Cotton Catchment Communities
Cooperative Research Centre

"Prosperity through innovation"

OUR MISSION

To provide high quality collaborative research, education and adoption activities which benefit the Australian cotton industry, regional communities and the nation

OUR PURPOSE

To facilitate the delivery of a cotton industry that

- adopts world's best practice in production, environmental and catchment management
- secures international competitiveness using research to increase yield and fibre quality
- generates improved social and economic conditions in cotton communities

OUR PROGRAMS

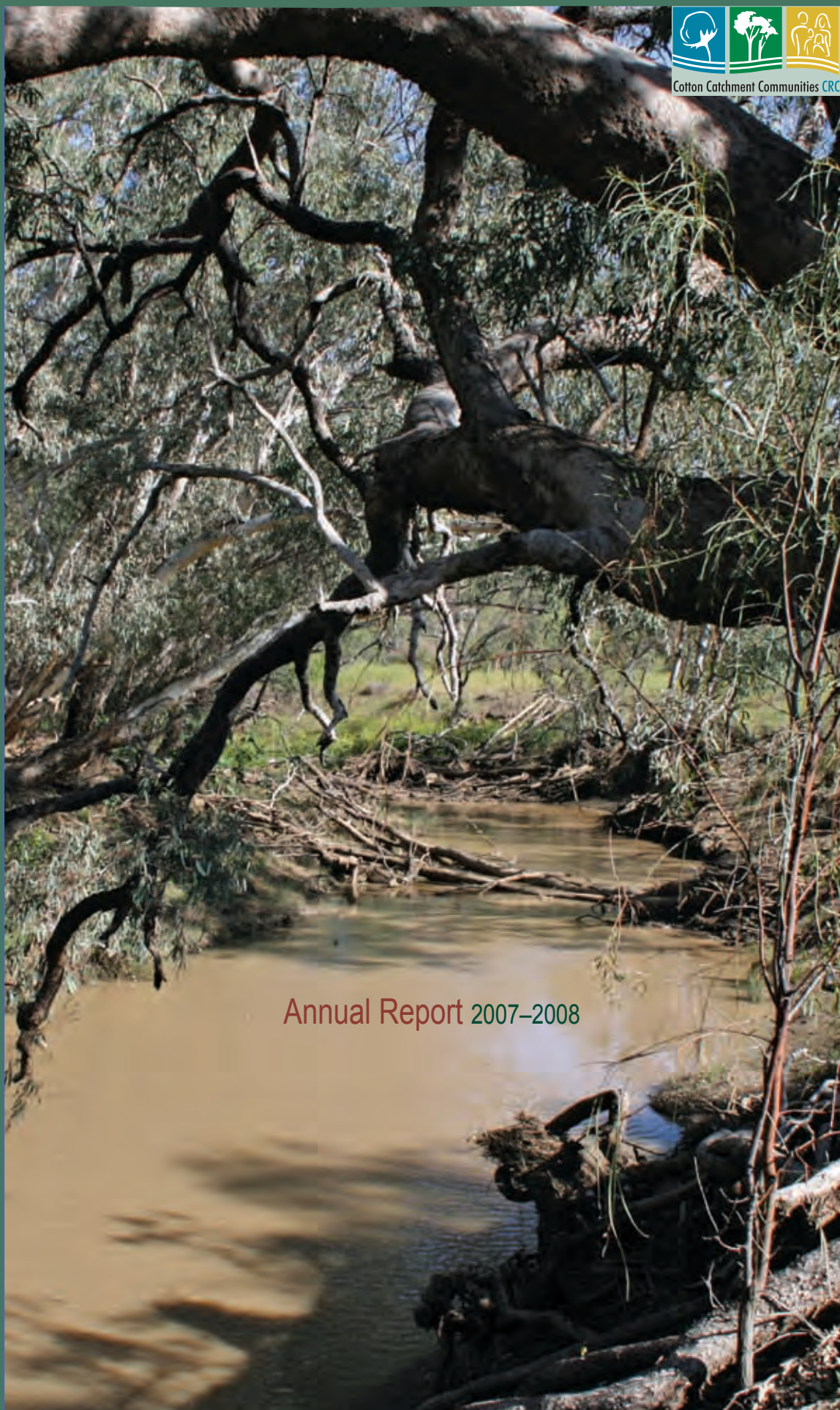
- The Farm
- The Catchment
- The Community
- The Product
- The Adoption

OUR OUTCOMES

- Internationally competitive cotton farming systems
- Best practice cotton enterprises delivering sustainable ecosystems and reduced impacts on catchments
- Mutually beneficial interactions between industry and regional communities
- High quality consumer-preferred cotton
- Increased skills and knowledge of people

CRC AUSTRALIA

Established and supported under the Australian Government Cooperative Research Centres Programme



Cotton Catchment Communities CRC

Annual Report 2007–2008

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Achnowledgements

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Edited and designed by Weemalah Writeability

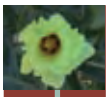


TABLE OF CONTENTS

CEO'S CERTIFICATION

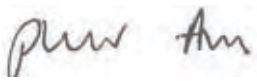
I hereby certify that the information provided to the Department of Innovation, Industry, Science and Research by Cotton Catchment Communities CRC in:

- the CD section of the CRC's 2007–08 Annual Report;
- the CRC's online milestone tables for the 2007–08 financial year;
- the CRC's online financial tables for the 2007–08 financial year;
- the CRC's online 2007–08 Management Data Questionnaire; and
- the four Quarterly Reports provided online for the financial year submitted on 4 October 2007, 9 November 2007, 18 March 2008 and 2 May 2008, respectively

provides a true and fair view of the matters reported on therein.

I certify that the application of Commonwealth funding and Researcher/Participant Contributions were for the Activities of the CRC as specified in Schedule 1 of the Commonwealth Agreement and that the CRC has met its obligations in relation to the treatment of Intellectual Property. I also certify that the Chairman of the Board meets the requirements of independence set out in the Commonwealth Agreement and that the majority of Board members are not Research Providers.

I am aware that giving false or misleading information is a serious offence.



Philip Armytage

Chief Executive Officer
Cotton Catchment Communities CRC Ltd

15 September 2008

EXECUTIVE SUMMARY

David Anthony

CHAIRMAN'S REPORT

The Cotton Catchment Communities CRC (Cotton CRC) has completed its third year, entering the mid course of the program. A significant number of projects have been undertaken over this period: around 300, including PhD projects. These projects fit within the organisation's Strategic Plan and align with the business case originally presented to the Australian Government Department of Education, Science and Training (DEST), which managed the CRCs Program at the time (the Department of Innovation, Industry, Science and Research (DIISR) now manage the program.)

A review of the Cotton CRC's Strategic Plan in January 2008 provided the opportunity for key stakeholders and centre participants to be involved in our annual strategic review process. The updated plan has been published and distributed widely, and is available on the Cotton CRC website, www.cottoncrc.org.au.

The past year has been a challenging yet interesting one. Crippling drought – the worst in living memory – saw the Australian cotton crop reduced by 83 per cent from its 2001 non-drought affected peak to just 600,000 bales. Some valleys had zero water allocation and most had less than ten per cent. The flow-on effect was felt by the Cotton CRC, which needed to apply budget restrictions to new research and extension activities. The Board has been very careful to ensure that it manages expenditures prudently and navigates successfully through these testing times.

Long-serving CEO, Guy Roth, resigned in late 2007 to take up a position with Land and Water Australia. I would like to extend both the Board's and my thanks to Guy for all his hard work and considerable contributions to both the current and previous Cotton CRCs. We wish him well with his new endeavours and hope to work closely with him in his new role. I also welcome his successor, Mr Philip Armytage. Philip's agribusiness background has enabled him to adjust quickly to his new role. With the help of the management team and guidance from Guy, there has been a fairly seamless transition into the new leadership of the Cotton CRC.

There were also changes at the Board level, with Mr David Hamilton from the Queensland Department of Primary Industries and Fisheries replacing Mrs Helen Scott-Orr from the NSW Department of Primary Industries. Recently Board member, Mr Bruce Finney, announced his resignation and the Board is currently working with centre participants to find a suitably skilled replacement. The Board is appreciative of the input and guidance from these retiring directors, who have both been with the Board since inception and have played a key role in the establishment and administrative set up of the Cotton CRC.

In late June 2008, the Board undertook its second Board evaluation process since the start-up of the Cotton CRC, using a commercial Human Resources firm. The results are being compiled at present. The Board is committed to good governance, innovative thinking and effective decision-making, all of which are aimed at

adding value to the catchments, communities and cotton industry covered by the Cotton CRC.

August 2007 saw the second Cotton CRC Science Forum held in conjunction with Narrabri's Cotton Collective week. The forum provides the opportunity for all researchers and extension staff to highlight their projects, exchange ideas, experience peer review activities and gain a greater awareness of Cotton CRC research effort across all five program areas.

The next Science Forum will be held later this year, in conjunction with our third year review (the Australian Government CRC Programmes standard benchmarking activity for Cooperative Research Centres). The Cotton CRC is advanced in preparation for this important milestone review to ensure it gets the maximum value from this external assessment process.

The Board travelled to various locations throughout the year, including Narrabri, Narromine, Sydney and Geelong (CSIRO at Belmont). The visit to Geelong related mainly to our Product Program, as considerable research is being undertaken at the Textile and Fibre Technology laboratories at CSIRO Materials Science and Engineering to support Australian cotton as a premium product in world markets. To enhance this support of Australian cotton in overseas markets, the Cotton CRC also stepped up efforts in the Best Management Practices (BMP) program by collaborating with several other industry organisations to appoint a BMP Manager for the industry. The new manager has direct responsibility for engaging growers in the second phase of the BMP process and building BMP as a key vehicle for a future of responsible and sustainable cotton production.

As we head into the fourth year of the Cotton CRC we look anxiously for the water supply outlook to improve. A Cotton CRC study released in February 2008 highlighted the significant economic impact of drought in cotton communities. Prices have improved since 2007 and with reasonable water cotton growers can achieve good returns and this, in turn, flows benefits back into regional areas. Currently, with limited water, many cotton growers have taken advantage of historically high grain prices to plant more winter cereals and oilseeds. Growers with significant cotton-related infrastructure face some major challenges deciding whether to plant more cotton or run with cereal crops until water allocations improve.

On behalf of the Board I express my gratitude for the hard work and dedication of the management team and all the program and sub-program leaders who drive our research portfolio forward. We have achieved considerable progress towards our strategic goals and the Board appreciates the efforts of the researchers and education and adoption personnel funded through the CRC as they continue to work towards the milestones and strategic outcomes of the Cotton CRC.

Lastly, I would like to thank our centre participants, affiliates and DIISR for their ongoing support in our pursuit of the Cotton CRC's strategic outcomes.

David Anthony

Chairman

Philip Armytage

CHIEF EXECUTIVE OFFICER'S REPORT

The third year of the Cotton Catchment Communities CRC (Cotton CRC) has seen a transition from the start-up phase to a phase of consolidation. Much of the success of the Cotton CRC to date has been the result of the vision and capabilities of the previous CEO, Mr Guy Roth. I would like to thank Guy for his hard work with the Cotton CRC and particularly for the support and assistance provided to me through this transitional period. In addition, I would also like to congratulate the staff of the Cotton CRC for their contribution, commitment and professionalism.

My key focus has been to ensure we consolidate and continue the excellent work already undertaken in the 300 current and completed projects that the Cotton CRC manages. These projects are geographically spread across the key cotton growing regions, as well as the Kimberly region in Western Australia, the Burdekin region in North Queensland and Geelong in Victoria. The clear success of the projects is due to the collaborative research and extension efforts across the twelve participant organisations, 36 affiliate organisations and external research groups.

Ongoing drought has had a considerable impact, not only on cotton production, with the smallest crop area planted in Australia for 30 years, but also on the available human capital residing in the regional communities. With little or no inflow into water storages or natural flow in rivers, public attention has been focused on the use of water for irrigation in the Murray Darling Catchment.

Water use remains a strong focus of the Cotton CRC and existing projects in the farm and catchment programs focus on research in this area. With the recent addition of the $5 million National Water Commission water storages project, we now have research that spans the catchment down to the farm scale, including groundwater, riparian health, deep drainage, evaporation, plant physiology and farming systems. Having a greater understanding of water use and management practices will be important to the industry given the potential uncertainties, especially in relation to climate change.

Education and training continues to be an important dimension of the Cotton CRC. There are currently 38 PhD students conducting research across a broad range of projects in the industry. Additionally, the Cotton CRC supports The University of New England Cotton Production Course, the CSIRO Materials Science and Engineering Cotton Field to Fabric course based in Geelong and the new Aboriginal Employment Strategy Schools-Based Traineeship project at the Australian Cotton Research Institute, Narrabri.

A primary focus for the Cotton CRC during 2007–08 has been reviewing the existing Best Management Practices (BMP) program. The Cotton CRC has contributed significantly to collaboratively support and

resource the new BMP strategy for the industry. This occurs not only through our investment in research but also adoption. BMP is pivotal to providing a driving force for taking appropriate research through to best practice and then effecting practice change.

The premium status of the Australian cotton crop in the global market continues to be under threat. The uptake of biotechnology and the rapid improvement of fibre quality from competitor countries are impacting on the ability of Australia's marketers to secure a premium in the market place. Cotton germplasm producing extra long staple (ELS), bred by CSIRO, has been trialled successfully in the 2007–08 season. New elite ELS varieties are in advanced stages of production and will become available over the next three years. Existing processing technology does not allow the full utilisation of the additional length that these varieties generate. The Cotton CRC has reacted swiftly to divert resources in the Product program to address this issue and build knowledge and technology for the future.

Looking ahead to the next twelve months, the Cotton CRC has recently developed several key projects that will further support extension and the uptake of research. These include the appointment of the Farming Systems Scientist (Michael Braunack) through CSIRO, our Research Economist (Janine Powell) through the NSW Department of Primary Industries and an Education Officer (Trudy Staines) through CSIRO. These positions will assist the Cotton CRC with the crucial link of taking the science and delivering it to the industry and community audiences alike.

I would like to thank DIISR, the Cotton CRC's participant and affiliate organisations, the Board of Directors, our research scientists and their teams, the extension and management team, collaborators and, importantly, the Cotton CRC staff for their support, hard work, and focus on our vision of

Adding $1 billion of additional benefits to the industry and the catchments and communities in which it operates.

Whilst I have had the opportunity to catch up with many people associated with the Cotton CRC, I look forward to meeting those I have not yet had the chance to meet at the upcoming Science Forum and Third Year Review in October.

