Tasmanian and Victorian production and other forests with a focus on implications for seed transfer guidelines for Tasmanian native eucalypt forests.	Seed transfer guidelines which better account for genetic structure.
Partners: Industry partners from south-eastern Australia Others: FPA, Forestry Tasmania and CSIRO	Presentation of review of overseas research and experience and early results from Tasmanian catchments ('Novel approaches to rehabilitating streamside reserves').	Context for considering the appropriateness of current codes of practice for riparian plantations on ex-agricultural land.	Improved forest practices regulations for riparian plantations.
Partners: Program One industry and research partners	Workshop in 'Forest health assessment and modelling', Burnley Campus, University of Melbourne, July 2008.	Communication of progress towards decision tools for use by forest growers including opportunity for feedback about relevance and application.	Increased links in the various components of the forest health research and work with industry partners and more useful delivery strategy. The use of remote sensing and modelling technologies to alert forest growers about changes in forest health will result in large savings in ground surveillance costs with additional benefits through improved health and safety.

Education and training

Chair: Professor Peter Kanowski

Manager: Dr Neil Davidson

Extent to which the CRC is on target in terms of recruiting and supervising PhD and masters students

A total of 57 PhD and Masters students (52 PhD, 5 Masters) were engaged in CRC projects during the reporting period. Thirty-five of these were receiving full or top-up scholarships from the CRC for Forestry. A further 21 PhD students were supported by CRC project funds, but did not receive CRC scholarship funds.

Four PhD and Masters students completed their projects in 2008–09. These were Philip Alcorn, Amelia Koch, Paul Neville, and Juan Carlos Valencia Baier.

A further 9 PhD and Masters students had submitted theses for examination at the time this Annual Report went to press. In addition, three CRC-supported Honours students—Justin Bloomfield, Jennifer Sanger and Sarah Ulgalde—completed their projects, bringing the total number of CRC Honours graduates to six.

Involvement of industry in research supervision

Twenty-four industry partner staff from eight industry partners were members of the supervisory panels of CRC for Forestry research students in 2008–09. These industry supervisors were members of the supervisory panels of 40% (23 of 57 students) of CRC for Forestry research students in 2008–09.

Graduate destinations

Philip Alcorn – Australian Department of Climate Change, ACT

Amelia Koch – Forest Practices Authority, Tasmania

Paul Neville – Restoration Geneticist, Kings Park Authority, WA

Juan Carlos Valencia Baier – Senior Forest Manager, INFOR, Chile

Nature of end-user involvement in developing undergraduate courses

Staff of the CRC for Forestry at each of the participating universities teach undergraduate courses which are informed by their CRC work in association with industry partners, and industry partners are involved with the development of Honours projects. The CRC for Forestry and its staff continue to play a very active role in supporting the National Forestry Masters Program (<http://www.forestry.org.au/masters>), in which four of the five CRC for Forestry universities are involved.

CRC for Forestry industry partners continued to be closely involved in the development and delivery of three courses of the National Forestry Masters in 2009: the Australian Joint Course, offered by the Australian National University and University of Melbourne; Forest Operations, offered by the University of Melbourne; and Plantations and the Environment, offered by the University of Tasmania.

Nature of seminars/workshops/courses run for industry

Industry participants have been included in a number of modules run as part of the National Forestry Masters Program, with in-kind support from CRC researchers.

Workshops and seminars run by specific research projects and programs are reported elsewhere.

Contribution to skill development in the industry

Thirty-four research students participated in the CRC for Forestry's 2008 Annual Science Meeting (the other students were unavailable for good reason), and in satellite student training programs addressing communication and media skills. CRC for Forestry education funds supported individual students to participate in other targeted generic skills training, such as in scientific writing and statistics, on case-by-case bases agreed with their supervisors.

Education and training outputs and/or milestones

Output / Milestone number	Description	Contracted achievement date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
2008-2009 Milestones					
Milestone E&T 1.1.2	Second 21 CRC PhD students enrolled.	April 2009	Yes		
Milestone E&T 2.1.1	First 21 PhD students have completed at least two courses (or equivalent) in research leadership and management.	December 2008	Yes		

Recommendations and responses from the third-year review

Recommendation	Implemented (Y or N)	Reasons why not implemented	Strategies to implement
(R1): That a discretionary fund be established to assist the CEO to respond to changing circumstances.	Y		CEO developed a revised budget model. Two new priority projects have been established under this process.
(R2): Membership of Program Coordinating Committees be reviewed to ensure that pathways to adoption are best represented.	Y		PCC membership has been reviewed. This issue was also addressed through the decision support systems workshop held in August 2009.
(R3): CRCF should encourage industry to form a peak body to represent forest operations research across the sector.	In principle		CRC management working through existing peak bodies and National RD&E strategy to bring about the intended outcome.
(R4): CRCF take advantage of the flexibility permitted under CRC Program procedures for Program changes whenever it feels this to be justified and desirable.	Y		Two new priority projects initiated in the last 12 months. Commonwealth advised of budget alterations.
(R5): CRCF investigates the possibility for initiating additional new areas of research, particularly those in forestry related areas in carbon and water, either through the gaining of new funding sources or by adjustments in its present research portfolios.	Y		Landscape water-use project initiated in late 2008. 'Managing forests for carbon' project initiated in August 2009, with additional funding from FWPA.
(R6): The Panel commends the CRCF for its strategic approach to planning for the continuation of its partnerships and activities after wind-up of the present structure and recommends that the CRC Committee also considers the relevant system-wide issues.	Y		Referred to the CRC Committee and secretariat for consideration.
(R7): The Panel recommends that Project Operating Plans have well-defined procedures for delivering results and promoting adoption.	Y		2009–2010 Project Operating Plans enhanced accordingly. Consolidated report provided to the Board. Industry engagement strategy revised and enhanced.
(R8): The Panel recommends that more rigorous ways of measuring the success of adoption be considered.	Y		Measures of adoption incorporated more fully into Project Operating Plans and industry engagement strategy.
(R9): Expectations across Programs about the quantity and quality of the deliverables should be better specified. In particular the type and commercial potential (and for whom) of the IP generated should be clarified.	Y		Project management system modified accordingly. IP register updated and evaluated.
(R10): A more detailed description of the commercialisation and adoption of research should be drafted. This should include what should be the role of industry partners in implementing IP and how to monitor the expected changes in practices and impacts. Given the importance attributed to Education and Training in the CRCF, the changes in rate of employment of highly skilled forest professionals by industry should be specially monitored.	Y		See response to recommendation R7. Graduate outcomes to be monitored where possible.
(R11): The Panel recommends that the CRCF consider mechanisms to ensure that there is an on-going capacity to train end-users in the operational use of the model CABALA.	In principle		BPOS, a decision support system based on CABALA, has been deployed and trialled with industry partners.
(R12): The Panel recommends that the CRCF consider alternative strategies to meet their contractual research commitments should the planned recruitment of postgraduates not eventuate or be delayed.	Pending		To be re-examined following the final major recruitment round in late 2009.

Glossary of terms

APFL	Albury Plantation Forest Company
ARC	Australian Research Council
BPOS	Blue-gum Productivity Optimisation System
C&U	Commercialisation and utilisation
CABALA	A linked carbon, water and nitrogen computer model of forest growth for silvicultural decision support (from carbon balance)
CERF	Commonwealth Environment Research Facilities Program
CRCF	The CRC for Forestry
CSIRO	The Commonwealth Scientific and Industrial Research Organisation (Australia)
CWD	Coarse woody debris
DArT	Diversity arrays technology (a generic genotyping technology)
DPI NSW	New South Wales Department of Primary Industries
QDPIF	Queensland Department of Primary Industry and Fisheries
DPIW	Department of Primary Industries and Water, Tasmania
DSE	Department of Sustainability and Environment, Victoria
FEA	Forest Enterprises Australia Ltd
FFIC	Forests and Forest Industry Council of Tasmania
FPA	Forest Practices Authority, Tasmania
FPC	Forest Products Commission, WA
FT	Forestry Tasmania
FWPA	Forest and Wood Products Australia
GSL	Great Southern Limited
GTRPC	Green Triangle Regional Plantations Committee
Gunns	Gunns Limited
HVP	Hancock Victorian Plantations
IP	Intellectual property
IPMG	Industry Pest Management Group
ITC	ITC Limited
LiDAR	Light detection and ranging
LTER	Long-term ecological research—there is an LTER site located at Warra in southern Tasmania.
MODIS	Moderate Resolution Imaging Spectroradiometer
NIR	Near infra-red
Oji	Oji Paper Co. Ltd
PCC	A CRC for Forestry program coordinating committee
PSC	A CRC for Forestry project steering committee
SEFE	South East Fibre Exports
SST	Silvicultural systems trial
StandForD	Standard for Forestry Data
STBA	Southern Tree Breeding Association
TCFA	Tasmanian Community Forest Agreement
VR	Variable retention
WAPRES	WA Plantation Resources



CRC for Forestry
Annual Report 2008–09
Appendix 1

Publications 2008–09

Appendix 1

CRC for Forestry Publications 2008–09

Refereed journal articles (in press)

- Acuna M, Kellogg L (2009 in press) Evaluation of alternative cut-to-length harvesting technology for native forest thinning in Australia. *International Journal of Forest Engineering*.
- Allen DE, Mendham DS, Singh B, Cowie A, Wang W, Dalal RC, Raison RJ (2009 in press) Nitrous oxide and methane emissions from soil are reduced following afforestation of pasture lands in three contrasting climatic zones. *Australian Journal of Soil Research*.
- Barbour RC, Baker SC, O'Reilly-Wapstra JM, Harvest TMA, Potts BM (2009 in press) A footprint of tree-genetics on the biota of the forest floor. *Oikos*.
- Barbour RC, Forster LG, Baker SC and Potts BM (2009 in press) Biodiversity consequences of genetic variation in bark characteristics within a foundation tree species *Conservation Biology*.
- Barbour RC, Storer MJ and Potts BM (2009 in press) Relative importance of tree genetics and microhabitat on macrofungal biodiversity on coarse woody debris. *Oecologia*.
- Bradbury G, Beadle CL, Potts BM (2009 in press) Genetic control of survival, growth and form in Australian Blackwood. *New Forests*.
- Downes GF, Drew D, Battaglia M, Schultze D (2009 in press) Measuring and modelling stem growth and wood formation: An overview. *Dendrochronologica*.
- Downes GM, Drew DM, Battaglia M and Schulze ED (2009 in press) Measuring and modelling stem growth and wood formation: An overview. *Dendrochronologia*.
- Franks PJ, Drake PL, Beerling DJ (2009 in press) Plasticity in maximum stomatal conductance constrained by negative correlation between stomatal size and density: An analysis using *Eucalyptus globulus*. *Plant, Cell and Environment*.
- Freeman JS, Whittock SP, Potts BM, Vaillancourt RE (2009 in press). QTL influencing growth and wood properties in *Eucalyptus globulus*. *Tree Genetics and Genomes*.
- Gates G, Ratkowsky D, Grove SJ (2009 in press) Aggregated retention and macrofungi: a case study from the Warra LTER site, Tasmania. *Tasforests*.
- Grove SJ (2009 in press) Beetles and fuelwood harvesting: a retrospective study from Tasmania's southern forests. *Tasforests*.
- Macinnis-Ng, Fuentes S, O'Grady AP, Palmer AR, Taylor D, Whitley RJ, Yunusa I, Zeppel MJB, Eamus D (2009 in press). Root biomass distribution and soil properties of an open woodland on a duplex soil. *Plant and Soil*.
- McArthur C, Loney PE, Davies NW, Jordan GJ (2009 in press). Early ontogenetic trajectories vary among defence chemicals in seedlings of a fast-growing eucalypt. *Austral Ecology*.
- Miller AM, McArthur C, Smethurst PJ (2009 in press) Spatial scale and opportunities for choice influence browsing and associational refuges of focal plants. *Journal of Animal Ecology*.
- Mimura M, Barbour RC, Potts BM, Vaillancourt RE, Watanabe KN (2009 in press) Inbreeding and pollination distance in continuous and fragmented forest landscapes. *Molecular Ecology*.
- Mitchell AD, Smethurst PJ (2009 in press) Magnesium and potassium deficiency induced in glasshouse-grown *Eucalyptus globulus*. *Tasforests* 18.
- Nevill P, Bossinger G, Ades P (2009 in press) Phylogeography of the Australian montane species an world's tallest angiosperm *Eucalyptus regnans*. *Journal of Biogeography*.
- Pinkard EA, Battaglia M, Bruce J, Kriticos DJ (2009 in press) Process-based modeling of the severity and impact of foliar pest attack on eucalypt plantation productivity under current and future climates. *Forest Ecology and Management*.
- Pinkard EA, Battaglia M, Bruce J, Leriche A, Kriticos D (2009 in press) Process-based modelling of the severity and impact of foliar pest attack on eucalypt plantation productivity under current and future climates. *Forest Ecology and Management*.