Philip Armytage

Chief Executive Officer

HIGHLIGHTS

here have been significant organisational, research, education and extension achievements throughout 2007–08. While the majority of highlights are contained within each program report, an overview of this year's achievements includes:

ACCELERATING THE ADOPTION OF RESEARCH

- Extension's national priority teams have been aligned to the Cotton CRC's core farm program goals and the industry priorities established by ACGRA: Insects and Weeds; Water; Soils and Disease; Nutrition and Fibre Quality
- Following the success of the National Healthy Soil Symposium previously undertaken in the cotton industry, three Healthy Soils Regional Forums were held in the key cotton growing regions of Narrabri, Goondiwindi and Hillston
- The second Cotton CRC Science Forum was held in August 2007, in conjunction with the Narrabri Cotton Collective Week, and was attended by over 150 extension staff, researchers, growers and cotton consultants
- A significant number of field days and seminars were held in conjunction with the industry, showcasing emerging research and best practice in water management, soils, resource management, and crop rotation and configurations, along with newer areas such as birds and fish in cotton farming systems
- A range of adoption materials was published, including the Cotton Pest Management Guide for 2007–2008 and the Guidelines for Ring Tank Storages.

COMMERCIALISATION OF RESEARCH OUTCOMES

- The Cotton CRC now has seven research projects in which commercial partners are involved, or are being sought to commercialise Intellectual Property
- A partnership valued at $100,000 with Ag Biotech and Monsanto Ltd is being negotiated to commercialise semiochemicals for improved refuge efficiency for an insect behaviour modifying plant extracts project
- Projects focusing on measuring fibre maturity, new ginning processes, electrical imaging of soil water and fungal biopesticides are currently under negotiation.

Dr Sharon Downes goes to Parliament

Cotton CRC and CSIRO research entomologist, Dr Sharon Downes of Narrabri attended the annual 'Science meets Federal Parliament' forum in Canberra, where they spent a day meeting with Parliamentarians and their staff before attending formal meetings in Parliament House.

Sharon was able to brief MPs on the future research directions of the cotton industry.

"Science meets Federal Parliament" provides a platform for scientists to discuss relevant and topical scientific issues facing Australia, as well as an opportunity to meet and develop relationships with parliamentarians of the day.

RESEARCH, DEVELOPMENT AND EXTENSION HIGHLIGHTS

EDUCATION AND TRAINING

- The Cotton CRC now has 38 postgraduate students working across the four research programs. Almost all of them have joint supervisors from non-university research organisations involved in the Cotton CRC and many are jointly supervised by industry personnel
- Seven students were granted their PhDs
- Six university students were awarded summer scholarships during the 2007 summer to provide them with research experience related to the cotton industry
- 'Managing for Quality', was formulated through the collaborative work of Rene Van der Sluij (CSIRO), Geoff Dunlop (NSW TAFE) and Mark Hickman (QDPI&F)
- A total of 74 people have completed the "Cotton Field to Fabric Training Course
- A prize for third year students was established at The University of Sydney in the Faculty of Agriculture and Natural Resources
- This year saw the appointment of an Education Officer, Trudy Staines, through the CSIRO.

THE FARM

- A new project that will assess the extent of seepage and evaporation losses from 135 storages across the cotton industry has been funded through the National Water Commission
- A new Cotton CRC farming systems scientist was appointed to study the interactions between soil, water, nutrients and varieties, with an emphasis on high-yielding cotton farming systems that are resilient to climate variability and change
- A new project, with the University of Southern Queensland, to develop an automated surface irrigation system has begun
- The first commercial crop of cotton was harvested in the Burdekin Region.

THE CATCHMENT

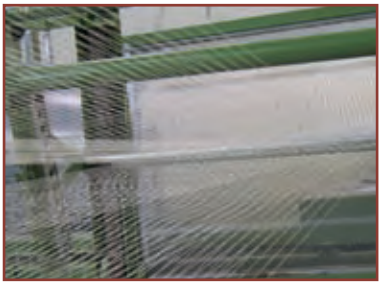
- There are 34 current research projects, including 16 postgraduate studentships, with a further twelve projects completed
- 2007–08 saw the Cotton CRC conduct a review of the ecosystem services research that it currently supports
- The successful implementation of the on-ground incentive project being undertaken with the Namoi CMA. Through this partnership, cotton growers in the Namoi catchment have had assistance to undertake a range of on-ground works which help achieve catchment targets, such as riparian management, re-vegetation of native vegetation and water management
- A 2008 'Biodiversity in Cotton Landscapes: Maintaining our natural workforce' calendar was created through joint partnerships with the Namoi CMA, Greening Australia, the Australian Government Department of Agriculture, Fisheries and Forestry and the Cotton CRC.

RESEARCH, DEVELOPMENT AND EXTENSION HIGHLIGHTS

THE COMMUNITY

- A new project, 'The Socio-economic Impact of the Australian Cotton Industry on Regional Communities in NSW and Queensland' was established
- Establishment of the highly successful 'Young Professionals Network' pilot
- The Schools-Based Traineeship, developed with CRDC and the Aboriginal Employment Strategy, saw five students begin their traineeship. This new and exciting project will foster greater engagement between the indigenous community and the cotton industry
- A study investigating the impact of the current drought on the community and businesses of Wee Waa has been completed and released.

THE PRODUCT



- SIROMAT fibre measurement technology is progressing to commercialisation
- Development of a new moisture monitoring technology has developed a prototype, which is being assessed within a gin
- The aquaculture program has developed initial guidelines for production of silver perch on cotton farms.

OPERATIONAL RISKS AND IMPEDIMENTS

The Australian cotton industry faces significant challenges in relation to the ongoing drought. Recent rains in central Queensland have provided some relief for the industry, doubling the forecast for the 2008–09 planted area to approximately 120,000ha: 37 per cent of the historical average planted area.

The funding from some affiliates and participants of the Cotton CRC is directly reliant on production. This is particularly the case with the Cotton CRC's largest participant, CRDC, so the management and Boards of the Cotton CRC and CRDC are working closely to manage ongoing funding of existing projects and commissioning of any new research.

AWARDS

David Perovic

PhD Student, Charles Sturt University

Inaugural ENDURE Summer School in Volterra, Italy

David was awarded a placement at the inaugural ENDURE summer school for PhD students in Volterra, Italy.

Dr Paul Grundy

Queensland Department of Primary Industries and Fisheries

ELDERS Young Achiever of the Year Award

Paul's role at the Queensland Department of Primary Industries and Cotton Catchment Communities CRC has included a strong research and extension capacity focusing on the field application of IPM tools that have included predator releases, biopesticides, attractants and other novel insecticides for the management of *Helicoverpa* and Silver leaf whitefly.

The purpose of the Young Achiever Award is to acknowledge, encourage and, most importantly, reward the positive achievements of young Australians involved in the cotton industry.

Sue Powell

PhD Student, Australian National University

Best Student Poster, Australian Society for Limnology conference in Queenstown, NZ

Sue's poster, 'Characterising flood response of wetland vegetation using temporal NDVI profiles', was awarded the best poster at the Australian Society for Limnology Conference.

Todd Green

PhD Student, University of New England

University of New England School of Environmental and Rural Sciences Conference Award

Todd was awarded a $500 grant to assist with travel to the 16th Australian Weeds Conference, held in Cairns. Todd presented an oral presentation and a three page referred conference proceedings paper outlining his research on the ecology of fleabane.

Warren Conaty

PhD student, University of Sydney

NSW state award for the Department of Agriculture, Fisheries and Forestry/Bureau of Rural Science 2007 Science and Innovation Award for Young People in Agriculture, Fisheries and Forestry

Warren was awarded a $10,000 grant towards his PhD studies. The grant has been used to run an extra field trial and to travel to the USA to undertake research at the United States Department of Agriculture-Agricultural Research Service Plant Stress and Water Conservation Laboratory Lubbock, Texas.

Dr Paul Grundy

Entomologist, Dr Paul Grundy (right), receives the ELDERS Young Achiever of the Year Award from the Hon. John Cobb MP, Federal Member for Parkes, for his work in controlling Helicoverpa and Silver leaf whitefly as part of Integrated Pest Management

Warren Conaty

Warren Conaty with former Federal Minister for Agriculture, Fisheries and Forestry, Peter McGauran, receiving his Science and Innovation Award for Young People in Agriculture, Fisheries and Forestry

AWARDS

Dr Steve Walker

Queensland Department of Primary Industries and Fisheries

Council of Australasian Weed Societies' (CAWS) 2008 Medal for Leadership

Steve was presented with the Council of Australasian Weed Societies' (CAWS) 2008 Medal for Leadership at the 16th Australian Weeds Conference in Cairns.

The medal recognised outstanding contributions to weed management in Australasia.

Professor Peter Gregg

Professor Peter Gregg

Business/Higher Education Round Table (BHERT) Award for Best Collaboration with a Regional Focus

Ms. Lisa Paul, Secretary of the Department of Education, Science and Training (which managed the CRCs Program, now managed by the Department of Innovation, Industry, Science and Research), presented the Business/Higher Education Round Table Award for 'Best Collaboration with a Regional Focus' for the Cotton CRC's Summer Scholarship Program to the Cotton CRC Chief Scientist, Professor Peter Gregg, during a gala awards ceremony in Sydney.

The BHERT award reflects recognition by the chief executives of major Australian corporations, research organisations and the Vice Chancellors of Australian Universities.

COTTON CRC SCIENCE AWARDS

Impact on Adoption

Rene van der Sluijs, Stuart Gordon, Mark Hickman

For the Cotton Field to Fabric Training Course

CRC collaboration/corporate citizen

Tracey Farrell

For outstanding efforts in establishing and fostering the CRC project High Yielding Irrigated Grains and Cotton Farming Systems and other Cotton CRC activities

Exceptional Service

David Nehl

In appreciation of his exceptional service to successive Cotton CRCs and to the cotton industry

Best Researcher Paper

Francisco Sanchez-Bayo, Ivan Kennedy, Angus Crossan, Mick Rose,

For pesticide removal from cotton farm tailwater by pilot-scale ponded wetland

Science and Innovation

Ian Acworth, Anna Greve, Bryce Kelly

For the development of electrical imaging techniques for soil water

Chief Scientist Award

Robert Mensah

CONTEXT AND MAJOR DEVELOPMENTS

INDUSTRY CONTEXT

Australia's cotton is recognised internationally for its excellent quality; consequently, it is in high demand and commands a premium in world markets. The majority of Australia's cotton is grown in NSW with the remainder produced in Queensland.

With the growing global use of biofuel for transport and a booming Asian population consuming more grain-fed meat protein, grain prices continue to be buoyant. This is generating good margins for those producers who have irrigation water or stored soil moisture. While some of the profitability is being offset by significant increases in input costs, traditional cotton growers have become much more opportunistic in their use of irrigation water. Gross margins from irrigated grain production have become near or comparable to cotton. This competition for water use is adding an exciting new dimension to the operations of the Cotton CRC, with many projects looking at potential synergies for irrigated grain and cotton crops.

The Australian Cotton industry is continuing to face major challenges in production, with recent years seeing a decline in the area allocated to cotton. Cotton production peaked in 1998–99, with 562,000 hectares planted. This compares with only 142,000 hectares planted in 2006–07 and 67,000 hectares in the 2007–08 season, which makes it the smallest cotton area planted in Australia for 30 years. As a consequence, the 2007–08 cotton crop harvest saw only 575 000 of 227 kilogram bales produced, which is down more than 50 per cent on the previous year's 1.3 million bales.

Where Australian cotton is grown

The major production areas in NSW stretch south from the Macintyre River on the Queensland border and encompass the Gwydir, Namoi and Macquarie valleys in the north, stretching along the Barwon and Darling Rivers in the west and the Lachlan and Murrumbidgee rivers in the south.

In Queensland, cotton is grown mostly in the south, in the Darling Downs, St George, Dirranbandi and Macintyre Valley regions, with the remainder grown near Emerald, Theodore and Biloela in central Queensland. Additionally, the Burdekin is establishing itself as an emerging cotton region.

CONTEXT AND MAJOR DEVELOPMENTS

The 2007–08 season may have been the smallest harvest Australia has seen, yet production per hectare and yield increased significantly. This year also saw the first commercial harvest of cotton in the Burdekin region of North Queensland. The future for cotton production in the Burdekin is looking extremely positive, with the estimated planting area increasing from 900 hectares to at least 1,300 hectares for the 2008–09 season.

Looking toward the coming season, the planted area for 2008–09 is estimated at 120,000 hectares, pending any significant runoff rainfall event in the next quarter.

Almost all of Australia's cotton is exported to China, Indonesia, Japan, Korea and other countries. A very small domestic spinning capacity exists. Cotton remains the world's preferred natural fibre, with demand continuing to rise. Fibre quality is paramount and the Cotton CRC is devoting considerable resources to ensure Australian cotton quality retains it markets position.

MAJOR DEVELOPMENTS

The Cotton CRC and Board of Directors conducted a review of the annual strategic plan, fine-tuning the strategic operations of the organisation to reflect changes in the current operating environment.

Reflecting the maturity of the organisation, the Cotton CRC has seen some restructuring. Noteworthy has been the evolution of the Project Administrator into a full Project Management Officer role to ensure that the Cotton CRC operates and delivers project management excellence. The role of Accounts Officer has also been evolved into a formal reporting accountancy position.

Three hundred unique projects commissioned within the Cotton CRC are delivering research, outcomes and extension for the industry.

Full operation mapping of all Cotton CRC projects against DIISR milestones has been undertaken.

KEY STAFF APPOINTMENTS

During the third year of operation Philip Armytage was apponted Chief Executive Officer

Philip commenced at the Cotton CRC in January, 2008. A graduate of Charles Sturt University, he began his career as an insect scout and agronomist with Cotton Growers Services, where he then served as a Branch Manager, Development Manager and, finally, as Marketing and Development Manager. His most recent appointment was with international agroscience organisation Syngenta Crop Protection, with responsibilities including innovation, strategic management, commercialisation and crop protection, relating to both cotton and sugar production.

As CEO, Philip will ensure continued progress in the implementation of the Cotton CRC's strategic plan and the outcomes articulated by the Commonwealth DIISR agreement.

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	15
Overcoming soil loss, salinity and acidity	5
Sustainable use of Australia's biodiversity	8
Responding to climate change and variability	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	5
FRONTIER TECHNOLOGIES FOR BUILDING AND TRANSFORMING AUSTRALIAN INDUSTRIES *Stimulating the growth of world-class Australian industries using innovative technologies developed from cutting-edge research*	
Frontier technologies	10
Smart information use	5
Promoting an innovation culture and economy	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	20

*Note: These percentages do not add up to 100 per cent as not all Cotton Catchment Communities CRC research is directly related to the National Research Priorities.

GOVERNANCE AND MANAGEMENT

THE COTTON CATCHMENT COMMUNITIES CRC

he Cotton Catchment Communities CRC is an incorporated company limited by guarantee. It is subject to Corporations law and has an independent, skills-based Board and an independent Chair.

PARTICIPANTS

The Cotton Catchment Communities CRC (Cotton CRC) consists of twelve core partners and 36 affiliate partners. These participants give the Cotton CRC a local, as well as a national, focus.

The partnerships, which include R&D providers, industry, catchment and community organisations, enhance the Cotton CRC's ability to deliver outcomes to a wide range of end-users across Australia.

The Cotton CRC's partners have committed significant funding, resources and research expertise to the Cotton CRC's research, education and extension agenda.

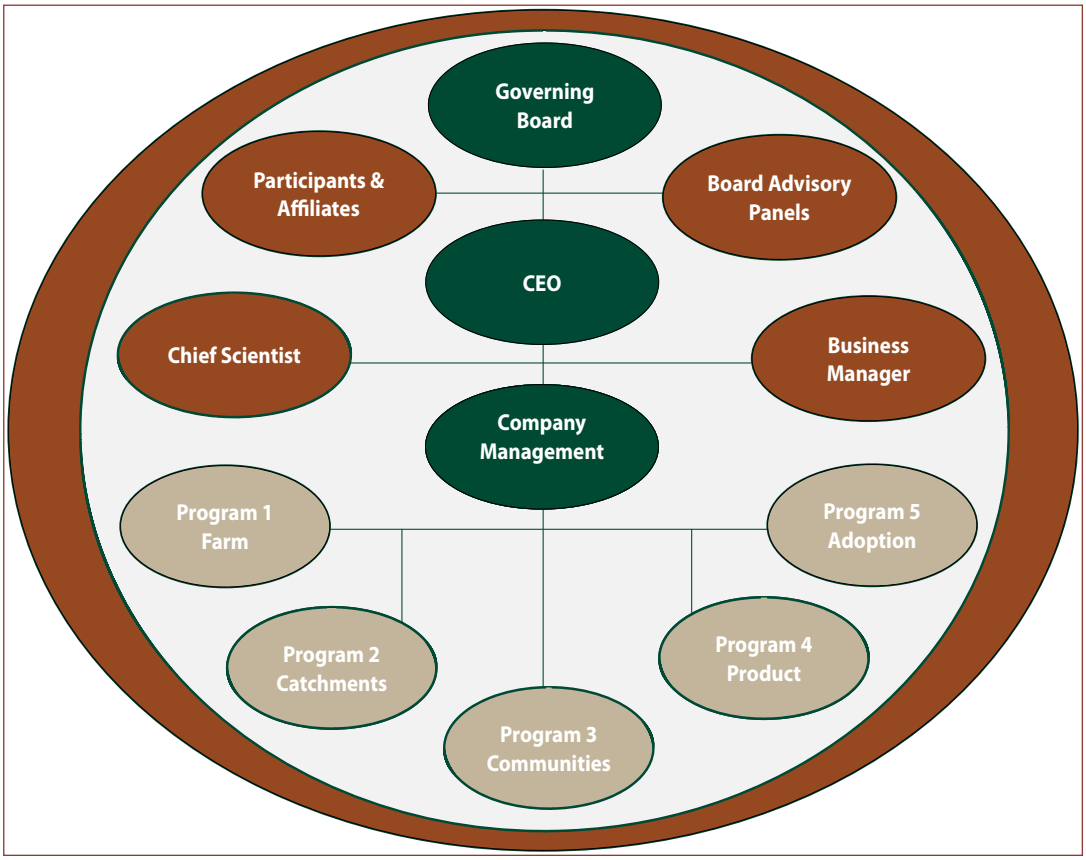
See Participants Table on the following page.

THE GOVERNING BOARD

The Governing Board sets policy and strategic directions for the Cotton CRC and monitors overall performance, acting in the best interests of the Company (the Cotton Catchment Communities CRC Ltd). The Board is responsible for optimising the Company's agreed outputs and outcomes and for maintaining the operating values and principles set by the members.

In carrying out its governance role, the main task of the Board is to drive the performance of the Company to achieve its research outcomes. The Board also ensures the Company complies with its

Cotton CRC Management Structure



contractual, statutory and other legal obligations, including the requirements of regulatory bodies. The Board has the ultimate responsibility for the successful operations of the Cotton CRC.

The shareholders appoint eight directors to the Cotton CRC Board. The Board represents a range of expertise, including research and development management, commercialisation and IP management, education and training, finance and business management, cotton growing, cotton marketing, catchment and communities interest, natural resource management and corporate governance.

There were two changes to the Board during 2007–08: Queensland Department of Primary Industries and Fisheries (QDPI&F) representative, David Hamilton, replaced Helen Scott-Orr from the NSW Department of Primary Industries (NSW DPI) and Bruce Finney resigned in May 2008. A replacement for Mr Finney is currently being sought.

The members have supported an incorporated company subject to tax. The Intellectual Property (IP) will be held by the Cotton Catchment Communities CRC Ltd on behalf of the members, with each member's ownership proportional to their cash and in-kind valuations except where projects or IP are identified and approved as discrete IP. In that case, ownership needs to be restricted to identified providers or owners of the IP.

The Board met five times throughout 2007–08 (see page 19). In addition, the Board Committees met several times during the year as outlined in the attendance table at the bottom of the page.

Participants

Participant's Name	Commonwealth Approval
Australian Cotton Growers Research Association	Yes
Cotton Seed Distributors Ltd	Yes
Cotton Australia Ltd	Yes
Cotton Research and Development Corporation	Yes
CSIRO	Yes
Department of Primary Industries, NSW	Yes
Queensland Department of Primary Industries and Fisheries	Yes
Western Australia Department of Agriculture and Food	Yes
The University of New England	Yes
The University of New South Wales	Yes
The University of Sydney	Yes
The University of Technology, Sydney	Yes

Board Committee Meetings

Directors	Directors' Meetings		Audit Committee		Human Resources Committee	
	Number eligible to attend	Number attended	Number eligible to attend	Number attended	Number eligible to attend	Number attended
Mr David Anthony	5	5	–	–	4	4
Mr John Herbert	5	5	–	–	4	4
Mr Stuart Higgins	5	4	–	–	4	4
Mr Bruce Finney	4	4	4	4	–	–
Dr Gary Fitt	5	5	–	–	–	–
Ms Kathryn Adams	5	5	4	4	–	–
Ms Helen Scott-Orr	1	1	2	–	–	–
Mr David Hamilton	4	4	2	2	–	–
Ms Dianne Bentley	5	5	–		4	4

ABOUT THE COTTON CATCHMENT COMMUNITIES CRC

THE BOARD

Chair

Mr. David Anthony
B. Sc. Agr. MAICD
David Anthony has 30 years background of Science in

Agriculture. In the past, David was Vice Chairman of the Australian Cotton Growers Research Association for 15 years, Treasurer/ Vice Chairman of Cotton Seed Distributors Limited for nine years, a Director of Cargill Australia for seven years, Director/Vice Chairman of the Cotton Research and Development Corporation for nine years, Chairman/Managing Director of Auscott Limited and Chairman of Cotton Catchment Communities CRC since its inception. He is a member of the Cotton CRC Human Resources Sub-Committee.

Deputy Chair

Mr John Herbert
FAICD

John Herbert has had a lifetime experience in agribusiness at CEO and Director level. This has included significant experience in research management and commercialisation in the private and public sectors. He has a strong interest in and a practical approach to effective corporate governance. John has served on the Board of RIRDC and Golden Casket Lottery Corporation and as Chair of the Rice CRC and the CRC for Tropical Plant Protection. In addition to his role on the Cotton CRC Board he is Chair of the Right Mind Pty Ltd. He is Chairperson of the Cotton CRC Human Resources Sub-Committee.

Mr. Stuart Higgins
B.Ag.Sc, G.C.R.Sc.(CP)

Stuart Higgins operates a Best Management Practices irrigated cotton and grain property on the Darling Downs in Queensland. Stuart has been recognised for his work on irrigation water use efficiency improvements and for establishing initiatives for engaging the wider community in complex agricultural issues, mainly through ABC Radio National. He has consulted in Asia, Africa and Central Asia for various non-government organisations on irrigation infrastructure assessments and agricultural value chain analysis. Stuart is a graduate of the Vincent Fairfax Ethics in Leadership Program and Chair of the Australian Cotton Industry Council's Best Management Practices Advisory Panel. He is Chairperson of the Cotton CRC's Technology and End User Specialist Advisory Panel and a member of the Human Resources Sub-Committee.

Mr Bruce Finney
BSc Ag, GAICD

Bruce Finney has extensive experience in the agricultural sector. Prior to his appointment as Executive Director of the Cotton Research and Development Corporation he worked for Twynam Agricultural Group in various roles, including Company Agronomist, Regional Manager of the Central Region and Natural Resource Management Coordinator. He is a past Chair of the Australian Cotton Growers Research Association and a graduate of the Australian Rural Leadership Program. Prior to his resignation, Bruce was an elected Board representative of the Cotton Research and Development Corporation, Cotton Seed Distributors Ltd, Cotton Australia Limited and the Australian Cotton Growers Research Association Inc. He was a member of the Cotton CRC Finance and Audit Sub-Committee.

Dr Gary Fitt
BSc (Hons), PhD, ATSE

Dr Gary Fitt has extensive experience in the science agricultural sector. Prior to his appointment as Senior Principal Research Scientist and Deputy Chief, CSIRO Entomology he was the Strategy Director of CSIRO Entomology, Chief Executive Officer for the Australian Cotton CRC and a Program Leader Cotton CSIRO Plant Industry. Gary is a fellow of the Royal Entomological Society of London, Australian Entomological Society, British Ecological Society and the Academy of Technological Sciences and Engineering. He is Chairperson of the Cotton CRC Science and Education Specialist Advisory Panel.

Ms Kathryn Adams
B.Sc. Agr (Hons), M.Env Stud, M.Bus, LLM, GAICD

Kathryn Adams is a Senior Research Fellow with the Australian Centre for Intellectual Property in Agriculture at Griffith University. She has served on several Research and Development Corporation Boards, including the Cotton Research and Development Corporation, and has held a range

of senior executive positions. Kathryn's expertise encompasses intellectual property, corporate governance, R&D investment, business development and environmental management. She is Chairperson of the Finance and Audit Committee.

Mr W. David Hamilton
B Agr Sc (Queensland), MS (Agron) (Texas A&M), FAICD

David Hamilton has extensive experience and interest in field crop agriculture and in the application of technology. He has particular interests in research, development, extension and education, especially in the cotton industry, having previously served on the Cotton Research and Development Corporation Board. He is a member of the Audit Committee, the elected Board representative of Queensland Department of Primary Industries and Fisheries, the NSW Department of Primary Industries and WA Department of Agriculture. David is a member of the Cotton CRC Finance and Audit Sub-Committee.

Ms Diane Bentley
B. Sc. Agr., GAICD

Diane Bentley has extensive expertise and interest in sustainability issues in relation to agriculture and natural resource management, policy development and research and development investment. She is Assistant Commissioner of the Natural Resources Commission of NSW, a Director of Land and Water Australia, Deputy Chair of the Grains Research and Development Corporation Northern Panel and a Member of the CB Alexander Foundation. Diane is Chair of the Cotton CRC Catchment and Communities Specialist Advisory Panel and a member of the Human Resources Sub-Committee.

Ms Helen Scott-Orr
BVSc (Hons), Dip.Bact. (Lond.), MACVS (Epidem.), FAICD

Helen Scott-Orr has extensive experience and interest in agriculture and veterinary research, policy, extension and education, especially relating to biosecurity and sustainability, as well as corporate governance of CRCs and similar alliances. Prior to her resignation, she was the elected Board representative of the Queensland Department of Primary Industries and Fisheries, NSW Department of Primary Industries and WA Department of Agriculture, and a member of the cotton CRC Finance and Audit Sub-Committee.

BOARD SUB-COMMITTEES

Human Resources Committee

- John Herbert (Chairperson)
- Stuart Higgins
- Dianne Bentley
- David Anthony

The HR Committee is responsible for making recommendations for the selection and maintenance of appropriate personnel, entitlements and environments in order to achieve Cotton CRC goals.

Finance and Audit Committee

- Kathryn Adams (Chairperson)
- Bruce Finney
- David Hamilton/Helen Scott-Orr
- Des Boucher (independent Non-Board member)

The Finance and Audit Committee is responsible reviewing the integrity of the Company's financial reporting and overseeing the independence of the external auditors, ensuring that best practice governance standards are identified and recommended.

SPECIALIST ADVISORY PANELS

The Board has established three advisory panels: Science and Education, Technology and End Users, and Catchment and Communities. Each panel is chaired by a Board member and consist of representatives from core participants and affiliate partners, as well as independent members with interests and skills in these areas. The panels are responsible for advising the Board and management on research priorities, resource allocation, emerging technical issues, opportunities for commercialisation and collaboration.

2007–08 Board Meetings

Meeting Date	Location
10 August 2007	Teleconference
26 October 2007	Sydney, NSW
30 and 31 January 2008	Narromine, NSW (Narromine Shire Council)
29 April 2008	Belmont, Victoria (CSIRO Materials Science and Engineering)
5 June 2008	Teleconference

ABOUT THE COTTON CATCHMENT COMMUNITIES CRC

COMPANY MANAGEMENT TEAM

The day-to-day management of the Centre is the responsibility of the Company Management Team (CMT), comprising the CEO, Chief Scientist, Business Manager and Program Managers. The CMT meets monthly, by telephone conference or at physical site meetings. The CEO sits as Chair of the CMT.

CENTRE FORUM

The Board receives strategic input and advice from the Centre Forum, which is made up of representatives of all partners and associated affiliates. This is a very important activity for communication and dialogue on key aspects of the Cotton CRC's progress, activities, commercialisation and other key issues as identified by the members, partners and Board.

Centre Forum Meetings 2007–08

Meeting Date	Location
8 August 2007	Narrabri (Cotton CRC Science Review)
6 March 2008	Teleconference

Specified Personnel 2007–08

CEO and Governing Board Members

Name	Organisation	Cotton CRC Position / Role
David Anthony	Independent	Chairman
John Herbert	Independent	Deputy Chair
Bruce Finney	Industry Participants group	Director
Dianne Bentley	Independent	Director
Dr Garry Fitt	Research providers group	Director
Kathryn Adams	Independent	Director
Mr David Hamilton	Government departments group	Director
Stuart Higgins	Independent	Director
Guy Roth (to Oct 07)	Cotton CRC	Chief Executive Officer
Philip Armytage (from Jan 08)	Cotton CRC	Chief Executive Officer

Program Leaders

Name	Organisation	COTTON CRC Position / Role
Professor Peter Gregg	Cotton CRC	Chief Scientist
Dr Paula Jones	Cotton CRC	Catchment and Communities Program Leader
Letitia Cross	NSW DPI	Adoption Program Leader
Dr Lewis Wilson	CSIRO	Farm Program Leader
Dallas Gibb	CRDC / Techmac	Product Program Leader
Graham Harris	QDPI&F	Farm Program Leader

RESEARCH ACTIVITIES

THE FARM

Program Leaders

Graham Harris
Queensland Department of Primary Industries and Fisheries

Lewis Wilson
CSIRO

Peter Gregg
Cotton CRC

Combining profitability with sustainability of production is critically important if the Australian cotton industry is to remain viable in the longer term. Sustainability includes a range of factors: less dependence on inputs such as pesticides, an effective use of available water, stewardship of plants and soil, and resilient farming systems capable of meeting new challenges such as climate change. The Farm program has four sub-programs that aim to achieve this outcome through addressing aspects of on-farm practice, as well as developing new commercial products to enhance crop management and profitability.