- Quentin AG, Pinkard EA, Beadle CL, Wardlaw TJ, O'Grady AP, Paterson S, Mohammed CL (2009 in press) Do artificial and natural defoliations have similar effects on physiology of *Eucalyptus globulus* Labill. seedlings? *Annals of Forest Science*.
- Rapley LP, Potts BM, Battaglia M, Patel VS, Allen GR (2009 in press) Long-term realised and projected growth impacts caused by autumn gum moth defoliation of 2-year-old *Eucalyptus nitens* plantation trees in Tasmania, Australia. *Forest Ecology and Management*.
- Strandgard M (2009 in press) Evaluation of log measurement errors as related to harvester log measurement accuracy. *International Journal of Forest Engineering*.
- Suitor S, Brown PH, Gracie AJ, Potts BM, Rix KD, Gore PL (2009 in press) The impact of resource competition on capsule set in *Eucalyptus globulus* seed orchards and its manipulation through irrigation management. *New Forests*.
- Suitor S, Potts BM, McGowen MH, Pilbeam DJ, Brown PH, Gracie AJ, Gore PL (2009 in press) The relative contribution of the male and female to the variation in reproductive success in *Eucalyptus globulus*. *Silvae Genetica*.
- Valencia J, Harwood C, Washusen R, Morrow A, Wood M, Volker P (2009 in press). Longitudinal growth strain as a log and wood quality predictor for plantation-grown *Eucalyptus nitens* sawlogs. *Wood Science and Technology*.
- Verbesselt J, Hyndman R, Newnham G, Culvenor D (2009 in press) Detecting trend and seasonal changes in satellite image time series. *Remote sensing of Environment*.
- Verbesselt J, Robinson A, Stone C, Culvenor D (2009 in press) Forecasting tree mortality using change metrics derived from MODIS satellite data. *Forest Ecology and Management*.
- Wardlaw TJ, Grove SJ, Yee M, Hopkins AJM, Harrison KS, Mohammed CL (2009 in press) Uniqueness of habitats in old eucalypts: Contrasting the wood-decay and saproxylic beetles of young and old eucalypts. *Tasforests*.

Refereed journal articles (published)

- Baker SC, Grove SJ, Forster L, Bonham KJ, Bashford D (2009) Short-term responses of ground-active beetles to alternative silvicultural systems in the Warra Silvicultural Systems Trial, Tasmania, Australia. *Forest Ecology and Management* 258, 444-459.
- Barbour RC, O'Reilly-Wapstra JM, de Little DW, Jordan GJ, Steane DA, Humphreys JR, Bailey JK, Whitham TG and Potts BM (2009) A geographic mosaic of genetic variation within a foundation tree species and its community-level consequence. *Ecology* 90(7), 1762–1772.
- Barry KM, Stone C, Mohammed CL (2008) Crown-scale evaluation of spectral indices for defoliated and discoloured eucalypts. *International Journal of Remote Sensing* 29, 47-69.
- Battaglia M, Mohammed, CA (2009) Forest Health: Building resilient systems that can adapt to change. *Australian Forest Grower* 32, 38-39.
- Beadle C, Duff G, Richardson A (2009) Preface. *Forest Ecology and Management* 258, 339-340.
- Beadle C, Duff, G, Richardson, A (Editors) (2009) Old Forests New Management. The conservation and use of old-growth forests in the 21st Century. *Forest Ecology and Management* 258, 339-540.
- Beadle C, Volker P, Bird T, Mohammed C, Barry K, Pinkard L, Wiseman D, Harwood C, Washusen R, Wardlaw T, Nolan G (2008) Solid-wood production from temperate eucalypt plantations: a Tasmanian case study. *Southern Forests* 70, 45-57.
- Cawthen L, Munks S, Richardson A, Nicol SC (2009) The use of temperature loggers to monitor tree hollow use by mammals. *Ecological Management and Restoration* 10 (2), 155-157.
- Chuter AE, Jordan GJ, Dalton PJ, Wapstra M (2008) Spore germination and early gametophyte development of the soft tree fern *Dicksonia antarctica*. *Tasforests* 17, 1-8.
- Close DC, Davidson NJ, Johnson DW, Abrams MD, Hart SC, Lunt ID, Archibald RD, Horton B, Adams MA (2009) Premature decline of *Eucalyptus* and altered ecosystem processes in the absence of fire in some Australian forests. *The Botanical Review* 75 (2), 191-203.
- Close DC, Davidson NJ, Watson T (2008) Health of remnant woodlands in fragments under distinct grazing regimes. *Biological Conservation* 141, 2395-2402.

- Collett NG, Elms S (in press). The control of *Sirex* wood wasp using biological control agents in Victoria, Australia. *Agricultural and Forest Entomology* 11, 283-294.
- Costa e Silva J, Borralho NMG, Araújo JA, Vaillancourt RE, Potts BM (2009) Genetic parameters for growth, wood density and pulp yield in *Eucalyptus globulus* across a range of sites in Portugal. *Tree Genetics and Genomes* 5, 291–305.
- Downes GM, Catela F and Meder, R (2009) Developing and evaluating a multisite and multispecies NIR calibration for the prediction of Kraft pulp yield in eucalypts. *Southern Forests* 71(2), 155-164.
- Downes GM, Drew DM (2008) Climate and Growth Influences on Wood Formation and Utilisation. *Southern Forests* 70, 155-167.
- Drake PL, Mendham DS, White DA, Ogden GN (2009) A comparison of growth, photosynthetic capacity and water stress in *Eucalyptus globulus* coppice regrowth and seedlings during early development. *Tree Physiology* 29, 663-674.
- Drew D, O'Grady AP, Downes G, Read J, Worledge, D, (2008) Daily stem growth patterns in irrigated and non-irrigated *Eucalyptus globulus*. *Tree Physiology* 28, 1573-1581.
- Drew DM, Downes GM, Grzeskowiak V, Naidoo T (2009) Differences in daily stem size variation and growth in two hybrid eucalypt clones. *Trees: Structure and Function* 23, 585-595.
- Drew DM, Downes GM, O'Grady AP, Read J (2009) Drought and temperature induced wood property variation in irrigated and non-irrigated *Eucalyptus globulus*. *Annals of Forest Science* 66(4), 1-406.
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- Gates GM, Horton BM (2009) A new *Entoloma* (Basidiomycetes, Agaricales) from Tasmania. *Mycotaxon* 107,175-179.
- Griffin RA, Hingston AB, Ohmart CP (2009) Pollinators of *Eucalyptus regnans* (Myrtaceae), the world's tallest flowering plant species. *Australian Journal of Botany* 57, 18–25.
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- Kelly J, Jose S, Nichols JD, Bristow M (2009) Growth and physiological response of six Australian rainforest tree species to a light gradient. *Forest Ecology and Management* 257, 287-293.
- Koch AJ, Munks SA, Driscoll DA (2008) The use of hollow-bearing trees by vertebrate fauna in wet and dry *Eucalyptus obliqua* forest, Tasmania. *Wildlife Research* 35, 727–746.
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- Dunn, C & Williams, K (2008) Making sense of social research in forestry. Paper presented to the Society For Social Studies Of Science (4s) & European Association For The Study Of Science And Technology (Easst) 20-23 August 2008 Conference theme: Acting with Science, Technology and Medicine. Rotterdam, The Netherlands
- Elek J, Allen G (2008) Reducing the chemical footprint when managing chrysomelid leaf beetles in eucalypt plantations: lethal trap trees. Oral presentation for ICE 2008, XXIII International Congress of Entomology, Durban, South Africa.
- Elek J, Trainer E (2008) A review of methods and a proposal for managing and reporting environmental impacts of pesticides in forestry management. Oral presentation for IUFRO Recent Advances in Forest Entomology, South Africa, July 2008.
- Flynn EM, Jones SM, Munks SA, Jones ME (2008) Assessing the effects of habitat type on milk composition and physiological parameters in the common brushtail possum (*Trichosurus vulpecula*) in Tasmania’s production forests, paper presented at Australian Mammal Society Conference, Darwin, Northern territory, Australia, September 2008.
- Glencross K, Nichols JD, Vanclay J, Bentley J (2008). Subtropical Hardwood Plantations as Potential Feedstock for a Range of Bioenergy and Biofuels Processes. Bioenergy Australia Conference, November 2008, Melbourne.
- Grove SJ, Yee M, Borrer Coss L (2008). Tailoring forest management to the habitat needs of the giant velvet worm (*Tasmanipatus barretti*). In Lefroy, E. (ed.). Biodiversity - balancing conservation and production: case studies from the real world. Proceedings of the conference at the University of Tasmania, 27 April 2007. University of Tasmania, Hobart, TAS. pp 205-216.

- Horton BM (2008). Ectomycorrhizal community composition in relation to canopy health and understorey vegetation in Tasmanian *Eucalyptus delegatensis* forest. Jill Landsberg scholarship holder plenary seminar, ESA annual conference - interactions in science, interactions in nature, Sydney, Australia.
- Hunt MA (2008) Presented to the CRC annual meeting, Launceston, November 2008.
- Jones RC, Hecht V, Gore PL, Potts BM, Steane DA, Vaillancourt RE and Weller JL (2008) Expression of Flowering Locus T (FT) and Leafy (ELF1) homologues are associated with annual flower bud initiation in *Eucalyptus globulus*. Proc. IUFRO_CTIA conference 'Adaptation, Breeding and Conservation in the Era of Forest Tree Genomics and Environmental Change', Quebec City, Canada, 25-28 August 2008. p. 82
- Jones RC, Steane DA, Potts BM, Vaillancourt RE (2008) Molecular evolution in complex forest tree gene pools: the case of *Eucalyptus globulus* in southeastern Australia. Proc. IUFRO_CTIA conference 'Adaptation, Breeding and Conservation in the Era of Forest Tree Genomics and Environmental Change', Quebec City, Canada, 25-28 August 2008. p. 106.
- Le S, Henson M, Shepherd M (2009) Relationships and population structuring amongst Red Mahoganies. In Australasian Forest Genetics, April 2009, Perth. pp. Conference Talk.
- Mendham DS, White DA, Drake P (2008) Managing site resources in 2nd and later rotations: Development of the BPOS decision support system. Presented to the CRC annual meeting, Launceston, November 2008.
- Nichols JD, Smith GRB, Glencross K, Grant J (2008). Subtropical Eucalypt Plantations in Australia: a new opportunity and challenge. Australian Forest Growers conference, Albury, NSW, Australia 20-22 October 2008.
- O'Grady AP (2008) Convergence of water use in an arid zone woodland. Ecohydrology meeting University of Western Australia November 2008.
- O'Grady AP, Battaglia M (2008) Predicting tree size class distribution and survival: Cellular automata model for forest stands. Presented to the CRC Annual Science Meeting, Launceston, November 2008.
- O'Reilly-Wapstra JM, Hamilton M, Williams D, Wardlaw T, Williams D, Potts BM (2008) Genetic relationships in preference between multiple herbivores in a eucalypt system. Abstract in 'Interactions in Nature. Proceedings of 33rd Ecological Society of Australia Annual Conference'. Sydney, Australia. (Eds C McArthur and D Hochuli). (Ecological Society of Australia) p. 56.
- Osborne D, Hogg B, Bristow M, Hunt MA (2008) Initial development of a simple eucalypt plantation site selection index based on field soil parameters. Poster presented at IUFRO Conference on Processes Controlling Productivity in Tropical Plantations, Porto Seguro, Brazil, Nov 10-14, 2008.
- Pinkard EA (2008) The development of a health module for the process based model CABALA. Presented to the CRC Annual Science Meeting, Launceston, November 2008.
- Powell CJ (2008) The role of the matrix in shaping ground-dwelling arthropod diversity and community composition of native remnants embedded within a pastoral and blue gum (*Eucalyptus globulus*. Labill) plantation landscape. Oral presentation at the XXIII International Congress of Entomology (ICE), Durban, South Africa, July 6-12.
- Russell JH, Kimball B, Yanchuk AD, Rousi M, O'Reilly-Wapstra J, Potts BM (2008) Limitations and opportunities in breeding and deploying mammal-resistant trees. Proc. IUFRO_CTIA conference 'Adaptation, Breeding and Conservation in the Era of Forest Tree Genomics and Environmental Change', Quebec City, Canada, 25-28 August 2008.
- Sansaloni CP, Petroli CD, Steane DA, Vaillancourt RE, Carling J, Myburg AA, de Resende MDV, Wenzl P, Kilian A, Grattapaglia D (2009) High-density diversity arrays technology (DArT) genotyping for cost-effective mapping and genome-wide selection in *Eucalyptus*. Presented at Plant and Animal Genome XVII Conference, January 10-14, 2009.
- Schirmer, J (2008) Social impacts of land use change. Catchments and Plantation Forestry forum, Wagga Wagga, 31st October 2008. Hosted by the Murrumbidgee Catchment Management Authority
- Schirmer, J (2008) What is the role of 'information' in community engagement about the environment? A case study of research into land use change. Conference presentation to Reimagining Sociology: The Australian Sociology Association Annual Conference. December 2nd, 2008, University of Melbourne, Melbourne
- Schirmer, J (2009) Social dimensions of forestry: Understanding the social impacts of expansion of plantations on agricultural land. Presented March 26th 2009, to the Yale Forest Form Leadership Seminar Series, The Global Institute of Sustainable Forestry, Yale School of Forestry & Environmental Studies, Marsh Hall Rotunda, New Haven
- Sexton T (2009). A first glimpse at wood property associations in *Eucalyptus pilularis* (Blackbutt). Australasian Forest Genetics Conference, Fremantle, April 19-22, 2009.