The Farm Program Leaders

Lewis Wilson, Graham Harris and Professor Peter Gregg

INTEGRATED CROP PROTECTION

❝ the good guys and the bad guys ❞

This sub-program aims to ensure effective and sustainable management of pests that threaten the productivity of cotton systems. This includes a range of insects, mites, weeds and diseases that consume, compete with or debilitate cotton plants.

The widespread adoption of transgenic insect-resistant cotton, Bollgard II®, has led to a dramatic reduction in insecticide use and enhanced survival of the natural enemies of pests. Research from the University of New England PhD student, Chris Carr, is finding that a combination of reduced spraying and more rainfall early in the season encourages a higher build-up of *Trichogramma*, an egg parasitoid of *Helicoverpa* spp., in cotton crops. However, reduced spraying also creates challenges, as some pests such as green mirids, previously coincidentally controlled by insecticides applied against *Helicoverpa* spp. but not controlled by Bollgard II®, now survive and sometimes require control. Many of the options available to control these emerging pests are disruptive to beneficial insects, which allows populations of secondary pests such as mites, aphid or whitefly to develop, and 2007–08 saw the Cotton CRC research and extension effort focus on avoiding this problem. Research has shown that reduced rates of insecticides, in conjunction with salt or petroleum spray oil additives, offer reduced cost, equivalent efficacy and a reduced impact on beneficials. This information is available to industry through the latest Cotton Pest Management Guide.

Following surveys conducted by Dr. Mary Whitehouse of CSIRO, it is evident that mirids are being sprayed at below threshold levels, partly because the thresholds are being applied poorly, which results in higher costs, increased secondary pest risk but no higher yield. A major extension effort to improve management is underway. Management of mirids would also be improved with a better understanding of where populations develop, as it is possible that there are populations which sporadically build up in inland areas following rainfall and could move to cotton regions, adding to local populations.

PhD student James Hereward has developed seven microsatellite loci (DNA markers) that he is using to establish the origin of mirid populations in cotton regions. This

has implications for managing and forecasting mirid abundance and resistance management.

Cotton aphids can also be a significant problem in Bollgard II® crops, with the potential to reduce yield, downgrade lint quality and spread disease. Dr Lewis Wilson of CSIRO has developed a new sampling protocol and thresholds for aphids which allow growers to forecast potential yield losses and, hence, the need for control.

Bollgard II® is a central part of integrated pest management and it is crucial to prevent its major target, *Helicoverpa* spp., developing resistance to this technology. A core component of resistance management is the growing of refuge crops to produce non-selected moths to mate with any resistant moths, thereby diluting any resistance; however, the economic return from water used on unsprayed refuges is low and the effectiveness of refuges for control of *Helicoverpa* is being studied to increase refuge productivity.

The assumption that moths produced in refuges are mating with any resistant individuals surviving in Bollgard II® crops is also being evaluated, using carbon-isotope analysis to test whether moths in Bollgard II® crops originate from C3 (cotton or legumes) or C4 (maize or sorghum) plants. Early results suggest some mixed mating but not always enough. Bollgard crops can carry above-threshold numbers of *Helicoverpa* larvae. Research by PhD student, Baoqian Lu is investigating how larvae are able to survive and whether the damage they do is economically damaging. Early results suggest survival is not due to resistance to *Bt* proteins in Bollgard II® nor to poor expression in the leaves.

The Cotton CRC is also developing weed control thresholds using the 'Critical period for weed control concept', which provides a rational basis for weed control by linking weed type, density and time to potential yield loss to decide when to control weeds. Herbicide damage to cotton crops is also an ongoing concern and we are currently investigating the response of cotton to low rates of herbicides, in terms of both growth and yield, to provide growers with a better understanding of the risks from herbicide drift. Efforts to extend outcomes to both the cotton and dryland farming communities via field days and targeted industry publications have achieved excellent results.

Diseases, including Fusarium wilt, Black Root Rot, Verticillium wilt and a range of seedling diseases, continue to pose significant challenges to cotton production.

Jason Moulynox's PhD research has identified bacteria and some anti-fungal proteins that are showing promise for management of Black Root Rot, and field trials will be undertaken in spring 2008. New research is also investigating the process of infection of plant roots by Black Root Rot by generating non-pathenogenic mutants and comparing their characteristics with the wild type. Several proteins that appear to be critical to the infection process have been identified.

Disease surveys that monitor changes in disease distribution and severity have found that Black Root Rot continues to spread. Most significantly though, the incidence of Verticillium wilt increased substantially last year, probably due to cooler, wetter conditions.

Jason Moulynox

Black Root Rot continues to be a problem for the Australian cotton industry. Promising research by PhD student, Jason Moulynox, may help to control this disease

Some plants have been killed from the top down, prompting concerns of a new strain, and this is being investigated. Experiments are showing that growth of Sicot F1, the most Fusarium-resistant cotton variety available, reduces the soil spore load, compared with a typical variety (Sicot 71). This suggests that it may be possible to reduce the severity of this disease in badly affected fields over time.

WATER USE EFFICIENCY

“ more crop per drop ”

The aim of this sub-program is to improve water use efficiency with a 50 per cent increase in cotton yield per megalitre of water supplied to farms. Since 2000–01, the cotton industry has achieved a 25 per cent improvement in water use efficiency to 1.38 bales per megalitre. There are 18 research projects underway, focusing on the efficiency of water use within irrigated cotton farming systems at the farm scale, conducted in collaboration with the Cotton CRC Water Team.

Understanding deep drainage and how to prevent it is a priority for the Cotton CRC, with numerous projects underway. Field research by Des McGarry is quantifying the losses through deep drainage from furrow irrigation systems, using barrel lysimeters installed in six commercially irrigated fields in southern Queensland. Research is also examining the links between deep drainage during irrigation events and groundwater levels in the St George irrigation area. The research results have been communicated to collaborators and local irrigators, and to the broader irrigation industry through the Irrigation 2008 Conference.

Anthony Ringrose-Voase is researching the reliability of deep drainage estimates from the different methods available, using a large deep drainage lysimeter installed at the ACRI. Results to date suggest a similar pattern in deep drainage to that found with the barrel lysimeters. He also found that the drainage estimates by chloride mass balance were 60 per cent less than those from the deep drainage lysimeter. This research confirmed the inappropriateness of using soil moisture sensing equipment to detect deep drainage below the root zone.

A PhD project recently completed by Chris Vanags of the University of Sydney also demonstrated the potential for palaeochannels as a source of water losses from storages, fields and channels.

The loss of water through evaporation from on-farm storages is a significant obstacle to improving whole farm water use efficiency in the cotton industry. It is being addressed through collaborative research with the CRC for Polymers and CRC for Irrigation Futures to produce new improved monolayer products and application systems to reduce evaporative losses. There is scope to significantly improve on the field performance of current commercial evaporation mitigation products. Provisional patents have been lodged by the CRC for Polymers, on behalf of the consortium of CRCs, to protect the intellectual property (IP) related to new monolayer products for the control of these evaporation losses.

Seepage can also be a significant source of water loss from on-farm storages. A project that will assess the extent of seepage and evaporation losses from 135 storages across the cotton industry has recently been funded through the National Water Commission. This project will work with existing industry consultants to build capacity in the provision of irrigation services and develop cost-effective amelioration strategies to reduce seepage losses from storages.

Understanding deep drainage

Dr Thusitha Gunawardena (Queensland Department of Natural Resources and Water and Cotton CRC) working with Grant Millar (left – QDNRW), installing barrel lysimeters at the Australian Cotton Research Institute, Narrabri

Photo: *Dr Des McGarry, QDNRW*

A set of Best Management Practices (BMP) guidelines for the management of storages will also be developed and promoted to industry.A new project at the University of Southern Queensland is addressing the development of an automated surface irrigation system to optimise furrow irrigation. Technologies to enhance the performance of alternatives to furrow irrigation are also being examined. Two PhD projects by Manouchehr Torabi and Jay Dhungel at the University of Central Queensland are assessing the value of oxygation, a new drip irrigation technology.

PLANTS AND SOILS

“ growing it ”

The outcome of this sub-program will be systems that improve the management of cotton plants to ensure profitable production and enhanced stewardship of the soil. It currently includes 23 research projects.

Activities are focused on:

- improving efficiency of utilisation of applied nutrients (especially nitrogen) by up to 15 per cent compared with 2005 levels, with comparable reductions in greenhouse gas emissions;
- understanding soil biology and soil health; and
- developing and assessing methods for precision farming and managing in-crop spatial variability.

Research by Ian Rochester demonstrated very high yields of 15 bales per hectare where legume-based cropping rotations with cotton are used. These rotations also appear better at sequestering carbon in cotton-growing soils. A user-friendly method of identifying Nitrogen Use Efficiency (NUE) has been developed and is being used to collate NUE data from commercial fields across the industry. The information from this research, together with that for phosphorus and potassium, will be used to update the decision support system, NutriLOGIC. Nutrient acquisition and redistribution within cotton is also being examined.

Research begun in previous Cotton CRCs and completed within the current Cotton CRC shows that limited cotton growth in soils of low to moderate sodicity is primarily due to soil physical factors such as soil strength and poor aeration. Further reductions in cotton growth in soils of high sodicity are most likely caused by soil chemical factors, such as sodium toxicity and micronutrient deficiencies. This research also showed that sodic soil solution chemistry plays no role in the symptoms associated with premature senescence. Current research by PhD students, John Bennet and James Quilty from The University of Sydney, examines the use of gypsum and lime in addressing sodicity in irrigable soils within the Macquarie and Lachlan valleys, and evaluating the effectiveness of a range of organic amendments being promoted within the industry.

Other agronomic research is focusing on the agronomy of Ultra Narrow Row (UNR) cotton, early irrigation and nitrogen strategies to maximise the yield of Bollgard II® cotton and the identification of high temperature stress protection genes in cotton cultivars.

The advent of Bollgard II® transgenic insect-resistant cotton has raised new questions about agronomic management. Since Bollgard retains a high proportion of the fruit it sets, the timing of water and nutrients application may differ from conventional cotton. PhD student Marcelo Paytas, from the University of Queensland, is investigating this question.

Finally, research is being conducted to ascertain the cost-benefit of adopting remote sensing technologies to determine in-crop spatial variation and adjust inputs of nutrients, water and growth regulators accordingly. This work is being carried out in commercial fields in the Namoi Valley and on the Darling Downs, in collaboration with Terrabyte Ltd, an associate partner in the Cotton CRC.

RESILIENT FARMING SYSTEMS

“ adapting to change ”

The resilient farming systems sub-program is an initiative of the Cotton CRC that developed from the recognition that future cotton farms will not necessarily be dominated by cotton but will have a mix of enterprises that provides resilience to short-term climate variability and long-term change, as well as the myriad of agronomic and economic challenges faced by growers. The sub-program contains eight research projects, including some large farming systems projects that are examining the role of rotations, tillage systems and cotton production in new areas.

Cotton yields have risen substantially over the last decade but, while it is widely recognised that the reasons are multi-dimensional, we lack a clear understanding of the nutrient/water/soil/plant interactions that are crucial to high yields. The Cotton CRC has appointed a new Farming Systems Scientist, Michael Braunack of CSIRO, to focus on these interactions. Research by Stephen Yeates, also of CSIRO, on water use by high retention transgenic cotton has provided new variety parameters for incorporation into the predictive cotton crop growth model, OZCOT, and identified the need for further

The Burdekin: Australia's new cotton region

Top: Dr Paul Grundy shows Cotton CRC Chief Scientist, Professor Peter Gregg around the Ayr Research Station

Bottom: A field day, as the first cotton is picked in the Burdekin

With an abundance of water and a well-established agricultural industry, the Lower Burdekin region is already home to thriving enterprises including sugar cane and horticulture and has now added cotton to the list, with the first commercial crop grown in 2007–08.

According to Dr Paul Grundy of the Queensland Department of Primary Industries and Fisheries, who relocated to the Burdekin to investigate whether cotton could be integrated with sugar cane, the 2008 yields were highly variable – between 4 and 12 bales – with the district average, including the 10 per cent planted as unsprayed refuge areas, estimated at 7.2 bales per hectare.

The quality of lint produced in the Burdekin has been the big story of 2008. With two thirds of the crop ginned and classed at the time of writing, every bale has been base grade or above, with 70 per cent of the crop attracting a premium for lengths of 38-39 and strength of 32–34 g/tex.

model development for new production areas.

Other elements of research in this sub-program are focused on developing agronomic practices to maximise the performance of high retention cotton and irrigated cereals (wheat and maize) in rotation with cotton. A Grains Research and Development Corporation-funded project is examining the agronomic requirements of producing high-yielding irrigated grains in cotton farming systems. Nilantha Hulugalle is investigating the benefits of cotton-cereal and cotton-vetch rotations in maximising profitability compared to monoculture cotton. PhD student, Alison Devereux, is studying the reasons for cotton yield increases reported in cotton/corn rotations through the University of Queensland.

The current drought and low water supplies in the Murray-Darling catchment have caused a major drop in cotton production, and it is often suggested that cotton production should move to areas of northern Australia where irrigation water is more abundant. In Central Queensland, research by Richard Sequeira is investigating the impact of planting date and irrigation practices on Bollgard II® cotton performance. Further north, in the Burdekin valley, research by Paul Grundy and Stephen Yeates is investigating the performance and sustainability of irrigated cotton as part of a rotation with sugar cane. The Cotton CRC research in the Burdekin has been directly responsible for the interest being shown in cotton production in that environment, demonstrated by an area of about 800 hectares of cotton planted last season by twelve new growers. That area is predicted to rise to at least 1,200 hectares in the coming season.

NEW TOOLS AND TECHNOLOGIES

“ improving the tool kit ”

This sub-program aims to develop new tools that will enhance the productivity of cotton systems and that can ultimately be commercialised to generate royalty income for the Cotton CRC.

The Cotton CRC’s research emphasises new tools for pest management, predominantly because this is where the greatest opportunities have arisen and where there is a clear need for less disruptive control options for a range of pests. The first product to be developed from this program, the moth attractant Magnet®, is likely to be fully commercial, through CRC partner Ag Biotech, for the 2008–09 cotton season. After extensive modifications, which were required to meet regulatory requirements, the product is now in the final stages of registration through the Australian Pesticide and Veterinary Medicines Authority. Magnet® consists of a mixture of synthetic plant volatiles, a feeding stimulant and an insecticide. It is targeted at *Helicoverpa* spp. and has been shown to produce area-wide reductions in pest density. Magnet® also attracts other moth pests in the same family as *Helicoverpa*, and trials of its effectiveness against pests of cotton and horticulture have been undertaken in the USA, New Zealand and south-east Asia. One difficulty has been that Magnet® has limited rainfastness, because it must remain liquid so moths can ingest it. Recent trials have identified some polymers that may alleviate this problem.