- Sims N, Culvenor D, Verbesselt J (2008) Monitoring forest condition with remote sensing. Presented to the CRC Annual Science Meeting, Launceston, November 2008.
- Stackpole D (2009). Genetic parameters for *Eucalyptus globulus* kraft pulp yield. Australasian Forest Genetics Conference, Fremantle, April 19-22, 2009.
- Steane DA, Myburg Z, Kilian A, Carling J, Huttner E, Sansaloni C, Petroli C, Grattapaglia D, Vaillancourt R (2009) DArT markers herald a new era of *Eucalyptus* phylogenomics. Paper presented at Plant and Animal Genome Conference XVII, San Diego, California, 10-14 January 2009.
- Thavamanikumar S (2009). Nucleotide variation and selection patterns at wood quality candidate genes in *Eucalyptus globulus* Labill. Australasian Forest Genetics Conference, Fremantle, April 19-22, 2009.
- Thavamanikumar S, McManus LJ, Tibbits JFG, Bossinger G (2009) Use of association genetics to dissect quantitative wood property traits in *Eucalyptus globulus*. Seminar presented in IUFRO Tree Biotechnology 2009, Whistler, Canada, 28 June to 3 July 2009, p.14.
- Tibbits J (2009). Why investigate association mapping for the improvement of plantation species in Australia? Australasian Forest Genetics Conference, Fremantle, April 19-22, 2009.
- Todd MK (2008) Ecology of the Tasmanian Masked Owl, *Tyto novaehollandiae castanops*. Paper presented at the Australian Birdfair 2008, Leeton, NSW.
- Washusen R (2009) The Influence of Plantation Silviculture on Tension Wood Formation. In: Apiolaza, L.A., Chauhan, S. and Walker, J.C.F. (eds) Revisiting Eucalypts - A Strategic Review. Workshop Proceedings 2009, pp 91-100.
- Wright T, Bennet L, Kasel S, Tausz M (2008) Changes in *Leptospermum myrsinoides* stomatal behaviour along a microclimate gradients as affected by adjacent land-use. Oral presentation at the Air Pollution and Global Change Symposium: Plant Function in a Changing Global Environment, University of Melbourne, Creswick Campus, Australia, November 7-11.
- Wright T, Bennet L, Kasel S, Tausz M (2008) Comparative influence of agriculture and Blue Gum plantations on remnant woodland microclimate. Oral presentation to Melbourne School of Land and Environment Postgraduate Conference, University of Melbourne, Dookie Campus, Australia, October 12-14.
- Wright T, Bennet L, Kasel S, Tausz M (2008) Does a change in production land-use increase remnant vegetation water stress? Oral presentation at the U21 Postgraduate Research Conference, University of Birmingham, UK, July 20-25.
- Wright T, Bennet L, Kasel S, Tausz M (2008) Water relations of remnant woodland trees affected more by adjoining agricultural than plantation systems. Oral presentation at the Ecohydrology and Ecophysiology of Plants in Water-limited Environments International Workshop, University of Western Australia, Australia, September 15-19.

Poster presentations

- Bailey T, Davidson N, Close D (2008) Recreating the eucalypt recruitment niche in degraded remnants in production landscapes. Poster presentation at the CRC for Forestry Annual Science Conference, Launceston, Tasmania, November 5-7.
- Bailey T, Davidson N, Close D (2008) Recreating the eucalypt recruitment niche in degraded remnants in production landscapes. Poster presented to the 33rd Ecological Society of Australia Annual Conference, Sydney, Australia, December 1-5.
- Borzak C, O'Reilly-Wapstra J, Potts B. (2008) Indirect and direct plant-herbivore interactions in a eucalypt system. Talk abstract in '33rd Ecological Society of Australia Annual Conference'. Sydney, Australia. (Eds C McArthur and D Hochuli). (Ecological Society of Australia). p. 64.
- Costa e Silva J, Hardner C, Tilyard P and Brad Potts B (2009) Inbreeding in *Eucalyptus globulus*. Poster abstract in 'Proceedings of Australasian Forest Genetics Conference, 19th - 23rd April, Fremantle, Western Australia. (CD).
- Duncan F, Gilfedder L, Davey C (2008) Native grasslands in northwest Tasmania and the role of forest managers in their conservation and management. Poster presented at joint International Grasslands Congress/International Rangelands Congress (IGC/IRC), Hohhot, China, June/July 2008.

- Elek J, Beveridge N (2008). How much do *Eucalyptus* leaf beetles eat? Poster for ICE 2008, XXIII International Congress of Entomology, Durban, South Africa and IUFRO Recent Advances in Forest Entomology, South Africa, July 2008.
- Elek J, Ramsden N, Patel V, Allen G (2008). Egg parasitism rates of the invasive Australian Eucalyptus weevil, *Gonipterus* sp., in its home range. Poster for ICE 2008, XXIII International Congress of Entomology, Durban, South Africa and IUFRO Recent Advances in Forest Entomology, South Africa, July 2008.
- Flynn EM, Jones SM, Munks SA, Jones ME (2008) Assessing the effect of habitat type and disturbance on population size and structure in the common brushtail possum (*Trichosurus vulpecula*) and other mammal species in production forests in Tasmania. Poster presented at Australian Mammal Society Conference, Darwin, Northern Territory, Australia, September 2008.
- Flynn EM, Jones SM, Munks SA, Jones ME (2008) Assessing the effect of habitat type and disturbance on population size and structure in the common brushtail possum (*Trichosurus vulpecula*) and other mammal species in production forests in Tasmania. Poster presented at CRC Forestry Annual Meeting, Launceston, Tasmania, November 2008.
- Grove S, Forster L, Doran N, Driessen M (2008) Turnover in beetle assemblages with altitude: baseline data from a long-term study on Mount Weld, southern Tasmania. Poster presentation, Ecological Society of Australia Annual Conference, Sydney 1-5 December 2008.
- Jones R, Steane D, Potts B, Vaillancourt R (2008) Conservation genetics of an outlying population of the *Eucalyptus globulus* species complex. Poster presentation at CRC annual Meeting, Launceston.
- Jones RC, Steane DA, Potts BM, Vaillancourt RE (2009). Conservation genetics of an outlying population of the *Eucalyptus globulus* species complex. Poster abstract in 'Proceedings of Australasian Forest Genetics Conference, 19th - 23rd April, Freemantle, Western Australia. (CD)
- Koch AJ and Munks SA (2008) Managing hollow-bearing trees in Tasmania's production forests. Poster presented at CRC Forestry Annual Meeting, Launceston, Tasmania, November 2008.
- Long NOM (2008) Water-use efficiency, physiological traits and inheritance in *Eucalyptus globulus* plantations. Poster presented to the CRC annual meeting, Launceston, November 2008.
- Mimura M, Robert C, Barbour RC, Brad M. Potts BM, Vaillancourt RE, Watanabe KN (2009). Inbreeding and pollination distance in continuous and fragmented forest landscapes of *Eucalyptus globulus*. Poster presented at Australasian Forest Genetics Conference, 19th - 23rd April'. Freemantle, Western Australia.
- Sanger J (2008) Is the endangered *Eucalyptus gunnii* subsp. *divaricata* shifting in response to climate change? Poster presented to the 33rd Ecological Society of Australia Annual Conference, Sydney, Australia, December 1-5.
- Scott R. (2008) Effects of variable retention harvesting on productivity and growth in wet eucalypt forests. Poster presentation at CRC annual meeting, Launceston, Tasmania.
- Sexton TR, Henry RJ, McManus LJ, Henson M, Thomas D and Shepherd M. (2008). Genetic Association Studies in Blackbutt (*Eucalyptus pilularis*). Poster presented to the Forestry CRC Annual Meeting, Launceston, Tasmania. 5-7th November.
- Shepherd M, Thomas D, Henson M (2009) Genetic structuring of Blackbutt (*Eucalyptus pilularis*) (Poster). In Australian Forest Genetics Conference, 20-22 April 2009, Freemantle, WA.
- Spain, M, Glencross, K, Palmer G, Nichols, D, and Smith, RGB (2008). Effects of initial spacing on wood properties of 7 year old *Eucalyptus pilularis* in plantations. Presented at Australian Forest Growers conference, Albury, NSW, Australia 20-22 October 2008.
- Stephens H, O'Reilly-Wapstra J, Baker S, Munks S, Potts B (2008). Aggregated retention and mammal conservation in old-growth forests. Poster abstract in 'Interactions in Nature. 33rd Ecological Society of Australia Annual Conference'. Sydney, Australia. (Eds C McArthur and D Hochuli). (Ecological Society of Australia). p. 248
- Wright T, Bennet L, Kasel S, Tausz M (2008) A stomatal conductance model to predict water use of remnant vegetation in plantation and agricultural landscapes. Poster presentation at the CRC for Forestry Annual Science Conference, Launceston, Tasmania, November 5-7.