Evaluation of the new mirid sex attractant pheromone, discovered during PhD research by Sam Lower, indicated that there is no simple correlation between numbers in pheromone traps and the size of field populations, so the pheromone may be of limited value for monitoring mirid abundance; however, if problems associated with the high volatility of the pheromone can be overcome, there is potential to use the pheromones in a ‘mating disruption’ program, whereby males become confused by the pheromone and are unable to find mates. A suitable pheromone release system has been developed but low mirid numbers at the sites selected have hampered field experiments.

Another significant project, by Dr Robert Mensah of the NSW Department of Primary Industries, is showing promise for control of *Helicoverpa* spp. This new tool, derived from a native plant species, ‘Plant X’, discourages moths from laying eggs on treated plants, discourages larvae from feeding and reduces survival of those larvae that do feed. Commercial scale production of Plant X: drying, extraction and formulation of a commercial product, looks promising and a commercial partner, Growth Agriculture, has signed a commercial agreement to help develop and market the product.

For* The Farm *Outputs and Milestones, see page 72.

Robert Mensah

Dr Robert Mensah, who is conducting research with ‘Plant X’ to control Helicoverpa, won the Cotton CRC Chief Scientist Award for 2008

Vetch improves soil nutrition

This vetch crop was ploughed into the soil in September using discs. The field was then long fallowed until cotton was planted in October of the following year

THE CATCHMENT

Program Leader

Dr Paula Jones *Cotton CRC*

Sub-Program Leaders

Integrated management of river systems

Dr Glenn Wilson *The University of New England*

The dynamics and connectivity of groundwater systems

Assoc Professor Bryce Kelly *University of NSW*
Professor Ian Acworth *University of NSW*

Managing on-farm water storages for irrigation and environmental purposes

Professor Ivan Kennedy *The University of Sydney*

Managing biodiversity and ecosystem services on farms

Dr Alan House *CSIRO*

Integrated farm and catchment management resources

Jane MacFarlane *Namoi CMA*


Paula Jones

he Cotton CRC Catchment Program aims to enable best practice cotton enterprises to deliver sustainable ecosystems and reduced impacts on catchments. To achieve this, research is focused in five key areas, which are aligned to the five sub-programs.

Three years into the Cotton CRC, a number of the Catchment Program projects are nearing completion and further projects have been developed over the last twelve months. There are 34 current research projects, including 16 postgraduate studentships, with a further twelve projects now completed. The 34 current projects are spread across a range of cotton growing regions in NSW and Queensland and bring together a number of different research and investment partners from industry, catchment bodies, state and federal government agencies, research institutions and community organisations. This year has seen the establishment of eight new collaborative projects, in conjunction with a range of organisations including Namoi Catchment Management Authority (CMA), Central West CMA, Condamine Alliance, the Queensland Murray Darling Committee, Australian Government Department of Agriculture, Fisheries and Forestry, the Cotton Research and Development Corporation (CRDC), The University of Sydney, the University of Queensland and The University of New England, Greening Australia and Eco Logical Australia. Four of the new projects are PhD studentships.

INTEGRATED MANAGEMENT OF RIVER SYSTEMS

By 2012, this sub-program aims to have characterised river health and ecological responses to flow variability in two key floodplain catchments and will have assisted catchment bodies to develop science-based riparian health indicators. Currently, there are seven active research projects focused on:

Assessing the potential implications of different river flow management strategies on flood patterns and the responses of hydrology, habitats, biota and ecological processes over the long-term;

- Establishing riparian health indicators; and
- Developing probabilistic models to predict rainfall and river flows.

This research is largely concentrated in the Gwydir and Border Rivers regions but 2007–08 has also seen the development of new projects in the Namoi catchment. One of these, 'Riparian vegetation identification and condition assessment', is a joint project between the Namoi CMA and Cotton CRC. This project will provide a benchmark for future Namoi catchment and sub-catchment riparian vegetation condition assessments, as well as information that will assist the Namoi CMA to prioritise future investments. Despite only commencing in April this year, the project has already started to collaborate with the Murray Darling Basin Committee's 'Sustainable Rivers Audit' team. The field data collected will be used by MDBC to assist in the development of a new vegetation theme. The remote sensing data collected by MDBC will be compared with the field data collected by the Namoi CMA/ Cotton CRC project to establish the accuracy of the remote sensing data in reflecting the vegetation condition on the ground. This is an excellent outcome for such a relatively new project.

Another significant project in this sub-program, which is nearing completion, is that being undertaken by Dr Glenn Wilson and his team at The University of New England, funded through the Australian Government Department of Environment, Water, Heritage and the Arts. The project was initially developed because very little information was available on ecological responses to flow variability within channels such as the lower Gwydir River, Mehi River or Gingham Watercourse. In order for Environment Contingency Allowance (ECA) releases to occur in a scientifically defensible manner, the ECA committee requires sound information on the downstream aquatic responses to flow variability in this ecosystem. The project has addressed this by:

- determining the flow requirements of streams and terminal wetlands on the lower Gwydir floodplain;
- developing recommendations for future flow management, monitoring indicators, and institutional arrangements for the lower Gwydir aquatic ecosystem; and
- providing managers of the *Gwydir Regulated River ECA* and other river flows into floodplain terminal wetlands with a model to guide the effective management of flows to maximise environmental outcomes.

The project has been successful from both scientific and extension perspectives in achieving its desired outcomes. Two field sampling seasons have been completed, preliminary models developed and the extension of research findings to key stakeholders undertaken. Throughout the course of the project, the NSW Minister for Natural Resources appointed Glenn Wilson as an Independent Scientist on the Gwydir ECA Operations Advisory Committee. Discussions are now being held with representatives from relevant NSW Government agencies to develop a decision support tool kit that incorporates the scientific findings and models from this project.

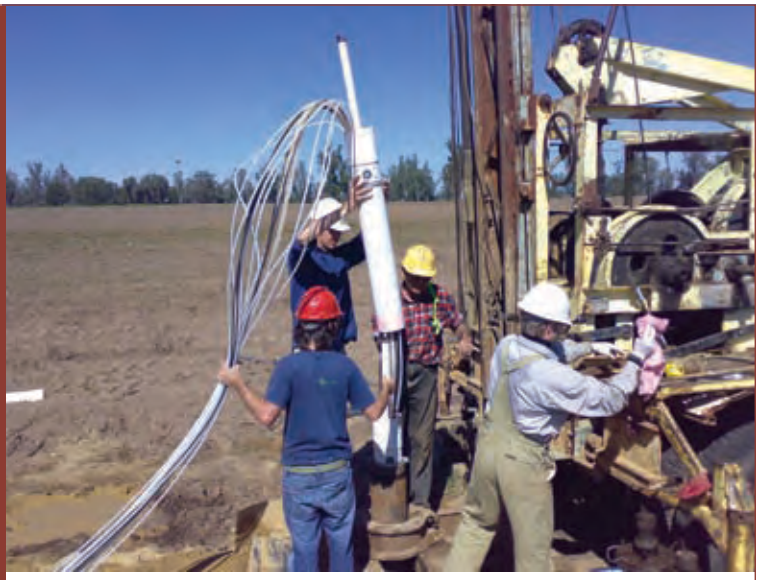
THE DYNAMICS AND CONNECTIVITY OF GROUNDWATER SYSTEMS

In this sub-program, the Cotton CRC aims to benchmark current groundwater conditions in a number of cotton catchments and to improve the reliability of aquifer recharge modelling by at least ten per cent. This is a large undertaking but we now have nine projects in place, including a new PhD project, to deliver on this goal.

Research activities in this sub-program focus on:

- The establishment of groundwater health and biodiversity indicators;

UNSW Connected Waters Initiative team



The University of NSW Connected Waters Initiative team installing a multi-level chemical sampler that will be used to detect the movement of river water into the aquifer.

- Benchmarking the current knowledge and condition of defined groundwater systems; and
- Coupling and refining existing surface and groundwater models to improve sustainable yield estimates.

The majority of research projects are being undertaken in the Namoi catchment and involve collaboration with a range of stakeholders, including the Namoi CMA, CRDC, the NSW Department of Water and Energy and various research institutions, including the University of NSW, The University of Sydney, the Australian National University and the University of Technology, Sydney.

Professor Ian Acworth, Associate Professor Bryce Kelly and their team at the University of NSW are undertaking one of the largest projects within this sub-program. Their project, 'Development of 3D Geological Mapping and Database Interface to Support Interconnected Groundwater and Surface Water Management', is funded through the Namoi CMA, National Water Commission and Cotton CRC. It also includes collaboration with farmers and the NSW Department of Water and Energy. The project aims to better characterise the flow of water through a catchment and to develop an integrated method for the investigation of surface and groundwater connectivity.

Since the project commenced in early 2007, instrumentation has been installed in the study catchment (Maules Creek in the Lower Namoi), field sampling trips undertaken, field days for growers held and numerous scientific and extension articles produced. Discussions have been held with end users, most notably growers and representatives from the Namoi CMA and NSW Department of Water and Energy, regarding how this work might be used as part of their future decision-making processes.

The PhD project that commenced this year is being undertaken by Sarah Bennett at The University of Sydney. Sarah's project, 'Developing stochastic deep drainage surfaces for the Cox's Creek catchment', is an integral component in the overall groundwater research focus being undertaken in the Cox's Creek catchment. This study, in conjunction with three other Cotton CRC groundwater projects involving the University of Technology Sydney, the Australian National University and the University of NSW, is working towards an improved understanding of surface water and groundwater interactions in the region.

Groundwater & surface water management

A V-notch weir in use as part of groundwater and surface water management research by Professor Ian Acworth, Associate Professor Bryce Kelly and their team at the University of NSW. A data logger and level sensor record the water level behind the 'V' and the data collected can be directly converted to a discharge.

MANAGING ON-FARM WATER STORAGES FOR IRRIGATION AND ENVIRONMENTAL PURPOSES

The management and maintenance of water quality on cotton farms is an important issue: with improved on-farm water quality comes improved production and environmental benefits. By 2012, the Cotton CRC aims to establish baselines for on-farm water quality and develop remediation processes with the capacity to deliver both farm and catchment benefits.

The Cotton CRC currently has six research projects in this sub-program, which focus on:

- The development of guidelines and technical resources for assessing on-farm water quality options for remediation;
- Establishing the commercial feasibility of applying bioremediation enzymes for use on cotton farms;
- Managing water levels and aquatic biodiversity in storages; and

- The development of practical risk assessment techniques, including assessing the use of GIS to reinforce risk assessment and the management of environmental data.

Several of these projects are nearing completion, including that being undertaken by Professor Ivan Kennedy and his team at The University of Sydney, 'Advancing environmental values in cotton catchments using risk assessment: practical methods of remediation including on-farm wetlands'.

A PhD project examining aquatic biodiversity and the ecological value of ring-tank water storages on cotton farms, being undertaken by Susan Lutton from Griffith University, is also nearing completion. Susan's research is discovering some interesting differences in the aquatic biodiversity of water storages compared to natural wetlands, in terms of both species composition and numbers. In the last twelve months, Susan has also been presenting her research findings through a range of media, including a national conference, industry publications and academic journals.

This year also saw Mitchell Burns from The University of Sydney begin a PhD project examining practical risk assessment for agrochemicals at the catchment scale. Mitchell's research will develop hydrological and chemical fugacity computer models to relate agrochemical distribution in surface waters with chemical and physical properties of pesticides, hydrological behaviour of catchments and the extent of agrochemical use as a means of predicting their fate and impact in the environment.

MANAGING BIODIVERSITY AND ECOSYSTEM SERVICES ON FARMS

This sub-program aims to develop best practice techniques and guidelines to enable industry and catchment bodies to better assess, manage and monitor biodiversity and ecosystem services in cotton catchments. Currently, there are a total of eight research projects, which are working to achieve this aim by focusing their research activities on better understanding:

- the ecological and economic benefits and costs of alternative catchment and farm scale investment options in natural resource management;
- how the presence of key biological control agents and suppression of pests are influenced by the pattern and condition of patches of vegetation in cotton catchments;
- how management actions affect vegetation condition and its provision of ecosystem services;
- the contribution that native vegetation communities make to growing populations of key beneficial insects: how the spatial arrangement of source habitats of pests and natural enemies affects their colonisation dynamics at the landscape scale and the potential for natural pest regulation.

All of the projects in this sub-program involve collaborations between the Cotton CRC, various catchment bodies, state and federal government agencies, research institutions and growers. They are also geographically spread from the Darling Downs region in Queensland to the Macquarie in NSW.

This year has seen the commencement of two new PhD projects: the first, being undertaken

Biodiversity Canendar

2008 'Biodiversity in Cotton Landscapes: Maintaining our natural workforce' calendar

The calendar was a joint initiative between Namoi CMA, Greening Australia, the Australian Government through the Sustainable Industries Initiative Program and the Cotton CRC. The calendar used emerging research and case studies to provide practical advice on how to manage and monitor biodiversity within productive cotton landscapes and was a huge success across the industry.

THE CATCHMENT

by Oliver Robertson through the University of Queensland and entitled 'Healthy cotton catchments: integrating biodiversity, ecosystem services and landscape pattern for sustainable production', contributes significantly to the larger project being led by Dr Alan House (CSIRO). The latter project is examining how cotton farms can preserve biodiversity, including insects, birds and bats, by managing patches of native vegetation.

The second new PhD project is being undertaken by Megan Goode through The University of New England. Megan's project, 'Managing Invasive Native Scrub in the Endangered Ecological Community of Coolibah-Black Box Woodland of the Northern Riverine Plains in the Darling Riverine Plains and Brigalow Belt South Bioregions', aims to improve the understanding of the ecological processes in the Coolibah-Black Box EEC, as well as develop and demonstrate guidelines for long-term sustainable invasive native scrub and grazing management in these woodlands.

This year also saw Francis Karanja from The University of New England submit his PhD thesis for examination. Francis' thesis focused on:

- determining the ecological and economic benefits and costs of alternative catchment and farm scale investment options in natural resource management;
- evaluating the impact of catchment and sub-catchment scale investment options for the Border-Rivers-Gwydir Catchment Management Authority in terms of mitigating dryland salinity, meeting biodiversity catchment targets, and effects on quantity and quality of river flows and carbon sequestration; and
- assessing the benefits to growers and the Border Rivers Gwydir CMA of alternative farm decisions in relation to vegetation and crop management and re-vegetation at farm and area-wide scales.

Managing invasive native scrub

Megan Good conducts vegetation surveys in a dense coolibah stand on 'Gleneden' property near Wee Waa as part of her PhD research 'Managing Invasive Native Scrub in the Endangered Ecological Community of Coolibah-Black Box Woodland of the Northern Riverine Plains in the Darling Riverine Plains and Brigalow Belt South Bioregions'

His work has made an important contribution to this sub-program, especially in terms of being able to place an economic value on ecosystems services and providing catchment managers with a decision support tool to assist with the prioritisation and allocation of resources to achieve natural resource management (NRM) outcomes.

Finally, 2007–08 saw the Cotton CRC conduct a review of the ecosystem services research that it currently supports. The purpose of the review was to bring together researchers in this field and discuss the science in greater detail. All current ecosystem services researchers, as well as Cotton CRC extension staff and several external reviewers, including Professor Steve Wratten from Lincoln University, New Zealand, attended the review. It went extremely well and key recommendations from the day included broadening the scope of this review for next year and inviting researchers working in other Cotton CRC program areas to participate, as well as looking to involve the Cotton CRC's Economist in projects so that the economic benefits of ecosystem services can be quantified.

INTEGRATED FARM AND CATCHMENT MANAGEMENT RESOURCES

The aim of this sub-program is to develop a set of farm and catchment information resources and tools that are consistent with good science, best practice, practical adoption and catchment goals. To achieve this, the Cotton CRC is working with industry, catchment bodies and researchers to develop and implement a number of projects. A total of four projects sit within this sub-program and there are significant overlaps with, and operations support from, other extension projects within the Adoption program.

This year has seen the completion of a PhD project by Lisa Yu-Ting Lee at The University of Sydney. Lisa's research, 'Efficient water allocation in a heterogeneous catchment setting', aimed to establish a method for evaluating the economic and environmental outcomes of environmentally oriented policies that affect irrigated industries in a catchment. Her focus in this instance was on the economic and environmental outcomes of various water policies in the Mooki Basin in the Namoi catchment.

Another highlight this year has been the successful implementation of the on-ground incentive project being undertaken with the Namoi CMA. Through this partnership the Namoi CMA and Cotton CRC are working with cotton growers in the Namoi to increase the adoption of current best on-ground NRM practices. Specific on-ground targets are:

- 365 hectares of native vegetation conserved;
- 33 hectares of native vegetation revegetated;
- six in-stream structures built to improve riparian health;
- 10 kilometres (one side) of riparian area revegetated;
- 40 kilometres (one side) of riparian vegetation conserved;
- 1020 hectares of irrigated land sustainably farmed, including improved water use efficiency and reduced deep drainage.

Stacey Spanswick and Jane Macfarlane have led the implementation of the project and have successfully negotiated over 20 separate projects with Namoi cotton growers to achieve these targets. Virtually all of the on-ground targets have been reached, with many now exceeded.

Finally, the past year has seen researchers within the Catchment Program actively publish and communicate their research findings through a range of media, including the publication of a book, journal articles, conference presentations and industry extension publications and events.

Some highlights include the release of the book *Rational Environmental Management of Agrochemicals: Risk Assessment, Monitoring and Remedial Action* by Professor Ivan Kennedy and his team at The University of Sydney in October 2007, presentations by researchers at the Water Down Under conference in Adelaide (April 2008), the Ecological Society of Australia conference in Perth (November 2007), the Australia New Zealand Biocontrol Conference in Sydney (February 2008) and regular articles in industry magazines, including CRDC's 'Spotlight' Magazine and 'The Australian Landcare Magazine'.

For **The Catchment** ***Outputs and Milestones, see page 76.***

THE COMMUNITY

Program Leader

Dr Paula Jones *Cotton CRC*


Paula Jones

he Cotton Catchment Communities CRC Community Program aims to enable mutually beneficial interactions between industry and regional communities. This is being achieved by undertaking research in three key fields, including documenting the cotton industry's contribution to the economic and social fabric of cotton growing regions, identifying opportunities for, and implementing strategies which enhance, the flexibility and resilience of these cotton communities, and identifying ways that community and industry can collectively contribute to natural resource management issues.

The Communities Program and the wider cotton industry face the challenge of understanding the impact of the industry from a community, regional and national perspective. This area of research has not been a focus of previous CRCs, so industry research capacity and understanding is limited. The introduction of the Communities program into this third Cotton CRC is beginning to address that limited capacity through close collaborative work that harnesses the knowledge of outside experts, incorporates the experience of industry and considers the requirements of the end users to ensure effective outcomes. As with all collaborative exercises, this is a time consuming and challenging but worthwhile process that will result in greater capacity, understanding and mutually beneficial interactions.

The last twelve months have seen the establishment of several new projects, including a project entitled 'The Socio-economic Impact of the Australian Cotton Industry on Regional Communities in NSW and Queensland', undertaken by the Centre for Agricultural and Regional Economics (CARE) and Judith Stubbs and Associates, which has been examining communities such as Narromine, Warren, Narrabri, Moree and the Darling Downs. The project consists of two components: the first is to develop a framework and set of social, economic and environmental indicators to aid in understanding how 'cotton communities' are performing against relevant state and national benchmarks and the second is to examine the economic structure of cotton regions and the economic impact of the cotton industry on these communities.

The project is nearing completion and already there are some interesting findings:

- The impacts of the drought, coupled with the energy and mining boom, on these communities have included a loss of agriculture-related jobs, with people moving away to seek employment in the energy and mining sector.
- Economic diversity appears to be a key indicator of community wellbeing and robustness.
- There appears to be a difference in the health and wellbeing of the cotton communities across the state line: the NSW areas appear to be experiencing a reduced level of wellbeing across many indicators compared to the Queensland areas. Indicators where these differences are most apparent include higher unemployment rates in NSW, higher labour force participation rates for youth and indigenous

The impact of drought on a rural economy

The Wee Waa drought study

This study revealed that the gross turnover of small businesses has fallen from $116 million six years ago to $56 million in the last financial year. As in many rural communities, 95 per cent of local businesses in Wee Waa said they rely on a healthy agricultural and cotton industry.

The drop in local business turnover has had significant impacts on the wider community, leading to job losses of both permanent and casual positions. As a result, two thirds of these employees, along with their families, have left the region, contributing to a 21 per cent decline in student enrolments at local schools.

To combat the reduction in income, business are looking at ways to improve cash flow by reducing expenditure and stock, maintaining good communication with their bank and, where possible, looking at opportunities to diversify their businesses.

Of the business surveyed, 80 per cent said they would return to pre-drought staffing levels once the drought broke.

people in the Queensland areas and population projections which show gradual increases for the Queensland areas and continued decline in the NSW communities.

For communities such as Narrabri, the cotton industry is an important and integral part of the economy. It contributes most through cotton growing (about 17 per cent), but the community has also captured significant benefits from a substantial role in cotton research and development.

In other communities such as Dalby, which has significant diversity of industry and a selection of growth industries, including the mining and energy industry, the cotton industry only contributes around five per cent to the region.

The research group intends to return to these communities and discuss with key stakeholders the implications of these research findings and how they can be integrated into community strategic planning processes.

Another highlight this year has been the completion and release of a study investigating the impact of the current drought on the community and businesses of Wee Waa. The study was developed following discussions with Narrabri Shire Council and the Wee Waa Chamber of Commerce, with both organisations highly supportive of the project. Stacey Spanswick led the project and surveyed over 30 local Wee Waa businesses, local schools and health organisations. The findings were that the continuing drought has had a significant impact on the community of Wee Waa. The study also drew to the attention of the broader community the continuing socio-economic impacts of the drought on rural communities through the significant local and national media attention it received.

This year also saw the School-Based Traineeships project begin, with five students from Wee Waa and Narrabri High School participating. Four of the five trainees (Bronwyn Scott, Rusty Mussett, Beau Quirk and Amber Baker) are based at the Australian Cotton Research Institute and work with staff from NSW DPI, CSIRO and the Cotton CRC. The fifth trainee (Chloe Pokarier-Baker) is working at the Cotton Research and Development Corporation in Narrabri.

The traineeship project is being undertaken in conjunction with the Aboriginal Employment Strategy, CRDC and the Namoi CMA. It aims to foster greater involvement in the cotton industry by the indigenous community, as well as to provide students with the necessary employment skills and training to enable them to continue work in these rural communities and the industry.

Web pages on the Cotton CRC website have been dedicated to

THE COMMUNITY

the School-Based Traineeship project and trainee, Beau Quirk, is currently developing student profiles for inclusion on the Cotton CRC's Communities web pages. The participating students will use these to regularly post updates about their work experiences, as well as to promote the project to the industry and wider community.

Donna Moodie, through her PhD project at the University of Queensland, 'Inclusive engagement and development: an indigenous perspective of community, business and sustainable development', is also actively extending her research and has recently been requested to provide advice to Greening Australia on protocols for indigenous engagement for their national Veg Futures 08 Conference in Toowoomba. Donna will be presenting a paper on her research, as well as developing an activity for conference participants to engage with indigenous issues.

Another project established this year is the 'Young Professionals Network', developed by the Cotton CRC following findings from the socio-economic study by CARE.

School-Based Traineeships upgrading skills

School-Based Traineeship participant, Beau Quirk, updates the Cotton CRC website with profiles of the trainees taking part in the project

The study found that in many cotton communities there has been a major loss of young people, especially in the 20 to 40 age bracket. Many young people leave these communities to gain further education and work opportunities, meaning that attracting and retaining young professional staff has become an issue for many businesses in these rural communities.

The 'Young Professionals Network' brings together young people (early 20s to late 30s) in the community to develop and expand their professional and social network. The project is built on the premise that when young professional people are actively engaged in the community and have well established networks, they are more likely to remain in, and contribute to, the community. The project is being trialled in Narrabri and Wee Waa and there have been four events held since its inception in April 2008. The initial response has been overwhelming, with up to 70 people attending each of these events and very positive feedback from participants. It is planned to expand this project to other cotton communities in the future.

Finally, a new project, 'Innovative regional businesses and options for economic growth in cotton

Regional Young Professionals

The first Young Professionals 'meet and greet' held at The Cafe, Narrabri, with over 60 attendees.

communities', is just commencing through The University of New England. This project will largely address the Cotton CRC milestone, 'Identify innovative regional businesses and options for economic growth in cotton communities' but will also contribute to milestones under 'Document the past impact of changing agricultural technologies, emerging industries and drought on employment patterns in cotton communities'. It aims to document major environmental and social changes in cotton communities and to ascertain the extent to which these changes are understood by community leaders and business owners and considered in their decisions and strategies. The four project objectives are to:

- document major environmental changes in cotton communities and assess their interactions, relative impact, and complexity over time;
- assess the extent of understanding and response to these changes at the community level and the factors hindering effective response;
- determine the environmental changes perceived by small and medium business managers in cotton communities as having the most impact on their businesses, the strategies employed to overcome these changes, and outcomes in terms of business growth; and
- develop scenarios of the short, medium, and long-term impact of the changes on each cotton community investigated, distil effective change management strategies and policy actions, and discuss with community leaders.

Collectively, the projects mentioned here, and the existing suite of projects, contribute significantly to achieving the outcomes of the Communities Program. In addition, a number of projects are under development and expected to start in the coming months, to ensure that sufficient activities are in place to deliver against all of the program milestones, outputs and outcomes.

For* The Community *Outputs and Milestones, see page 80

THE PRODUCT

Program Leader

Dallas Gibb


Dallas Gibb

Crop yield and fibre quality are the two key factors that drive grower returns. The Product Program has a specific focus on fibre quality, and value adding technologies and practices. The program's primary aim is to ensure that growers have the capacity to produce cotton of the highest quality and that these quality attributes are preserved across the value chain. This is being achieved by undertaking research in five key sub-programs: Fibre quality and agronomic factors, harvesting and ginning process, marketing initiatives, reducing contamination and value adding.

Why focus on quality?

Australian cotton is already amongst the world's best with regard to quality but a number of challenges remain that could have significant impact on Australia's competitiveness.

From a processing perspective, all Australian cotton is exported as raw lint. The initial consumers of Australian cotton are the international spinning mills and fibre quality is a key aspect affecting spinning efficiency. As a result, mills are seeking to source quality cotton at the lowest price. Over the last five years a number of countries have improved the quality of cotton they produce, which has placed significant pressure on the price offered for Australian cotton. For Australia to maintain a premium in the market place it is paramount that we better understand the advantages that Australian cotton can offer mills and other enterprises across the value chain.

In response to this challenge the Cotton CRC, together with its industry partners, is seeking to establish stronger collaborative links with a number of international mills and garment producers. In establishing such partnerships the Cotton CRC has the objective of developing novel fibre assessment technology that may allow new classification parameters to be established, thereby allowing merchants the possibility of differentiating Australian cotton in the market place.

The Cotton CRC activities are also focused on cotton production and initial processing methods (that is, ginning) that enhance the cotton quality. Overall, through a focus on fibre quality, Cotton CRC outcomes will strengthen Australia's competitive advantage and improve the level of premiums achieved by growers.

FIBRE QUALITY AND AGRONOMIC ASSESSMENT

The most notable fibre properties for which cotton is marketed are length, strength and micronaire; however, for those spinners who specialise in developing premium fabric, fibre fineness and maturity are also key fibre properties. Together with fibre length, these two properties can be used to determine blending ratios for the different cotton types that make the final yarn and fabric.

Currently there are no commercially available instruments that measure fibre fineness and maturity directly. The novel instrument, SIROMAT, which directly measures fibre maturity and indirectly provides an improved assessment of fibre fineness compared to current techniques used by merchants

and mills, has been developed within this program. Development of SIROMAT was completed in 2007–08 by CSIRO Materials Science and Engineering.

This technology has shown that better predictions of yarn properties can be made. Strong correlation has been established between maturity as measured by SIROMAT and fabric dye uptake. The Cotton CRC is now planning to work with individual international spinners to assess the commercial benefits offered from the technology and will also seek commercial partners for development of the technology.

Improved agronomic management for fibre quality

Agronomic factors obviously will have a significant impact on fibre quality. The Cotton CRC has a major project, linking CSIRO Plant Industry at Narrabri and CSIRO Materials Science and Engineering (CMSE) at Geelong, which is examining the influence of on-farm agronomy on fibre quality. Factors such as variety, planting configuration, irrigation and defoliation scheduling are being investigated. This work will maximise the value of recent high-quality Australian varieties in keeping Australian cotton at the forefront of quality world growths.

Key outcomes for 2007–08 included the development of a new miniature spinning protocol, which was successfully established to allow small-scale assessment of spinning efficiency and consequent yarn properties.

Field trials have successfully assessed the impact of harvest aid timing on fibre quality and textile performance. While yield was significantly affected for early (that is, with bolls less than 60 per cent open), defoliation treatments, micronaire and linear density were significantly less for treatments applied to bolls up to 42 per cent open.