Other presentations

- Bailey T, Davidson N, Close D (2009) Eucalypt seedling trials for dry forest regeneration. Rowella Landcare group, Rowella, Tasmania, April 2009
- Bailey T, Davidson N, Close D (2009) Recreating the eucalypt regeneration niche in degraded bush remnants in production landscapes. Oral presentation to the Tasmanian Agricultural Research Forum, Launceston, Tasmania, February 12.
- Baker S, Scott R (2008) Variable Retention – An alternative to clearfelling. Forestry Tasmania Lunchtime Talk Series. 18th October 2008, Forestry Tasmania, Hobart.
- Baker TG (2009). Species, Sites and Silviculture: Plantation Growth and Yield. Victorian DPI Farm Forestry Research Seminar. Melbourne, 19 June 2009.
- Beadle C (2008) Plantation forestry: learning to live with constraints on yield. University of Tasmania School of Plant Science Seminar. September 5, 2009.
- Horton, BM (2008). Tasmania: the place, the ecology, the fungi, Seminar. School of Plant and Microbial Ecology, University of California, Berkeley, USA.
- Hunt MA (2009) Presentation to the Queensland Department of Primary Industries and Fisheries executive and the University of the Sunshine Coast executive on Forest Productivity Modelling and opportunities in carbon and water constrained economies. University of the Sunshine Coast June 2009.
- Miller AM, O'Reilly-Wapstra JM, Potts BM, McArthur C (2009) Manipulating seedling palatability for non-lethal browsing management. Alternatives to 1080 Program Annual Workshop, Mercure Hotel, Launceston, Tasmania, 6 May 2009.
- Neyland M (2009) Final PhD seminar. School of Plant Science, University of Tasmania.
- O'Grady AP (2009) Predicting size class distributions and productivity: A process based approach. University of Melbourne March 2009
- O'Grady AP, Battaglia M (2008) Presentation and summary of ARC Linkage Projects on predicting size class distributions and survival. Forestry Tasmania October 2008
- Potts BM (2008). Genetics and our forests. Invited presentation to the Tasmanian Royal Society and The University of Tasmania Winter Lecture Series "Genetics: Puzzles and Possibilities", Hobart, 15th July.
- Potts BM (2008). Tasmania's eucalypts: Their Place in Science. Invited presentation to the Tasmanian Royal Society, Hobart 1st July.
- Potts BM (2009) Flowering in *Eucalyptus globulus*. Presentation to the Fauna Strategic Planning Group (Technical Working group) developing swift parrot habitat management guidelines. 18th June , FPA, Hobart.
- Schirmer, J. 2008. Forestry, jobs and spending: Forest industry employment and expenditure in Western Australia, 2005-06. Public seminar presented 17th November 2008, Department of Agriculture, Albany
- Schirmer, J. 2008. Forestry, jobs and spending: Forest industry employment and expenditure in Western Australia, 2005-06. Public seminar presented 18th November 2008, Department of Agriculture, Bunbury
- Schirmer, J. 2008. Social impacts of land use change to plantation forestry. Presented to Rural Planning and Development Commission hearing on the Draft State Policy on the Protection of Agricultural Land, Hobart, 25th November 2008.
- Schirmer, J. & Williams, K. 2009. Socio-economic impacts of plantations. Public seminar presented 22nd June 2009, Department of Agriculture and Food, Albany.
- Schirmer, J. & Williams, K. 2009. Socio-economic impacts of plantations. Industry workshop held 22nd June 2009, Department of Agriculture and Food, Albany.
- Schirmer, J. & Williams, K. 2009. Socio-economic impacts of plantations. Public seminar presented 23rd June 2009, Department of Agriculture and Food, Bunbury.
- Schirmer, J. & Williams, K. 2009. Socio-economic impacts of plantations. Industry workshop held 23rd June 2009, Department of Agriculture and Food, Bunbury.
- Schirmer, J. & Williams, K. 2009. Socio-economic impacts of plantations. Public seminar presented 23rd June 2009, St Johns Ambulance Centre, Esperance.
- Schirmer, J. & Williams, K. 2009. Socio-economic impacts of plantations. Industry workshop held 23rd June 2009, St Johns Ambulance Centre, Esperance.

- Scott R (2008) Introductory PhD seminar. School of Plant Science, University of Tasmania.
- Sexton TR, Henry RJ, McManus LJ, Henson M, Thomas D and Shepherd M (2009) Genetic Association Studies in Blackbutt (*Eucalyptus pilularis*). Seminar presented at Forests NSW Sub-tropical Eucalyptus workshop. Grafton, New South Wales, March 30, 2009.
- Shepherd M (2009) Genetic structuring of *Eucalyptus pilularis*; . In Sub-tropical *Eucalyptus* Workshop, 30 March 2009, Grafton Forest Technology Centre, Forests NSW Trenayr. (Talk, with 2.1).
- Williams, K & Schirmer, J (2008) Socio-economic impacts of land use change. Public seminar presented December 8th 2008, Timboon District Hall, Timboon.
- Williams, K & Schirmer, J (2008). Socio-economic impacts of land use change. Public seminar presented December 8th 2008, Mortlake Memorial Hall, Mortlake.
- Williams, K & Schirmer, J (2008). Socio-economic impacts of land use change. Public seminar presented December 9th 2008, DPI Victoria offices, Hamilton.
- Williams, K & Schirmer, J (2008). Socio-economic impacts of land use change. Public seminar presented December 9th 2008, Casterton Town Hall, Casterton.
- Williams, K & Schirmer, J (2008) Socio-economic impacts of land use change. Public seminar presented December 10th 2008, Chardonnay Lodge, Coonawarra.
- Williams, K & Schirmer, J (2008). Socio-economic impacts of land use change. Public seminar presented December 11th 2008, DPI Victoria, Horsham.

Newsletters

- Fisk T (ed) (2008) The Log. Newsletter of the CRC for Forestry's Harvesting and operations research program. Issue 2 (July 2008). <http://www.crcforestry.com.au/newsletters/the-log/log2.html>
- Fisk T (ed) (2009) The Log. Newsletter of the CRC for Forestry's Harvesting and operations research program. Issue 3 (March 2009). <http://www.crcforestry.com.au/newsletters/the-log/log3.html>
- Harwood C (ed) (2008) The Wood from the Trees. Newsletter of the CRC for Forestry's High value wood resources program. Issue 4 (July 2008) <http://www.crcforestry.com.au/newsletters/wood-from-trees/index.html>
- Hunt M (ed) (2009) The Monitor. Newsletter of the CRC for Forestry's Managing and monitoring for forest growth and health research program. Issue 5 (April 2005). <http://www.crcforestry.com.au/newsletters/monitor/index.html>
- Loney PE, Field V (eds) (2009) The CRC for Forestry News. The CRC for Forestry's newsletter. Issue 2 (March 2009). <http://www.crcforestry.com.au/newsletters/crcnewsletter/crcnewsletter.html>
- O'Grady AP (ed) (2009) Understorey. Newsletter of the CRC for Forestry's Project 1.3 Modelling and information integration newsletter (January 2009). <http://www.crcforestry.com.au/downloads/Understorey-Jan-2009-final-compressed.pdf>
- Steane D (ed) (2009) Biobuzz: Newsletter of the CRC for Forestry's Biodiversity project. Issue 8 (March 2009). <http://www.crcforestry.com.au/newsletters/biobuzz/biobuzz8.html>
- Steane D (ed) (2009) Biobuzz: Newsletter of the CRC for Forestry's Biodiversity project. Issue 7 (November 2008). <http://www.crcforestry.com.au/newsletters/biobuzz/biobuzz7.html>
- Steane D (ed) (2009) Biobuzz: Newsletter of the CRC for Forestry's Biodiversity project. Issue 6 (August 2008). <http://www.crcforestry.com.au/newsletters/biobuzz/biobuzz6.html>
- Schirmer, J (ed) (2008) Communities newsletter #2, November 2008. Distributed via email to register of people interested in the Communities project

Industry bulletins

- Acuna M, Wiedemann J, Heidersdorf E (2009) Effects of different stocking densities on harvesting of blue gum stands in Western Australia. CRC Forestry Industry Bulletin.
- Acuna M, Wiedemann J, Strandgard M (2009) Evaluation of an in-field chipping operation in Western Australia. CRC Forestry Industry Bulletin.
- Brown M (2008) The impact of tare weight on transportation efficiency in Australian forest operations. CRC Forestry Industry Bulletin.

Fisk T, Acuna M, Strandgard M (2008) Impact of piece size and slope on productivity and costs of CTL harvesting equipment. CRC Forestry Industry Bulletin

Strandgard M (2008) Best practice harvester calibration. CRC Forestry Industry Bulletin.

Any other communications product aimed at transferring know-how or practical information to industry and other end-users

Matsuki M (2008) Seven industry staff training sessions undertaken by the Industry Pest Management Group (8 WA and 1 in Victoria).

Matsuki M (2009). Two industry staff training sessions undertaken by the Industry Pest Management (WA and Victoria).

Mendham DS (2009). BPOS v2.0 (Beta-version) was released to members for testing, at <https://www.crcforestrytools.com.au/bpos> (web-based decision support software)

White, D. (2008), Soil water stores in second rotation blue gum plantations, fact sheet, CRC for Forestry, Hobart.

Wiltshire RJE and Jordon G (2009). TreeFlip – Life-size guide to the trees of Tasmania. (School of Plant Science, University of Tasmania and CRC for Forestry).

Relevant committees

Allen GR, Collett N, Hardy G. Australian Forestry Council, Research Working Group 7 (Forest Health).

Baker S. Hollows Working Group.

Burgess T. International expert appointed to the European network on emerging diseases and invasive species threats to European Forest ecosystems under the Sixth framework Program, Priority 8.1.

Collett N. Victorian Forest Health Advisory Committee (appointed by Victorian Govt to oversee forest health issues in Victoria and make recommendations to the minister).

Close DC. Chair the Industry Reference Group (National group including representatives from WA, NSW and Tas) for Bushfire CRC project 'Eucalypt decline in the absence of fire'.

Davidson N. Warra LTR Research Committee.

Grove S. Research Working Group 4 (Primary Industries Standing Committee – Forest and Forest Products Subcommittee).

Hardy G. WA Dieback Consultative Council and Research Working Group both established by WA Minister of Environment.

Hunt MA. Deputy Chairman of the International Union of Forestry Research Organisations (IUFRO) Tropical Plantations Working Group (Division 1.06.02).

Hunt MA. External Member, University of the Sunshine Coast Faculty of Science Health and Education Advisory Committee.

O'Grady AP, Battaglia M. Members of the organising committee for the 2010 IUFRO Canopy Processes meeting.

Munks S, Jordan G. Tasmanian Government Threaten Species Scientific Advisory Committee.

Munks S. FPA Biodiversity Expert Review Panel (Executive Officer).

Munks S. Threatened species recovery team (threatened fish).

Munks S. Hollows Working Group and Fauna Strategic Planning Group.

O'Reilly-Wapstra J. Technical panel advising The Tasmanian Community Forest Agreement Research into Alternatives to the Use of 1080

Munks S. National Research Working Group 4.

O'Reilly-Wapstra J. Technical panel advising The Tasmanian Community Forest Agreement Research into Alternatives to the Use of 1080

Potts BM, Ades P. Australian Forestry Council, National Research Working Group 1 (Forest genetics and breeding)

Potts BM, Ades P. Vaillancourt RE. Technical committee of the Southern Tree Breeding Association.

Potts BM. Giant Trees Consultation Committee advising Forestry Tasmania

Other

Madhavan D (2009). Studies on Soil Carbon Fractions in Relation to Nitrogen Availability in Forest Soils. PhD Candidature Confirmation Report. Department of Forest and Ecosystem Science, The University of Melbourne, 40pp.

Technical notes

Horton BM (2008). Report from Bryony Horton— Inaugural winner of the Jill Landsberg Scholarship. *ESA Bulletin* 38(3), 15-16.

Scott R, Baker S (2008). Update on variable retention research. *Forest Practices News* 8, 10-11.

Field days and workshops hosted

Archibald R, Bradshaw W, Craig M, Crawford H, Davidson N, Grimbacher P, Master R (2009) Workshop on “Restoring degraded remnants within plantations”, Department of Agriculture and Food WA, Albany, Western Australia, May 12.

Archibald R, Burgess T, Bialkowski K (2008) WA biodiversity project meeting, Department of Agriculture and Food WA, Albany, Western Australia, October 20.

Archibald R, Burgess T, Bialkowski K (2009) WA biodiversity project meeting, Department of Agriculture and Food WA, Albany, Western Australia, February 4.

Archibald R, Hardy G, Bialkowski K (2008) WA biodiversity project meeting, Great Southern Ltd, Bunbury, Western Australia, August 18.

Blakemore P. (2008) Industry Workshop discussing key results from second stage processing study on plantation-grown *Eucalyptus nitens* logs. FIAT offices, Hobart, January 18, 2009.

Burgess T, Hardy G, Matsuki M (2008) Industry Pest Management Group meeting, 20th October, Albany, WA.

CRC Project 2.1 (2008) Association Genetics Workshop held at Invercauld House, Southern Cross University, Wednesday September 3 to Thursday September 4, 2008.

Hardy G, Matsuki M (2008) Industry Pest Management Group meeting, 18th August, Albany WA.

Matsuki M (2008) Industry Pest management Group workshop on relationships between damage and tree growth. 29th of August, Casterton, Victoria.

Matsuki M (2008) Industry Pest management Group workshop on statistical analysis of trials. 21st and 22nd October, Albany, WA.

Matsuki M (2008) Field day on identification of *Paropsisterna m-fuscum* near Albany, WA on the 4th December.

Matsuki M (2008) Industry Pest Management Group meeting. 30th July, Casterton, Victoria.

Matsuki M (2008) Industry Pest Management Group meeting. 4th September, Casterton, Victoria.

Matsuki M (2009) Industry Pest Management Group meeting. 13th May, Bunbury WA.

Matsuki M (2009) Industry Pest Management Group meeting. 4th February, Albany, WA.

Matsuki M (2009) Industry Pest management Group workshop on assessments of insect populations and CDI, 13th February, Casterton, Vic.

Steane D, Ades P (2009) Workshop on implications of genetic research on ash eucalypts to native forest seed zones with Forestry Tasmania. 19th June, Hobart, Tasmania

Media activities: radio, TV, online, newspaper and magazine articles

- Bailey T (2008) Growing trees in low rainfall areas – the Red Tree demonstration site six years on. Article published in *Tasmanian Farmer*, Issue 42, July.
- Bailey T (2008) New trials aim to promote eucalypt regeneration in areas of tree decline. Article published in *Tasmanian Farmer*, Issue 43, October.
- Loney P (2009) Press Release on B Potts' Clarke medal, reported in CRC program Newsletter Autumn 2009 'Clarke Medal recipient has a long involvement with CRCs'.
- Potts B (2009) ABC National Radio's 1 hour show Late Night Live with interviewer Phillip Adams discussing eucalypts with Dean Nichole, Prof. David Bowman, and Prof. Dario Grattapaglia (Brazil) 29/2/2009
- Potts B (2009) Radio Interview for ABC Radio news 23/3/2009 about Clarke Medal Award
- Potts B (2009) Radio Interview with Andy Muirhead on ABC breakfast session 24/3/2009 about Clarke Medal Award
- Potts B (2009) Short article in *The Mercury* 24/3/2009 about Clarke Medal Award
- Potts B (2009) Two articles in UNITAS magazine following on Clarke Medal Award following interview

Awards/grants

- Bailey T (2008) Australian Flora Foundation Young Scientist Award for "best poster on the biology or cultivation of an Australian plant", for the poster "Recreating the eucalypt recruitment niche in degraded remnants in production landscapes." Presented at the Ecological Society of Australia Annual Conference, Sydney, Australia, December 1-5.
- Potts B (2009) The Royal Society of New South Wales' 2008 Clarke Medal for distinguished work in a natural science done in Australia and its Territories. The medal was first awarded in 1878 and rotates through geology, botany and zoology. The 2008 award was for botany.
- Stephens HC, O'Reilly-Wapstra JM, Potts BM (2009) Does aggregated retention provide suitable habitat for mammal conservation in old growth forests? Holsworth Wildlife Research Fund.
- Stephens HC, O'Reilly-Wapstra JM, Potts BM (2009) Impacts of an alternative logging practice, aggregated retention, on two native rodents. MA Ingram Trust.

Annual reports

- CRC for Forestry (2008), *Annual Report 2007-08*, CRC for Forestry, Hobart.



CRC for Forestry

Annual Report 2008-09

Appendix 2

ACN 115 064 910

Annual financial report for the year ended 30 June 2009

Annual financial report for the year ended 30 June 2009

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Directors' report

The directors of CRC Forestry Limited submit herewith the annual financial report of the company for the year ended 30 June 2009. In order to comply with the provisions of the Corporations Act 2001, the directors report as follows:

The names and particulars of the directors of the company during or since the end of the year are:

Directors

Name	Particulars
Anne Katherine Carnell	(AO, B.Pharm, FAIM, FAIPM, MAICD). Chief Executive Officer, Australian Food and Grocery Council. Joined the Board at incorporation of the company on 30 June 2005 in a non-executive capacity. Ms Carnell is Chairman of the Board, Chairman of the Remuneration and Nomination Committee, a member of the Compliance Committee and the Communications Committee. She is currently a Director of - Red Cross Australia, beyondblue, The Aged Care Standards and Accreditation Agency Ltd.
Timothy Michael Browning	(B.Bus, Dip.C.M., MAICD). General Manager, Forestry Division, Timbercorp Limited. Joined the Board at incorporation of the company on 30 June 2005 in a non-executive capacity. Mr Browning is a member of the Compliance Committee. Tim resigned from the Board on the 5 th of November 2008.
Johannes Hendrik Drielsma	(B.Sc.For.(Hons), M.For.Sci, PhD). Executive General Manager, Forestry Tasmania. Joined the Board at incorporation of the company on 30 th June 2005 in a non-executive capacity. Dr Drielsma is the Chairman of the Communications Committee and a member of the Remuneration and Nomination Committee.
Gary Brian Inions	(B.Sc(Hons), PhD). Managing Director, Hansol PI Pty Ltd. Joined the Board on 13 December 2005 in a non-executive capacity. Dr Inions is a member of the Remuneration, Nomination and Commercialisation and Intellectual Property Committee.
James Balfour Reid	(B.Sc(Hons), PhD, D.Sc, FTSE, awarded David Syme Research Medal (1989) and the Royal Society of Tasmania Medal (2000)). Dean, Faculty of Science Engineering and Technology, University of Tasmania. Joined the Board at incorporation of the company on 30 June 2005 in a non-executive capacity. Professor Reid is a member of the Remuneration, Nomination and is Chair of the Commercialisation and Intellectual Property Committee.
Robert Geoffrey Woolley	(B.Ec, FCA). Chairman of the Forests and Forest Industry Council of Tasmania, and previously a partner in Deloitte Touche Tohmatsu and former Managing Director of Webster Ltd. Mr Woolley has extensive experience in management, business recovery and a professional background in financial services. He is currently Chairman of Tasmanian Pure Foods Ltd and a Director of Tandou Ltd. Joined the Board on 12 December 2005 in a non-executive capacity. Mr Woolley is Chairman of the Compliance Committee.
Robert John Pearce	(B.A., Dip. Ed., J.P.) Executive Director, Forest Industries Federation of WA and Chair of NAFL. Joined the Board in 31 st October 2006 in a non-executive capacity. Mr. Pearce is a member of the Communications Committee.
Lyndall Maree Bull	(B For Sci (Hons), B Sc, PhD, MAICD). Lecturer and National Convenor National Forestry Masters Program, Australian National University. Joined the Board on the 5 th of November 2008 in a non-executive capacity. Dr Bull is a member of the Compliance Committee.
Geoffrey Victor Herbert Wilson	(B.Sc. M.Sc. D.Sc. PhD, FTSE, FAIP FAIM MAICD, AM) He is currently a member of the Board of the Australian Maritime College (University of Tasmania) and Chairman of the Board of AMC Search. He joined the Board on 28 th April 2009 in a non-executive capacity.

The above named directors held office during the whole of the financial year and since the end of the year except for:

- Timothy Michael Browning – resigned 5th November 2008

Company Secretary

Mark Andrew Sheldon-Stemm (Cert. Comm, B. Soc. Sc, Grad. Dip. Agr. Econ, Grad. Dip. Man, FNPA).

Principal activities

CRC Forestry Limited is a company limited by guarantee (the amount of each members guarantee is \$10) incorporated on 30th June 2005 to manage the CRC for Forestry, a seven year forestry research organisation established under the Commonwealth Government's Cooperative Research Centre Programme. The principal activities of the CRC are sustainable forest landscape research in four main areas –

- Managing and Monitoring for Growth and Health – improved ability to select planting sites and manage for increased profitability of plantation investments, through higher yields and lower costs of production.
- High-Value Wood Resources – increased use of planting stock with improved genetic potential, managed to optimise production of high value wood for fibre and solid wood markets.
- Harvesting and Operations – adoption of harvesting and logistical practices that reduce delivered wood costs, contributing to industry profitability, while maintaining conformity with codes of practice and certification standards.
- Trees in the Landscape – improved security of access to land and forest resources for the forest industry, sustaining levels of investment in the establishment of new plantations, through demonstrated ability to manage in an environmentally and socially sustainable manner.

Review of operations

Comparative figures are available this year and show that despite the slow start in the 2008 financial year the majority of research projects are now on track and that some of the previous under spend is being taken up. The major sources of funding are the Commonwealth Government's CRC Programme and the Participants in the CRC for Forestry.

Changes in state of affairs

During the year there was no significant change in the state of affairs of the company other than that referred to in the financial statements or notes thereto.

Subsequent events

There has not been any matter or circumstance, other than that referred to in the financial statements or notes thereto, that has arisen since the end of the year, that has significantly affected, or may significantly affect, the operations of the company, the results of those operations, or the state of affairs of the company in future years.

Future developments

Disclosure of information regarding likely developments in the operations of the company in future years and the expected results of those operations is likely to result in unreasonable prejudice to the company. Accordingly, this information has not been disclosed in this report.

Indemnification of officers and auditors

During the year, the company paid a premium in respect of a contract insuring the directors of the company (as named above), the company secretary and all executive officers of the company against a liability incurred as such a director, secretary or executive officer to the extent permitted by the Corporations Act 2001. The contract of insurance prohibits disclosure of the nature of the liability and the amount of the premium.

The company has not otherwise, during or since the end of the year, indemnified or agreed to indemnify an officer or auditor of the company or of any related body corporate against a liability incurred as such officer or auditor.

Directors' meetings

The following table sets out the number of directors' meetings (including meetings of committees of directors) held during the year and the number of meetings attended by each director (while they were a director or committee member). During the year, 4 board meeting, 4 compliance committee, 2 communication committee, 1 commercialisation and intellectual property committee meetings were held. The remuneration and nomination committee did not meet during the year.

Directors	Board of directors		Remuneration and Nomination committee		Compliance committee		Communications Committee		Commercialisation Committee	
	Held	Attended	Held	Attended	Held	Attended	Held	Attended	Held	Attended
Anne Katherine Carnell	4	4			4	4	2	1		
Timothy Browning	1	1			2	2				
Johannes Drielsma	4	4					2	2		
Lyndall Bull	3	2			1	1				
Gary Inions	4	3							1	1
James Reid	4	3							1	1
Robert Woolley	4	3			4	4				
Robert Pearce	4	4					2	2		
Geoffrey Wilson	1	1								

Auditor's independence declaration

The auditor's independence declaration is included on page 6 of the annual report.

Signed in accordance with a resolution of the Board, made pursuant to s.298(2) of the Corporations Act 2001.

On behalf of the Directors



Anne Katherine Carnell
Chair/Director
Melbourne, 2 September 2009

The Board of Directors
CRC Forestry Limited
Private Bag 12
HOBART TAS 7001

2 September 2009

Dear Board Members

CRC Forestry Limited

In accordance with section 307C of the Corporations Act 2001, I am pleased to provide the following declaration of independence to the directors of CRC Forestry Limited.

As lead audit partner for the audit of the financial statements of CRC Forestry Limited for the financial year ended 30 June 2009, I declare that to the best of my knowledge and belief, there have been no contraventions of:

- (i) the auditor independence requirements of the Corporations Act 2001 in relation to the audit; and
- (ii) any applicable code of professional conduct in relation to the audit.

Yours sincerely

Deloitte Touche Tohmatsu

DELOITTE TOUCHE TOHMATSU



David Harradine
Partner
Chartered Accountants

Independent Auditor's Report to the Members of CRC Forestry Limited

We have audited the accompanying financial report of CRC Forestry Limited, which comprises the balance sheet as at 30 June 2009, and the income statement, cash flow statement and statement of recognised income and expense for the year ended on that date, a summary of significant accounting policies, other explanatory notes and the directors' declaration as set out on pages 9 to 25.

Directors' Responsibility for the Financial Report

The directors of the company are responsible for the preparation and fair presentation of the financial report in accordance with Australian Accounting Standards (including the Australian Accounting Interpretations) and the *Corporations Act 2001*. This responsibility includes establishing and maintaining internal control relevant to the preparation and fair presentation of the financial report that is free from material misstatement, whether due to fraud or error; selecting and applying appropriate accounting policies; and making accounting estimates that are reasonable in the circumstances.

Auditor's Responsibility

Our responsibility is to express an opinion on the financial report based on our audit. We conducted our audit in accordance with Australian Auditing Standards. These Auditing Standards require that we comply with relevant ethical requirements relating to audit engagements and plan and perform the audit to obtain reasonable assurance whether the financial report is free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial report. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the financial report, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial report in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by the directors, as well as evaluating the overall presentation of the financial report.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Auditor's Independence Declaration

In conducting our audit, we have complied with the independence requirements of the *Corporations Act 2001*.