HARVESTING AND GINNING PROCESSES

Two key fibre factors that reduce spinning efficiency and the quality of fabric that mills produce are neps (tangled fibres) and short fibre content (SFC). These two parameters, while influenced by fibre length and maturity, develop primarily through the mechanical harvesting and ginning of cotton.

Three projects have been established to research ginning technology. These focus on lint cleaning, ginning techniques and moisture management throughout the ginning operation. The cotton needs to be monitored constantly so that damage to the fibres can be avoided and research continues on the development of improved methods for assessing cotton throughout the ginning process. The Cotton CRC is also reviewing current technology for the assessment of neps and short fibre content.

Key outcomes for 2007–08 included the development of a new ginning point that can be fitted easily to the gin saw. The insert has been shown to improve lint removal and may provide improvements in gin productivity. Work in this area will be the central focus of a new Cotton CRC ginning project starting later in 2008.

A prototype capacitance moisture sensor has also been built and tested in a controlled lab study and an industrial scale sensor will be built and fitted to a commercial gin in 2008.

MARKETING INITIATIVES

International surveys conducted throughout 2007 showed the importance of marketing cotton under objective measurement. While Australian cotton is already marketed by objective assessment, the Cotton CRC continues a project to standardise classing methods using High Volume Instrumentation techniques and to ensure consistency in the application of these methods across different laboratories in Australia.

The opportunity to develop a new premium cotton class through use of new technologies such as SIROMAT will need to be matched with the adoption of appropriate quality assurance programs across

Loading containers

CONTAMINATION IN AUSTRALIAN COTTON IMPROVING

... but we must remain vigilant!

Contamination – even if it is a single foreign fibre – can lead to the downgrading of yarn, fabric or garments, or even the total rejection of an entire batch. Contamination represents a significant cost to spinning mills and this has led them to implement methods to cope with contamination. In order to eradicate contamination in Australian cotton, a comprehensive survey was carried out to obtain accurate and thorough information on:

- The degree and type of contamination found in cotton delivered in modules to the gin yards.
- The degree and type of contaminants found in bales delivered to the spinning mills.

Contaminants in modules

The survey found that the majority of contaminants in modules were metallic pieces from harvesters, module builders and from transportation of modules to the gins. This is followed by module ropes and covers and a category 'other', which included items such as mobile phones and rubber mats.

Contaminants in bales

With the assistance of a cotton mill, Apac Inti, situated in Indonesia where contaminants are manually removed from every bale of cotton before processing, we have been able to quantify the level of contamination in Australian cotton. The data shows that in 2006–07, contamination found in Australian cotton was measured at 0.6 grams/ton: the lowest of all world growths. The data also reveals that contaminants found in Australian cotton's major competitors such as Brazil, West Africa and some growths from the US have also decreased over the same period.

Table Contaminants by country of origin in grams per tonne found in bales shipped to Apac Inti

Country	1999–2000	2004–2005	2006–2007
Australia	1.4	1.9	0.6
China	2.2	3.0	*
Brazil	3.2	2.7	2.4
United States#	2.8	2.0	1.4
Uzbekistan	*	9.1	2.4
West Africa	3.7	7.0	2.5

Average of various locations
* No information available

Contaminants found in cotton

The major contaminant found in bales delivered were yarn made from cotton, polyester or blends thereof. This was followed, in order of frequency, by:

- pieces of cloth from either rags or clothing made from cotton or polyester;
- polypropylene yarns and plastics from sources such as shopping bags, lolly papers;
- bird feathers, jute and hessian yarn, human hair, paper and metallic pieces such as nuts, bolts and wire.

There is no doubt that the continued and increasing presence of foreign matter in raw cotton is a serious issue for textile processors. It is pleasing to note that the amount of foreign matter found in Australian cotton bales continues to be small relative to cotton from other countries but the challenge for the Australian cotton industry is to provide cotton with zero contamination. In response to this challenge, the Australian ginning sector is implementing Best Management Practices (BMP) and the industry is currently investigating the possibility of integrating decontamination systems into the gin. These measures will reduce and possibly eliminate the occurrence of foreign matter in modules delivered to the gin yard and, subsequently, the bales delivered to the spinner.

the value chain. The Cotton CRC is developing Best Management Practices (BMP) for crop production and fibre quality. These guidelines will be aligned with other BMP guidelines being developed by industry partners for ginning, storage and handing of cotton.

REDUCING CONTAMINATION

Australian cotton has an enviable reputation for freedom from contaminants originating from the field and gin; however, vigilance is required to maintain this reputation. A project monitoring the frequency and types of contaminants found in our cotton is being undertaken in collaboration with Australian gins and an Indonesian spinning mill, Apac Inti. Additionally a new project has also been established to develop new technology for the assessment of contamination during the ginning process.

VALUE ADDING

The value adding component of the Product Program has focused on the development of aquaculture techniques for farm water storages. Progress has been restricted, because many storages have been empty due to water shortages. The Cotton CRC's primary project in aquaculture is assessing the merits of silver perch cultivation in cotton farm water storages. During 2007–08, this project has successfully developed a new fish cage design and assessed appropriate stocking densities, diet requirements, disease management and overall production strategies. A production manual will be developed during 2008. A new project is also being developed to seek commercial partner interest in conducting large-scale trials on cotton farms.

For* The Product *Outputs and Milestones, see page 85.

Loading containers

Cotton CRC and University of New England PhD student, David Foley, is currently researching how to boost silver perch availability and lower production costs by using cage culture combined with the water resources currently available in cotton and other irrigation industries

THE ADOPTION

Program Leader

Extension and Knowledge

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Cotton CRC

Sub-Program Leaders

Regional Extension

Julie O'Halloran
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Mark Hickman
Queensland Department of Primary Industries and Fisheries


Letitia Cross

his program increases adoption of emerging scientifically-based information and knowledge in order to enhance the decision-making capabilities of people working in or with the cotton industry, its catchments and communities. The program delivers this through a combination of extension services, education pathways (including schools, vocational and tertiary), information products, electronic tools and utilising communication channels.

The Cotton CRC third year of operation has been an exciting time for the Adoption Program, with some of the initial projects coming to an end, the extension network rebuilt and the successful education component expanded. Over the last year, a key focus has been on an integrated approach to delivering knowledge and utilising multiple mediums for key messages to meet the needs of the relevant audiences and their learning styles.

The Australian cotton industry continues to have a comprehensive National Cotton Extension Team (NCET) in place, with a solid foundation of Regional Extension Officers across the major cotton growing valleys. Technical specialists in the areas of water management, resource management, soil health and BMP support these positions. The NCET delivers emerging research to the whole of industry through the National Priority Areas of Insects and Weeds, Water, Soils and Disease, Nutrition and Fibre Quality. Theses national priorities are aligned with the research directions set by the Cotton CRC, CRDC and ACGRA.

Some outcomes delivered in the national priority areas include:

INSECTS AND WEEDS

Pale Cotton Stainers

In January 2008, Pale Cotton Stainers were identified across the industry as an emerging pest problem in Bollgard II® cotton. The NCET coordinated a working group, including entomologists Dr Lewis Wilson and Dr Moazzem Khan, to compile available information in conjunction with data collection and validation, to be able to recommend


Pale Cotton Stainer

control thresholds for consultants. This was supplemented in February 2008 by the distribution throughout the industry of an associated information sheet and Dr Lewis Wilson provided presentations at relevant field days. Evaluation of this activity by consultants has been very positive and identified that it was 'high value, high quality and very timely', which has allowed the industry to minimise the use of pesticides as part of an integrated pest management for insects.

Other extension activities that supported integrated pest management throughout the cotton industry included:

- An integrated response to the Tobacco Streak Virus (TSV) incursion, identified in cotton in Emerald. The extension team worked with industry bodies and researchers to put in place timely industry information, which was extended locally and via the Cotton CRC website;
- A modified IPM short course, delivered to nine participants in southern NSW to meet the needs of an expanding regional cotton industry;
- Development of the online Pest and Beneficials Guide and establishment of an online Weeds guide;
- 'Come Clean Go Clean' information package redeveloped for Central Queensland then distributed to growers and consultants; and
- An Aphid Management Resource drafted in cooperation with researchers for publication and insertion in the 2008–09 Cotton Pest Management Guide.

WATER USE EFFICIENCY

Cotton and Grains Irrigation Workshop Series

Eight vocationally aligned workshops were developed in cooperation with the Cotton

Cotton and Grains Irrigated Workshop Series (CGIWS)	Number of Workshops	Number of Participants
Irrigation Benchmarking and Water Budgeting	9	94
Scheduling I	5	38
Pumps	2	17
Surface Irrigation Performance	3	24
Total CGIWS workshops and participants	19	173

Extension planning workshop

National and Regional Extension teams plan for the coming season at their annual extension workshop in Toowoomba

THE ADOPTION

CRC, NSW Department of Primary Industries,Queensland Department of Primary Industries and Fisheries, National Program for Sustainable Irrigation, CRC for Irrigation Futures, CRDC and GRDC, targeted at improving the management skills of cotton and grains irrigators and advisors. The workshops are delivered on-farm and provide practical training for growers and consultants. The new skills and qualifications are mapped to the Cotton BMP Land and Water Management Module and can be used directly to provide evidence for BMP certification. In the 2007–08 season, 19 workshops were delivered across the industry, with 173 participants *(See the table on the previous page)*.

Evaluations have shown these workshops to be an effective method of building the capacity of the irrigated cotton and grains sector in order to facilitate best management practices. On completion of activities, participants showed greater understanding of the key learning outcomes and approach to application of water effectively. Across all workshops, 75 per cent of growers increased their understanding from poor/medium to medium/high in the topic area.

Additionally, the change in management practices undertaken as a result of attendance at these days ranged from closer monitoring and recording of pumps, flow rates etcetera to changes in siphon sizes and run times, through to infrastructure such as laser levelling and shortening run lengths.

Benchmarking Water Use Efficiency (WATERtrack RAPID)

Understanding by an irrigation enterprise of how it is performing compared to its region or industry (that is, benchmarking), facilitates continuous improvement in management and water use. To harness the effect of this benchmarking, the water team undertook assessments using the WATERtrack RAPID program across 42 irrigated cotton farms from Hillston to Emerald. This showed that water losses on farm ranged from minus1.43 to plus 4.71 megalitres per green hectare, with an average loss (from the 30 farms with positive losses only) of around 1.53 megalitres per green hectare. Therefore, on average, the farms were able to utilise around 85 per cent of their water through the plant productively, with the average Gross Production Water Use Index (GPWUI) being 1.13 bales per megalitre.

Other extension activities that supported improved water use efficiency in the cotton industry included:

- delivery of the Centre Pivot Lateral Move (CPLM) Systems National Training Package, in conjunction with the CRC for Irrigation Futures, to 121 participants in six locations, with 100 per cent of participants rating the course useful to very useful;
- continued trial and demonstration work in furrow irrigation across the whole of industry,

Pumps worshop

Pumps workshop held in Walgett

including the demonstration of surface irrigation performance evaluations, storage meters, seepage and evaporation meters in at least one site per cotton valley;

- the provision of technical assistance to the Border River-Gwydir CMA in assessing approximately 60 Water Use Efficiency incentive applications. 56 applicants secured funding for a variety of on-farm WUE activities such as purchase and telemetry upgrade of c-probes, storage surveys, field and storage EM surveys and on-ground works including storage deepening or reconfiguration, supply and tail water system upgrades; and
- assisted training on water quality and river health for an indigenous TAFE class in Moree completing their Certificate III in Conservation in Land Management.

PLANTS AND SOILS

Healthy Soils Symposium

Following on from the success of the National Healthy Soil Symposium previously undertaken in the cotton industry, three Healthy Soils Regional Forums were held in the key cotton growing regions of Narrabri, Goondiwindi and Hillston in November 2007.

The forums were an excellent opportunity for farmers, agronomists and catchment bodies to interact with a range of expert speakers from the NSW Department of Primary Industries, Queensland Department of Primary Industries (NSW DPI) and Fisheries, CSIRO, The University of Sydney, Queensland University of Technology, Nutrient Management Systems and Precision Cropping Technology, to talk about the benefits of healthy soils and provide advice on management options for profitable and sustainable cotton and grain farming systems. In total, 167 people attended the three events, with solid representation from the targeted agribusiness sector.

Other extension activities that supported improved management of plants and soils in cotton industry were:

- A series of twelve soil health case studies, developed across the irrigated and dryland cropping systems, both regionally and topically. These are a compilation of accredited research and evidence from growers who have implemented a change to their farming system that has resulted in improved soil and environmental health.

Groundwater Workshops

Paul Keech (Narrabri Shire Council), Alan Redfern (cotton grower), Wendy Timms and Doug Anderson (Water Research Laboratory – workshop presenters), Rod Jackson (Irrigation Officer, NSW Department of Primary Industries), Rob Welsh (NSW Department of Primary Industries)

Seven workshops conducted in Narromine, Hillston, Gunnedah, Dalby, Goondiwindi, Moree and Narrabri increased understanding of groundwater systems among water users in cotton growing regions, as apart of the Sustainable Industries Initiative project through the Australian Government Department of Agriculture, Fisheries and Forestry. The 89 participants included growers (cotton, grains and lucerne) and consultants and extension officers, along with representatives from catchment bodies and local councils. The well received technical content of the workshops was delivered by the Water Research Laboratory, University of NSW.

This information and knowledge transfer was capitalised on through the associated production of six fact sheets covering aspects of biophysical features of aquifer recharge, storage and flow patterns, as well as surface connectivity, groundwater dependent ecosystems and resource management.

- Fifteen Healthy Soils Training Workshops, covering soil nutrition, understanding soil testing and property planning, were delivered across the industry. Over 74 per cent of attendees to the healthy soils workshops claimed they would change their farming practices as a result of the information they gained. Seventy five per cent of participants to the healthy soils workshops thought they would increase the profitability of their farming practices.
- Six demonstration sites have been established around two key areas: sodic soils (Warren and Hillston) and organic amendments (Hillston, Trangie, Dalby and Mungindi).

NUTRITION AND FIBRE QUALITY

Nitrogen Use Efficiency in Cotton and Irrigated Cereals

This was the focus of a collaborative seminar series centred on precision agriculture. The Cotton CRC, in partnership with NSW DPI, Grains Research and Development Corporation (GRDC), Namoi CMA and private organisations Belt-wide Agriculture and GPS Ag, delivered the seminar series to producers, with specific attention to utilising precision agriculture applications to improve nitrogen use efficiency (NUE). These well-attended seminars were delivered in the Gwydir, Macintyre, Upper Namoi, Lower Namoi and Emerald regions and contributed to industry adoption of recognised precision agriculture techniques on at least 50 per cent of the Australian crop and to improving the efficiency of applied nutrients by up 15 per cent, with comparable reductions in greenhouse gas emissions.