Auditor's Opinion

In our opinion, the financial report of CRC Forestry Limited is in accordance with the *Corporations Act 2001*, including:

- (a) giving a true and fair view of the CRC Forestry Limited's financial position as at 30 June 2009 and of its performance for the year ended on that date; and
- (b) complying with Australian Accounting Standards (including the Australian Accounting Interpretations) and the *Corporations Regulations 2001*.

Deloitte Touche Tohmatsu

DELOITTE TOUCHE TOHMATSU



David Harradine
Partner
Chartered Accountants
Hobart, 2 September 2009

Directors' declaration

The directors declare that:

- (a) in the directors' opinion, there are reasonable grounds to believe that the company will be able to pay its debts as and when they become due and payable; and
- (b) in the directors' opinion, the attached financial statements and notes thereto are in accordance with the Corporations Act 2001, including compliance with accounting standards and giving a true and fair view of the financial position and performance of the company.

Signed in accordance with a resolution of the directors made pursuant to s.295(5) of the Corporations Act 2001.

On behalf of the Directors



Anne Katherine Carnell

Chair/Director

Melbourne, 2 September 2009

Income statement for the year ended 30 June 2009

	Note	2009 \$	2008 \$
Revenue			
Revenue	2	6,100,562	5,754,497
Other income	2	290,752	232,890
Total Revenue		6,391,314	5,987,387
Expenses			
Research provider expenses		5,030,219	4,812,356
Employee related expenses		572,174	592,572
Depreciation		40,817	15,836
Rental and maintenance		104,005	101,671
Corporate and other expenses		644,099	464,952
Total Expenses		6,391,314	5,987,387
Profit before income tax		-	-
Income tax expense		-	-
Profit for the year		-	-

Notes to the financial statements are included on pages 14 to 25.

Balance sheet as at 30 June 2009

	Note	2009 \$	2008 \$
Current assets			
Cash and cash equivalents	12(a)	2,173,212	2,081,683
Trade and other receivables	4	261,745	38,651
Other	5	559,443	441,910
Total current assets		2,994,400	2,562,244
Non-current assets			
Plant and equipment	6	21,222	25,895
Total non-current assets		21,222	25,895
Total assets		3,015,622	2,588,139
Current liabilities			
Trade and other payables	7	171,912	82,504
Other	7 a)	2,829,291	2,492,238
Total current liabilities		3,001,203	2,574,742
Non-current liabilities			
Provisions	8	14,419	13,397
Total non-current liabilities		14,419	13,397
Total liabilities		3,015,622	2,588,139
Net assets		-	-
Equity			
Reserves		-	-
Retained earnings		-	-
Total equity		-	-

Notes to the financial statements are included on pages 14 to 25.

Cash flow statement for the year ended 30 June 2009

	Note	2009 \$	2008 \$
Cash flows from operating activities			
Receipts from customers		5,845,574	6,103,199
Payments to suppliers and employees		(5,875,736)	(6,021,920)
Net cash (used in)/ provided by operating activities	12 (c)	(30,162)	81,279
Cash flows from investing activities			
Interest received		161,286	163,362
Payment for property, plant and equipment		(39,695)	-
Proceeds from sale of property, plant and equipment		100	-
Net cash provided by investing activities		121,691	163,362
Cash flows from financing activities			
Net cash provided by financing activities		-	-
Net increase in cash and cash equivalents		91,529	244,641
Cash and cash equivalents at the beginning of the year		2,081,683	1,837,042
Cash and cash equivalents at the end of the year	12(a)	2,173,212	2,081,683

Notes to the financial statements are included on pages 14 to 25.

Statement of recognised income and expense for the financial year ended 30 June 2009

	Note	2009 \$	2008 \$
Net income recognised directly in equity		-	-
Profit for the year		-	-
Total recognised income and expense for the year		-	-

Notes to the financial statements are included on pages 14 to 25.

Notes to the financial statements for the year ended 30 June 2009

Note	Contents	Note	Contents
1	Summary of accounting policies	9	Leases
2	Profit from operations	10	Economic dependency
3	Remuneration of auditors	11	Segment information
4	Current trade and other receivables	12	Notes to the cash flow statement
5	Other current assets	13	Financial instruments
6	Plant and equipment	14	Key management personnel remuneration
7	Current trade and other payable	15	Related party transaction
8	Non-current provisions	16	Additional company information

1. Summary of accounting policies

Statement of compliance

The financial report is a general purpose financial report which has been prepared in accordance with the Corporations Act 2001, Accounting Standards and Interpretations, and complies with other requirements of the law. Accounting Standards include Australian equivalents to International Financial Reporting Standards ('A-IFRS').

The financial statements were authorised for issue by the directors on 2 September 2009.

Adoption of new and revised Accounting Standards

In the current year, the company has adopted all of the new and revised Standards and Interpretations issued by the Australian Accounting Standards Board (the AASB) that are relevant to its operations and effective for the current annual reporting period. The adoption of these new and revised Standards and Interpretations has resulted in no changes to the company's accounting policies.

Critical accounting judgements and key sources of estimation uncertainty

In the application of the Company's accounting policies, management is required to make judgments, estimates and assumptions about carrying values of assets and liabilities that are not readily apparent from other sources. The estimates and associated assumptions are based on historical experience and other factors that are considered to be relevant. Actual results may differ from these estimates.

The estimates and underlying assumptions are reviewed on an ongoing basis. Revisions to accounting estimates are recognised in the period in which the estimate is revised if the revision affects only that period, or in the period of the revision and future periods if the revision affects both current and future periods.

Standards and Interpretations Issued and not yet effective

At the date of authorization of the financial report, the Standards and Interpretations relevant to the entity listed below were in issue but not yet effective:

Standards/Interpretations	Effective date
AASB 101 Presentation of Financial Statements (revised September 2007), AASB 2007-8 Amendments to Australian Accounting Standards arising from AASB 101	For annual reporting periods beginning on or after 1 January 2009.
AASB 8 Operating Segments, AASB 2007-3 Amendments to Australian Accounting Standards arising from AASB 8	For annual reporting periods beginning on or after 1 January 2009.
AASB 2007-10 Further Amendments to Australian Accounting Standards arising from AASB 101	For annual reporting periods beginning on or after 1 January 2009.
AASB 2008-1 Amendments to Australian Accounting Standard - Share-based Payments: Vesting Conditions and Cancellations	For annual reporting periods beginning on or after 1 January 2009.
IFRS 3 Business Combinations (revised), IAS 27 Consolidated and Separate Financial Statements (revised)	For annual reporting periods beginning on or after 1 July 2009.
Amendments to IFRS 2 Share-based Payment	For annual reporting periods beginning on or after 1 January 2009.
AASB 2008-5 Amendments to Australian Accounting Standards arising from the Annual Improvements Process	For annual reporting periods beginning on or after 1 January 2009.
AASB 2008-6 Further Amendments to Australian Accounting Standards arising from the Annual Improvements Process	For annual reporting periods beginning on or after 1 January 2009.
AASB 2008-7 Amendments to Australian Accounting Standards - Cost of an Investment in a Subsidiary, Jointly Controlled Entity or Associate	For annual reporting periods beginning on or after 1 January 2009.
AASB 2009-2 Amendments to Australian Accounting Standards - Improving Disclosures about Financial Instruments	For annual reporting periods beginning on or after 1 January 2009.
AASB 2009-4 Amendments to Australian Accounting Standards arising from the Annual Improvements Process	Applies to annual reporting periods beginning on or after 1 July 2009
AASB 2009-5 Further Amendments to Australian Accounting Standards arising from the Annual Improvements Process	Applies to annual reporting periods beginning on or after 1 January 2010

Basis of preparation

The financial report has been prepared on the basis of historical cost. Cost is based on the fair values of the consideration given in exchange for assets.

The following significant accounting policies have been adopted in the preparation and presentation of the financial report:

(a) **Cash and cash equivalents**

Cash comprises cash on hand and demand deposits. Cash equivalents are short-term, highly liquid investments that are readily convertible to known amounts of cash, which are subject to an insignificant risk of changes in value and have a maturity of three months or less at the date of acquisition.

Bank overdrafts are shown within borrowings in current liabilities in the balance sheet.

- (b) **Date of incorporation**
The company was incorporated on 30 June 2005, comparative information from the 2008 financial year is presented in this report.
- (c) **Employee benefits**
A liability is recognised for benefits accruing to employees in respect of wages and salaries, annual leave, long service leave, and sick leave when it is probable that settlement will be required and they are capable of being measured reliably.
Liabilities recognised in respect of employee benefits expected to be settled within 12 months, are measured at their nominal values using the remuneration rate expected to apply at the time of settlement.
Liabilities recognised in respect of employee benefits which are not expected to be settled within 12 months are measured as the present value of the estimated future cash outflows to be made by the Company in respect of services provided by employees up to reporting date.
Defined contribution plans
Contributions to defined contribution superannuation plans are expensed when employees have rendered service entitling them to the contributions.
- (d) **Financial assets**
Investments are recognised and derecognised on trade date where the purchase or sale of an investment is under a contract whose terms require delivery of the investment within the timeframe established by the market concerned, and are initially measured at fair value, net of transaction costs except for those financial assets classified as at fair value through profit or loss which are initially measured at fair value.
Other financial assets are classified into the following specified categories: financial assets 'at fair value through profit or loss', 'held-to-maturity investments', 'available-for-sale' financial assets, and 'loans and receivables'. The classification depends on the nature and purpose of the financial assets and is determined at the time of initial recognition.
Trade receivables, loans, and other receivables that have fixed or determinable payments that are not quoted in an active market are classified as 'loans and receivables'. Loans and receivables are measured at amortised cost using the effective interest method less impairment. Interest income is recognised by applying the effective interest rate.
- (e) **Goods and services tax**
Revenues, expenses and assets are recognised net of the amount of goods and services tax (GST), except:
i. where the amount of GST incurred is not recoverable from the taxation authority, it is recognised as part of the cost of acquisition of an asset or as part of an item of expense; or
ii. for receivables and payables which are recognised inclusive of GST.
The net amount of GST recoverable from, or payable to, the taxation authority is included as part of receivables or payables.
Cash flows are included in the cash flow statement on a gross basis. The GST component of cash flows arising from investing and financing activities which is recoverable from, or payable to, the taxation authority is classified as operating cash flows.
- (f) **Government grants**
Government grants are assistance by the government in the form of transfers of resources to the company in return for past or future compliance with certain conditions relating to the operating activities of the entity. Government grants include government assistance where there are no conditions specifically relating to the operating activities of the company other than the requirement to operate in certain regions or industry sectors.
Government grants relating to income are recognised as income over the periods necessary to match them with the related costs. Government grants that are receivable as compensation for expenses or losses already incurred or for the purpose of giving immediate financial support to the company with no future related costs are recognised as income of the period in which it becomes receivable.
Government grants relating to assets are treated as deferred income and recognised in profit and loss over the expected useful lives of the assets concerned.

(g) Impairment of assets

Financial assets, other than those at fair value through profit or loss, are assessed for indicators of impairment at each balance sheet date. Financial assets are impaired where there is objective evidence that as a result of one or more events that occurred after the initial recognition of the financial asset the estimated future cash flows of the investment have been impacted.

For financial assets carried at amortised cost, the amount of the impairment is the difference between the asset's carrying amount and the present value of estimated future cash flows, discounted at the original effective interest rate.

The carrying amount of financial assets including uncollectible trade receivables is reduced by the impairment loss through the use of an allowance account. Subsequent recoveries of amounts previously written off are credited against the allowance account. Changes in the carrying amount of the allowance account are recognised in profit or loss.

With the exception of available-for-sale equity instruments, if, in a subsequent period, the amount of the impairment loss decreases and the decrease can be related objectively to an event occurring after the impairment was recognised, the previously recognised impairment loss is reversed through profit or loss to the extent the carrying amount of the investment at the date the impairment is reversed does not exceed what the amortised cost would have been had the impairment not been recognised.

At each reporting date, the Company reviews the carrying amounts of its assets to determine whether there is any indication that those assets have suffered an impairment loss. If any such indication exists, the recoverable amount of the asset is estimated in order to determine the extent of the impairment loss (if any). Where the asset does not generate cash flows that are independent from other assets, the Company estimates the recoverable amount of the cash-generating unit to which the asset belongs. Where a reasonable and consistent basis of allocation can be identified, corporate assets are also allocated to individual cash-generating units, or otherwise they are allocated to the smallest company of cash-generating units for which a reasonable and consistent allocation basis can be identified.

Recoverable amount is the higher of fair value less costs to sell and value in use. 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 for which the estimates of future cash flows have not been adjusted.

If the recoverable amount of an asset (or cash-generating unit) is estimated to be less than its carrying amount, the carrying amount of the asset (cash-generating unit) is reduced to its recoverable amount. An impairment loss is recognised immediately in profit or loss, unless the relevant asset is carried at revalued amount, in which case the impairment loss is treated as a revaluation decrease.

Where an impairment loss subsequently reverses, the carrying amount of the asset (cash-generating unit) is increased to the revised estimate of its recoverable amount, but only to the extent that the increased carrying amount does not exceed the carrying amount that would have been determined had no impairment loss been recognised for the asset (cash-generating unit) in prior years. A reversal of an impairment loss is recognised immediately in profit or loss, unless the relevant asset is carried at fair value, in which case the reversal of the impairment loss is treated as a revaluation increase).

(h) Income tax

Current tax

Current tax is calculated by reference to the amount of income taxes payable or recoverable in respect of the taxable profit or tax loss for the period. It is calculated using tax rates and tax laws that have been enacted or substantively enacted by reporting date. Current tax for current and prior periods is recognised as a liability (or asset) to the extent that it is unpaid (or refundable).

Deferred tax

Deferred tax is accounted for using the comprehensive balance sheet liability method in respect of temporary differences arising from differences between the carrying amount of

assets and liabilities in the financial statements and the corresponding tax base of those items. In principle, deferred tax liabilities are recognised for all taxable temporary differences. Deferred tax assets are recognised to the extent that it is probable that sufficient taxable amounts will be available against which deductible temporary differences or unused tax losses and tax offsets can be utilised. However, deferred tax assets and liabilities are not recognised if the temporary differences giving rise to them arise from the initial recognition of assets and liabilities (other than as a result of a business combination) which affects neither taxable income nor accounting profit. Furthermore, a deferred tax liability is not recognised in relation to taxable temporary differences arising from goodwill.

Deferred tax assets and liabilities are measured at the tax rates that are expected to apply to the period(s) when the asset and liability giving rise to them are realised or settled, based on tax rates (and tax laws) that have been enacted or substantively enacted by reporting date. The measurement of deferred tax liabilities and assets reflects the tax consequences that would follow from the manner in which the company expects, at the reporting date, to recover or settle the carrying amount of its assets and liabilities.

Deferred tax assets and liabilities are offset when they relate to income taxes levied by the same taxation authority and the company intends to settle its current tax assets and liabilities on a net basis.

Current and deferred tax for the period

Current and deferred tax is recognised as an expense or income in the income statement, except when it relates to items credited or debited directly to equity, in which case the deferred tax is also recognised directly in equity, or where it arises from the initial accounting for a business combination, in which case it is taken into account in the determination of goodwill or excess.

In accordance with a Private Tax Ruling issued by the Australian Taxation Office, Commonwealth funding provided to CRC Forestry Limited will be derived for the purposes of section 6-5 of the Income Tax Assessment Act 1997 (C'th) as and when it is expended on permitted activities ("Activities") pursuant to the Commonwealth Agreement dated 26 October 2005. On this basis, and on the basis that other differences arising between taxation and accounting treatments are insignificant, current tax assets (or liabilities) and deferred tax assets (or liabilities) have not been recognised in the financial report.

(i) Payables

Trade payables and other accounts payable are recognised when the company becomes obliged to make future payments resulting from the purchase of goods and services.

(j) Plant and equipment

Plant and equipment, leasehold improvements and equipment under finance lease are stated at cost less accumulated depreciation and impairment. Cost includes expenditure that is directly attributable to the acquisition of the item. In the event that settlement of all or part of the purchase consideration is deferred, cost is determined by discounting the amounts payable in the future to their present value as at the date of acquisition.

Depreciation is provided on plant and equipment. Depreciation is calculated on a straight line basis so as to write off the net cost or other revalued amount of each asset over its expected useful life to its estimated residual value. Leasehold improvements are depreciated over the period of the lease or estimated useful life, whichever is the shorter, using the straight line method. The estimated useful lives, residual values and depreciation method is reviewed at the end of each annual reporting period.

The following estimated useful lives are used in the calculation of depreciation:

- Plant and equipment 3 - 10 years

(k) Provisions

Provisions are recognised when the company has a present obligation, the future sacrifice of economic benefits is probable, and the amount of the provision can be measured reliably.

The amount recognised as a provision is the best estimate of the consideration required to settle the present obligation at reporting date, taking into account the risks and uncertainties surrounding the obligation. Where a provision is measured using the cashflows estimated to settle the present obligation, its carrying amount is the present value of those cashflows.

When some or all of the economic benefits required to settle a provision are expected to be recovered from a third party, the receivable is recognised as an asset if it is virtually certain that recovery will be received and the amount of the receivable can be measured reliably.

(l) Revenue recognition

Rendering of services

Revenue from a contract to provide services is recognised by reference to the stage of completion of the contract.

Interest revenue

Interest revenue is recognised on a time proportionate basis that takes into account the effective yield on the financial asset.

(m) Leased assets

Leases are classified as finance leases when the terms of the lease transfer substantially all the risks and rewards incidental to ownership of the leased asset to the lessee. All other leases are classified as operating leases. Operating lease payments are recognised as an expense on a straight-line basis over the lease term, except where another systematic basis is more representative of the time pattern in which economic benefits from the leased asset are consumed.

2 Profit from operations

Revenue

CRC Programme funds:

Received during the year (and included on Cash Flow Statement)

Less amount allocated to deferred government grant (included in Balance Sheet)

Core Participant funds

Supporting Participant funds

Total Revenue

Other Income

Miscellaneous income

Other contracts & agreements

Interest income - bank deposits

Profit/loss on sale of fixed asset

Total Other Income

Gains/losses and other expenses

Loss on decommission of asset

Operating lease expenses

Employee benefits expenses

Post employment benefits

Termination benefits

Other employee benefits

3 Remuneration of auditors

Auditor of the parent entity

Audit of the financial report

Other accounting consultancy

The auditor of CRC Forestry Limited is Deloitte Touche Tohmatsu.

4 Trade and other receivables

Trade receivables (i)

Provision for Doubtful Debts

Goods and services tax (GST) recoverable

Total current receivables

(i) The average credit period on sales of goods is 30 days, no interest is charged on trade receivables.

Ageing of past due not impaired

30-60 days

60-90 days

90 + days

Movement in Provision for Doubtful Debts

Balance at the beginning of the year

Impairment losses recognised on receivable

Balance at the end of the year

	2009 \$	2008 \$
Received during the year (and included on Cash Flow Statement)	4,600,000	4,200,000
Less amount allocated to deferred government grant (included in Balance Sheet)	337,053	204,334
	4,262,947	3,995,666
Core Participant funds	1,316,052	1,268,693
Supporting Participant funds	521,563	490,138
Total Revenue	6,100,562	5,754,497
Other Income		
Miscellaneous income	25,116	35,528
Other contracts & agreements	104,250	34,000
Interest income - bank deposits	161,286	163,362
Profit/loss on sale of fixed asset	100	-
Total Other Income	290,752	232,890
Gains/losses and other expenses		
Loss on decommission of asset	3,551	8,646
Operating lease expenses	104,005	100,488
Employee benefits expenses		
Post employment benefits	68,272	57,597
Termination benefits	1,022	3,009
Other employee benefits	502,880	531,966
	572,174	592,572
Remuneration of auditors		
Auditor of the parent entity		
Audit of the financial report	15,750	12,000
Other accounting consultancy	4,865	-
	20,615	12,000
Trade and other receivables		
Trade receivables (i)	113,415	26,640
Provision for Doubtful Debts	(43,725)	-
	69,690	26,640
Goods and services tax (GST) recoverable	192,055	12,011
Total current receivables	261,745	38,651
Ageing of past due not impaired		
30-60 days	-	-
60-90 days	-	14,400
90 + days	-	-
Movement in Provision for Doubtful Debts		
Balance at the beginning of the year	-	-
Impairment losses recognised on receivable	(43,725)	-
Balance at the end of the year	(43,725)	-

4 Trade and other receivables (continued)

Aging of Impaired Trade Receivables
60 – 90 days

-	-
-	-
43,725	-
43,725	-

5 Other current assets

Advance payments to research providers:

Australian National University

CSIRO

Murdoch University

Queensland Department of Primary Industry & Fisheries

Southern Cross University

University of Melbourne

University of Western Australia

University of Tasmania

7,459	-
78,091	27,308
80,001	107,870
-	11,606
60,253	104,673
147,221	20,556
186,418	4,415
-	165,482
559,443	441,910

6 Plant and equipment (at cost)	2009	2008
	\$	\$
Plant and equipment (at cost)	99,794	51,439
Less accumulated depreciation	(78,572)	(25,544)
Total net book value	21,222	25,895
Reconciliation of net book value		
Balance at beginning of the year	25,895	50,377
Additions	39,695	-
Disposals	(3,551)	(8,646)
Gross balance at end of the year (at cost)	62,039	41,731
Less depreciation	(40,817)	(15,836)
Net book value at end of the year	21,222	25,895
7 Current trade and other payables		
Trade payables (i) & (ii)	3,644	1,143
Goods and services tax (GST) payable	121,708	-
Accrued expenses	46,560	81,361
	171,912	82,504

(i) The average credit period on purchases of goods and services from the suppliers is 30 days. No interest is charged on the trade payables for the first 30 days from the date of the invoice. Thereafter, some creditors charge interest on the outstanding balance. The company has financial risk management policies in place to ensure that all payables are paid within the credit timeframe.

(ii) Trade Payables includes an amount of \$ 3,644 owing to the Queensland Department of Industry and Fisheries, this being the difference between the total advance payments and the amount expended.

7a) Current non-trade liabilities		
Deferred Government Grant	2,829,291	2,492,238
	2,829,291	2,492,238
8 Non-current provisions		
Employee benefits	14,419	13,397
	14,419	13,397

9 Leases

Operating leases

Leasing arrangements

CSIRO and the University of Tasmania have entered into a Licence Agreement, the terms of which relate to the site costs for the CRC and the University to occupy a certain number of offices and access laboratory space in the CSIRO's Tasmanian Research Centre, College Road, Sandy Bay, Tasmania. The Licence Agreement can be terminated by either party on giving 12 months notice. As the company is not a signatory to the agreement, no amount has been provided for in the financial statements, however the matter is disclosed here for information of users of this report.

Expected future operating lease payments	2009	2008
	\$	\$
Not longer than 1 year	106,605	102,752
Longer than 1 year and not longer than 5 years	327,877	351,034
	431,882	453,786

10 Economic dependency

A significant volume of the company's revenue is via an agreement with the Commonwealth Government to fund the CRC for Forestry for the period 26 October 2005 to 30 June 2012.

11 Segment information

CRC Forestry Limited operates in the forest research industry in Australia.

12 Notes to the cash flow statement

	2009 \$	2008 \$
(a) Reconciliation of cash and cash equivalents		
For the purposes of the cash flow statement, cash and cash equivalents includes cash on hand and in banks and investments in money market instruments, net of outstanding bank overdrafts. Cash and cash equivalents at the end of the year as shown in the cash flow statement is reconciled to the related items in the balance sheet as follows:		
Cash and cash equivalents	210,916	106,354
At call deposit account	1,962,296	1,975,329
	2,173,212	2,081,683
(b) Financing facilities		
Mastercard facility – (available and unused)	60,000	60,000
(c) Reconciliation of profit for the year to net cash flows from operating activities		
Profit for the year	-	-
Gain on sale of non-current assets	(100)	-
Depreciation and amortisation of non-current assets	40,817	15,836
Decommission of asset	3,551	8,646
Interest income received and receivable	(161,286)	(163,362)
(Increase)/decrease in assets:		
Current receivables	(266,819)	172,417
Other current assets	(117,533)	94,671
Increase/(decrease) in liabilities:		
Current payables	89,408	(233,849)
Other current liabilities	380,778	183,911
Non-current provisions	1,022	3,009
Net cash from operating activities	(30,162)	81,279

13 Financial instruments

(a) Financial risk management objectives

The Compliance Committee manages the financial risks relating to the operations of the company.

The company does not enter into or trade financial instruments, including derivative financial instruments, for speculative purposes. The use of financial derivatives is not approved by the board of directors. The company manages its capital to ensure that it continues as a going concern.

(b) Significant accounting policies

Details of the significant accounting policies and methods adopted, including the criteria for recognition, the basis of measurement and the basis on which income and expenses are recognised, in respect of each class of financial asset, financial liability and equity instrument are disclosed in note 1 to the financial statements.

(c) Fair value of financial instruments

Directors consider that the carrying amount of financial assets and financial liabilities recorded at amortised costs in the financial statements approximates their fair value.

(d) Interest rate risk management

Maturity profile of financial instruments

The company does not have any significant exposure to interest rate risk. The following table details the company's exposure to interest rate risk as at 30 June 2009:

	Weighted average effective interest rate	Variable interest rate (Less than one year)	Fixed maturity dates						Non interest bearing	Total
			Less than 1 year	1-2 years	2-3 years	3-4 years	4-5 years	5+ years		
2009	%	\$	\$	\$	\$	\$	\$	\$	\$	\$
Financial Assets:										
<i>Cash and cash equivalents</i>										
Cash at bank and on hand		55,155								55,155
At call term deposit	2.90	155,761								155,761
Investment (Nov 09)	3.80		1,462,296							1,462,296
Investment - CBA - (Sept 09)			500,000							500,000
Sub Total										2,173,212
<i>Loans and receivables</i>										
Trade receivables	n/a								69,690	69,690
Other receivables	n/a								192,055	192,055
Sub Total										261,745
Total		210,916	1,962,296	-	-	-	-	-	261,745	2,434,957
Financial liabilities:										
<i>At amortised cost</i>										
Trade payables	n/a								3,644	3,644
Other payables	n/a								168,268	168,268
Total			-	-	-	-	-	-	171,912	171,912

	Weighted average effective interest rate	Variable interest rate Less than one year	Fixed maturity dates						Non interest bearing	Total
			Less than 1 year	1-2 years	2-3 years	3-4 years	4-5 years	5+ years		
2008	%	\$	\$	\$	\$	\$	\$	\$	\$	\$
Financial assets:										
<i>Cash and cash equivalents</i>										
Cash at bank and on hand	5.00	106,296								106,296
At call term deposit	7.15	202,713								202,713
Investment (Aug 08)	7.60		161,205							161,205
Investment (Oct 08)	7.85		1,111,411							1,111,411
Investment- CBA - (Sept 08)	8.60		500,000							500,000
Sub Total										2,081,625
<i>Loans and receivables</i>										
Trade receivables	n/a								26,640	26,640
Other receivables	n/a								12,011	12,011
Sub Total										38,651
Total		309,009	1,772,616	-	-	-	-	-	38,651	2,120,276
Financial liabilities:										
<i>At amortised cost</i>										
Trade payables	n/a								1,143	1,143
Other payables	n/a								81,361	81,361
Total			-	-	-	-	-	-	82,504	82,504

(d) Credit risk management

Credit risk refers to the risk that a counterparty will default on its contractual obligations resulting in financial loss to the company. The company has adopted a policy of only dealing with creditworthy counterparties and obtaining sufficient collateral where appropriate, as a means of mitigating the risk of financial loss from defaults. The company exposure and the credit ratings of its counterparties are continuously monitored and the aggregate value of transactions concluded are spread amongst approved counterparties. Credit exposure is controlled by counterparty limits that are reviewed and approved by the Compliance Committee annually. The company measures credit risk on a fair value basis.

Trade accounts receivable consist of a small number of customers, spread across diverse industries and geographical areas. Ongoing credit evaluation is performed on the financial condition of accounts receivable and, where appropriate, credit guarantee insurance cover is purchased.

The company does not have any significant credit risk exposure to any single counterparty or any company of counterparties having similar characteristics.

14 Key management personnel remuneration

	2009 \$	2008 \$
Short-term employee benefits	255,441	224,289
Post-employment benefits	43,424	22,635
Other long-term employee benefits	-	5,464
Termination benefits	3,241	-
	302,106	252,388

15 Related party transaction

During the financial year there were no related party transactions undertaken by the company.

16 Additional company information

CRC Forestry Limited is a company limited by guarantee (the amount of the members guarantee is \$10), incorporated and operating in Australia.

Registered office

CSIRO Tasmanian Research Centre, College Road, Sandy Bay, Tasmania, Australia, 7005

Principal place of business

CSIRO Tasmanian Research Centre, College Road, Sandy Bay, Tasmania, Australia, 7005



CRC for Forestry
Annual Report 2008–09
Appendix 3

Qualified Accountant's Certification

28th October 2009

Cooperative Research Centres Program
Department of Innovation, Industry, Science and Research
Level 10, Industry House
10 Binara Street
CANBERRA ACT 2601

Audit Certificate

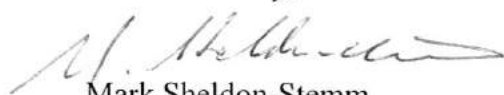
Please accept the following Audit Certificate from Deloitte Touche Tohmatsu as evidence that we comply with the Annual Report Guidelines (Section Seven).

In conversations with our CRC contact (Philip Hodgson), we indicated that Deloitte Touche Tohmatsu would not complete the form contained in the guidelines, as they consider it a non-compliant form and that they are unable to express their opinion in this format.

However, in the Audit Certificate they directly address each of the points in the form and have signed the Audit Certificate.

In discussions with Philip Hodgson and an email from him on the 16th of October 2009, he indicated that as long as the auditors address the questions on the form, in their letter, the Audit Certificate will comply with the Annual Report Guidelines.

Yours sincerely,



Mark Sheldon-Stemm
Company Secretary and Business Manager
CRC Forestry Limited

Independent Auditor's Report to the directors of CRC Forestry Limited and the Department of Innovation, Industry, Science and Research Representing the Commonwealth

Report on the Financial Information

We have audited the accompanying financial information, being a special purpose financial report, of the Cooperative Research Centre for Forestry ("the Centre") administered by CRC Forestry Limited ("the Company") which comprises Tables 1a, 1b, 2, 3, 4 and 5 of the Annual Report ("the financial information") for the financial year ended 30 June 2009.

The Responsibility of the Directors for the Financial Information

The directors of the Company are responsible for the preparation and fair presentation of the financial information and have determined that the financial information is appropriate to meet their needs and the financial reporting requirements of the Agreement between the Commonwealth of Australia and CRC Forestry Limited in relation to the Centre dated 26 October 2005 ("the Agreement"). The responsibility of the directors also includes establishing and maintaining internal control relevant to the preparation and fair presentation of the financial information that is free from material misstatement, whether due to fraud or error; selecting and applying appropriate accounting policies; and making accounting estimates that are reasonable in the circumstances.

Auditor's Responsibility

Our responsibility is to express an opinion on the financial information and the Company's compliance with the requirements of the Agreement in terms of clauses 5(1) and 5(2) 'Contributions', 6(1) and 6(2) 'Application of Commonwealth Funding and Contributions', and 8(1) and 8(3) 'Accounting for Commonwealth Funding and Contributions' in order to express an opinion on them to the directors of the Company and Department of Innovation, Industry, Science and Research (the "DIISR") based on our audit.

We conducted our audit in accordance with Australian Auditing Standards. These Auditing Standards require that we comply with relevant ethical requirements relating to audit engagements and plan and perform the audit to obtain reasonable assurance whether the financial information is free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial information. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the financial information, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the

Company's preparation and fair presentation of the financial information in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control.

The financial information has been prepared for distribution to the Directors of the Company and DIISR for the purpose of fulfilling the directors financial reporting requirements under clause 14(2)(a) of the Agreement. We disclaim any assumption of responsibility for any reliance on this report or on the financial report to which it relates to any person other than the directors of the Company and DIISR, or for any purpose other than that for which it was prepared.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Auditor's Independence Declaration

In conducting our audit, we have complied with the independence requirements of the Australian professional accounting bodies.

Basis for Qualified Auditors Opinion

The following Participants (excluding Supporting Participants) did not contribute amounts equal to or in excess of the amount of the contributions committed to in the budget as required by clauses 5(1) and 5(2):

<i>Participants</i>	<i>Number (FTE) of Staff in Kind Contributions</i>	
	<i>Amount Contributed (FTE)</i>	<i>Amount Committed (FTE)</i>
Southern Cross University	0.4	1.7
The University of Melbourne	4.6	5.0

<i>Participants</i>	<i>Non-Staff In Kind Contributions</i>	
	<i>Amount Contributed (\$'000)</i>	<i>Amount Committed (\$'000)</i>
Forests and Forest Industry Council of Tasmania	3	50
Southern Cross University	75	100
VIC Department of Sustainability and Environment	43	50

<i>Participants</i>	<i>Cash Contributions</i>	
	<i>Amount Contributed (\$'000)</i>	<i>Amount Committed (\$'000)</i>
Great Southern Limited	67	84

The following Supporting Participants did not contribute amounts equal to or in excess of the amount of the contributions committed to in the budget as required by clauses 5(1) and 5(2):

<i>Supporting Participants</i>	<i>Number (FTE) of Staff in Kind Contributions</i>	
	<i>Amount Contributed</i>	<i>Amount Committed</i>
Australian National University	0.7	1.2
Forest Products Commission	1.4	1.5
Norske Skog Paper Mills (Australia) Limited	0.2	0.4
South East Fibre Exports Pty Ltd	0.0	0.4
Timbercorp Limited	0.5	1.1

<i>Supporting Participants</i>	<i>Non-Staff In Kind Contributions</i>	
	<i>Amount Contributed (\$'000)</i>	<i>Amount Committed (\$'000)</i>
Hancock Victorian Plantations Pty Limited	24	30
South East Fibre Exports Pty Ltd	2	5
Tasmanian Department of Economic Development	0	100

<i>Supporting Participants</i>	<i>Cash Contributions</i>	
	<i>Amount Contributed (\$'000)</i>	<i>Amount Committed (\$'000)</i>
South East Fibre Exports Pty Ltd	10	25
Timbercorp Limited	59	75

Total yearly expenditures on the activities of the Centre under each Head of Expenditure differed by more than 10% or \$200,000 (whichever is the greater amount) from the allocation in the budget without prior approval by the Commonwealth as follows:

<i>Head of Expenditure</i>	<i>Total Expenditure (\$'000)</i>	<i>Amount Budgeted (\$'000)</i>
Supplier Expenses	1,361	2,183

Qualified Auditor's Opinion

In our opinion, except for the effects of non-compliance with the requirements of the Agreement, arising from the matters referred to in the qualification paragraph, for the financial year ended 30 June 2009, in all material respects:

1. The financial information presents fairly the sources of funding, the application of that funding and the financial position of the Centre for the financial year in accordance with the requirements of the Agreement;
2. Participant contributions and contributions from supporting participants equalled or exceeded the amount of contributions committed to in the budget (clauses 5(1) and 5(2));
3. The grants and contributions were used only for the activities of the Centre (clause 6(1));
4. The total yearly expenditure on activities of the Centre under each Head of Expenditure in Schedule 3 of the Agreement did not differ by more than 10% or \$200,000 (whichever is the greater amount) from the allocation in the budget without prior approval by the Commonwealth;

5. Capital items acquired from the grant and the contributions were in accordance with the capital item expenditure budget in Schedule 3 of the Agreement (clause 6(2));
6. In accounting for the Commonwealth funding and contributions, the CRC has exercised proper accounting standards and controls, determined in accordance with the COSO framework (clause 8(1)); and
7. Grant and cash contributions were paid into and expended from the Centre's bank account and interest on the balance has been credited to the account (clause 8(3)).

Deloitte Touche Tohmatsu

DELOITTE TOUCHE TOHMATSU



David Harradine

Partner

Chartered Accountants

Hobart, 16 October 2009