Nitrogen Use Efficiency Benchmarking

The current benchmark of nitrogen use efficiency across the Australian cotton industry is continuing through the regional NUE Trials, adding to data collected in 2006–07. Given that fertiliser costs are increasing and cotton prices are low, as well as pressure to minimise fertiliser losses to the environment, optimising nutrition programs and making better fertiliser decisions is a key priority for the Australian cotton industry. The data will indicate growers' attitudes to nutrient management and how they make their decisions, allowing for more targeted scientifically-based recommendations to address any emerging issues.

Other extension activities that supported improved plants and soils efficiency in cotton industry were:

- Continuation of the Central Queensland Cotton Farming Systems Trial, which will provide data that allows growers to adapt and improve their cotton production systems in Central Queensland;
- A series of production and physiology information sets have been developed and included in Cotton Tales, which is made available across the industry. These include topics such as 'Fibre Quality update on environment and agronomic impacts' (Michael Bange), 'Plant population and yield data' (Rose Roche and Michael Bange), 'Nutrient demand and high yielding crops' (Ian Rochester) and 'Nitrogen losses' (Peter Grace and Des McGarry).

OTHER OUTCOMES DELIVERED

Consultant mentoring to deliver best management practices in WUE

The focus of a collaborative sub-project within the Department of Agriculture, Fisheries and Forestry Sustainable Initiative project has been delivering increased adoption of best management practices in water use efficiency (WUE) to the cotton industry in the Condamine catchment. This project, a collaboration between the Cotton CRC, Condamine Alliance, DAFF and Cotton Australia, is providing training and incentive funding in WUE measures to groups of growers and consultants in the Condamine catchment. Ten consultants from five organisations, and 14 growers are engaged in this project. The participating consultants collectively have another 98 clients not involved in this project, which offers great post-project potential to gain further improvements in water use efficiency once they have incorporated irrigation services into their skill set. The 14 growers involved in this project are representative of the cotton irrigators within the Condamine Catchment, with groups at Colonsay, Norwin, Brookstead, Cecil Plains, Jondaryan and Dalby.

Training was provided as part of the project's mentoring process and all growers in the project are undertaking a pre-certification audit for the cotton industry BMP program. Additionally, an economist engaged in the project has undertaken an economic evaluation of the environmental and production benefits from a range of recommended practices changes, including changing to a

lateral irrigation system, improving a lateral system, changing siphon size in a surface system, amelioration of water storage, halving field length and changing field configuration. The economic evaluation showed that for those growers investing in such activities there would be a net positive return on their investment.

Certified BMP Farm Manager Award

In association with Tocal College, the National Training Coordinator secured the qualification of a Certified BMP Farm Manager Award through the recognition of prior learning and skills under the Vocational Training and Education system. This enables cotton growers, managers and farm workers who have been instrumental in introducing BMP to a BMP Certified cotton farm operation to have this effort formally recognised with a vocational qualification that is equivalent to a Diploma of Agriculture specialising in cotton production. The Certified BMP Farm Manager qualification presents a marketable asset, acknowledged and endorsed by the cotton industry.

Farmers attend workshops in Hillston

Cotton growers attend National Cotton Extension Team workshops at Hillston in southern NSW

RESEARCH COLLABORATIONS

The cooperative nature of the Cotton CRC ensures that most of its projects already reflect collaboration across a number of partnering and affiliate organisations.

NATIONAL COLLABORATION

The Cotton CRC has entered into a wide range of formal and informal collaborations during 2007–08. During the establishment of the Cotton CRC, the Board established a series of core values, including collaboration, consultation and communication. The Cotton CRC has a range of mechanisms in place to enable a positive communication process designed to maintain an active 'community of interest' among all partners.

All Cotton CRC projects involve collaboration with various combinations of researchers, end-users and other stakeholders: cotton industry bodies, small and medium enterprises, catchment management organisations and community stakeholders. Discipline groups operate to enable researchers and industry personnel to discuss the fine details of projects and opportunities. These groups cover topics such as water, soil, disease, nutrition, and crop protection issues.

- The Australian Cotton Growers Research Association (ACGRA) provides direction and contributes extensive networks to the Cotton CRC.
- The Cotton Research and Development Corporation is a significant investor of grower and Australian Government funds.
- Cotton Australia, Cotton Seed Distributors, Dunavant, Monsanto Australia, Incitec Pivot and the Australian Cotton Shippers Association add further industry input, commercialisation prospects and their own networks of people.
- CSIRO brings expertise and infrastructure through its Plant Industry, Entomology, Material Science and Engineering, and Sustainable Ecosystems divisions.
- State agriculture departments in NSW, Queensland and Western Australia play important roles in research and adoption, as do catchment bodies such as Namoi Catchment Management Authority (CMA), Condamine Alliance, Gwydir-Border Rivers CMA, Queensland Murray Darling Committee and Central West CMA.
- The Universities of Sydney, New England and Queensland are critical to the education activities.
- The University of NSW, University of Technology Sydney, University of Central Queensland, Australian National University, SunWater and Aquatech continue to contribute new skills in water management.
- The Cotton CRC is also working with community organisations such as Narromine, Warren, Narrabri, Millmerran and Inverell Shire Councils through the Communities Program.
- The newly established Student Traineeships Program is the direct result of collaboration between CRDC, Namoi CMA, Cotton CRC and the Aboriginal Employment Strategy.
- The development of the 2008 'Biodiversity in Cotton Landscapes' calendar saw the established of several new partnership throughout 2007–08 between the Cotton CRC, Namoi CMA, Greening Australia and the Australian Government Department of Agriculture Fisheries and Forestry.
- The Cotton CRC also supports WINCOTT, an organisation that aims to provide, information and resources to support women within the cotton industry. This support occurs through information days, general interest field days and opportunities for skill building within the cotton industry.

These collaborations add value to the Cotton CRC, as they ensure that Cotton CRC research is meeting the needs and priorities of the end-users. Throughout 2007–08, the Cotton CRC has strengthened collaboration with end-users. End-users are represented on the Board Advisory Panels and many project steering committees, as well as Regional Advisory Panels for extension members. Many of the challenges faced by the cotton industry are broad and involve a number of disciplines. In the year ahead, our aim is to further consolidate and integrate our projects and programs.

INTERNATIONAL COLLABORATIONS

The Cotton CRC provides a scientific exchange program to enable researchers to interact with their international peers. This program allows researchers to travel overseas and, alternatively, for international visitors to spend time in Australia.

Australia

Dr James Mahan, United States Department of Agriculture-Agricultural Research Service, USA, visited Narrabri to assist PhD student Warren Conaty to investigate 'Irrigation scheduling in cotton based on thermal leaf optima for improved water use efficiency'. The basis for this research is the BIOTIC (Biologically Identified Optimal Temperature Interactive Console) approach to irrigation scheduling developed by Dr Mahan, who works at the Plant Stress and Germplasm Development Unit (PSGD) in Lubbock, Texas.

Dr James Constantz, US Geological Survey, California, USA, shared his knowledge and techniques for using the temperature profile method to measure seepage and groundwater surface water interaction from rivers and channels with Cotton CRC researchers, as well as staff from NSW Government agencies.

Brazil

Dr Mary Whitehouse was an invited speaker at the Symposium on Agroecology of Spiders at the XVII International Congress of Arachnology.

USA

A number of Cotton CRC researchers attended the 4th World Cotton Research Conference, held in Lubbock, Texas, 10 to 14 September 2007. These researchers included Dr Lewis Wilson (CSIRO), who presented a paper on compensation in cotton following real and simulated mirid damage as part of a symposium on compensation. Others who attended were Graham Charles (NSW Department of Primary Industries), Nicola Cottee (The University of Sydney), Dr Gary Fitt (CSIRO), Geoff McIntyre (Queensland Department of Primary Industries and Fisheries) and cotton growers, Robyn and John Watson of Boggabri.

Cotton CRC researchers also presented papers at the Beltwide Cotton Conference held in Nashville, Tennessee, 8 to 13 January 2008. Dr Rose Roche presented a paper on 'Ultra Narrow Row (UNR) cotton in Australia'. Dr James Neilsen presented a paper on 'The effect of soil type on the response of cotton to water stress'. Dr Robert Long also presented a paper and visited a number of key cotton research establishments in the US, including the International Textile Centre in Lubbock, Texas, and the Southern Regional Research Centre in New Orleans, Louisiana.

Argentina

Hamish Millar, ACGRA, attended the 2nd International Federation of Agricultural Producers World Congress of Young Farmers.

Pakistan

Dr Paul Grundy (QDPI&F) and David Kelly (CSD) attended the Cotton leaf curl virus (CLCuV) study tour, 23 to 30 July 2007.

Visit by Dr James Mahan

Cotton CRC visitor, Dr James Mahan (centre), with Dr James Neilsen and PhD student, Warren Conaty. Dr Mahan assisted Warren with his irrigation scheduling research project

LINKAGES WITH OTHER CRCs

The Cotton CRC, the CRC for Irrigation Futures and the CRC for Polymers continued their joint project examining cost effective solutions for control of evaporation losses from irrigation storage dams. Possible solutions include floating covers, shade cloth and liquid monolayers.

The Cotton CRC and CRC for Irrigation Futures are jointly funding two PhD students: Warren Conaty of The University of Sydney is investigating 'Irrigation scheduling in cotton, based on leaf thermal optima' and Paul Coop of the University of New England is examining 'Optical sensors for monolayer detection'.

The Cotton CRC has just completed a joint project with the CRC for Irrigation Futures, CRDC, GRDC and the National Program for Sustainable Irrigation on Knowledge Management for irrigation in cotton and grains.

COMMERCIALISATION AND UTILISATION

STRATEGIES AND ACTIVITIES

The Cotton Catchment Communities CRC has a number of Commercialisation and Technology Transfer Systems well established to deliver outcomes to a diversity of end-users, including cotton farmers, cotton consultants, agribusiness, cotton shippers, international and domestic spinners, local and state governments and the Australian Government, community organisations, indigenous groups and catchment bodies. Quite often, as with many other agricultural and environmental CRCs, the pathways to adoption are not always commercial and the protection of IP is not always feasible nor desirable. Public good outcomes and the outcomes that benefit a large number of small to medium enterprises (such as cotton farms) are more effectively delivered through adoption channels such as communication, extension and education.

PATHWAYS TO ADOPTION

Adoption pathways within the Cotton CRC are multi-directional, utilising numerous communication channels and participative learning options to facilitate the uptake of emerging research. Extension, education, training, communication and knowledge management staff develop the knowledge emerging from science and practice management into integrated product suites that are tailored to meet the needs of the respective audiences. End-users are an integral part of this product development, often through trials, working groups and steering committees, which ensures greater grower ownership. This, in turn, leads to increased adoption levels and more targeted scientific outcomes for the industry.

LOCAL EXTENSION STAFF DELIVERING IN A NATIONAL FRAMEWORK

During the last year the Cotton CRC, CRDC, NSW Department of Primary Industries and Queensland Department of Primary Industries and Fisheries have undertaken a collaborative re-investment into extension services. The hallmark is regional service delivery, which brings together all extension services available in each region (supported by specialist extension staff) to deliver targeted information and knowledge. Ongoing consultation with a representative Regional Advisory Panel helps to set the local direction through annual planning of service delivery, thereby directly meeting each region's needs.

Regional delivery occurs within a wider 'whole of industry' knowledge delivery framework, pre-emptively extending emerging scientific knowledge in National Priority areas. Extension's National Priority Teams are aligned to the Cotton CRC's core Farm Program goals and the industry priorities established by ACGRA: Insects and Weeds; Water; Soils and Disease; Nutrition and Fibre Quality. Areas of natural resource management and the BMP Program aspects are integrated within these priorities to ensure they are a part of how the industry does business, rather than an additional process. This national pre-emptive approach enables the National Cotton Extension Team to deliver knowledge consistently to the whole industry.

PARTNERING PUBLIC AND PRIVATE SECTORS

The Cotton CRC engages a range of public and private sector organisations (see participants list) in the 'adoption type of commercialisation' of research. These broadly fall into two categories:

Decision-makers

Building the capacity or scientific basis on which government and catchment management bodies are basing investment and management decisions is a critical component of the adoption and commercialisation strategy. End-user organisations such as catchment management bodies, the NSW Department of Water and Energy and Queensland Department of Natural Resources and Water are actively involved in funding and delivery of a range of collaborative projects through steering committees, direct investment, working groups and extension activities.

Agribusiness and Consultants

Supporting and building the capacity of private sector consulting services is a key part of the Cotton CRC's adoption and commercialisation strategy. A large number of private consulting enterprises serve cotton and related industries and their peak representative body, Crop Consultants Australia Ltd (CCA, formerly Cotton Consultants Australia Ltd), with 300 members, is a partner in the Cotton CRC. The CCA has representation on a specialist end-user board advisory panel to ensure all members are aware of developments and that the development directions are appropriate to their needs. Additionally, specific members participate in a number of project steering committees, or directly in

the research being undertaken (for example, independent irrigation consultants), or as a targeted audience in a participative learning activity (for example, building capacity in irrigation services in the Condamine catchment). Engagement in this area allows the Cotton CRC to capitalise on its limited resources by building understanding in a smaller audience of advisors who, in turn, can facilitate the change on-ground with their numerous clients.

In adopting new technologies, end-users will often require individual advice or monitoring services from specialised independent consultants. Where these specialised skills are not readily available in cotton regions, the Cotton CRC works to encourage the demand for, and build the supply of, independent services. This includes raising awareness amongst end-users of new technologies, key issues and the value of making changes, which creates a viable consulting opportunity to attract skills to the regions to assist end-users to adopt proven technologies. This is one part of building the 'supply' side of knowledge services; the other is in building regional capacity through training. The Cotton CRC encourages consultants to attend its various science meetings and supplies speakers for CCA meetings. Completion of the Cotton CRC Cotton Production Course at The University of New England is common training for CCA members and their staff, and is recognised as one form of accreditation for membership of CCA.

BEST MANAGEMENT PRACTICES PROGRAM

Over the past decade, the cotton industry's environmental management system, the Best Management Practices (BMP) program has been highly successful and has positioned the Australian cotton industry well. Due to this success and a continuing need for such an industry program, the Cotton CRC, along with ACGRA, CRDC and Cotton Australia, has made a commitment to the future evolution of BMP into a second phase. To facilitate this, the Cotton CRC, CRDC and Cotton Australia have jointly invested in a BMP Program Manager, Louise Adcock, to drive the development of the second phase of the program.

As the cotton industry moves into a new era, the new phase of the program will take a more holistic view of a farm business, rather than just cotton alone. It will take a farming systems approach, and focus on the key elements of a farming business, including water, soil, chemicals, Integrated Pest Management (IPM), carbon and energy, biosecurity, technologies, biodiversity and human resources. The program will become multi-levelled, providing growers with a higher degree of flexibility with a simplified entry level and the standards will become more challenging as a grower progresses through the levels. It will provide the opportunity to retrospectively recognise growers who have been proactive, while providing a pathway of tools, expertise and resources to assist other growers to improve their business priorities.

ECONOMICS – A DRIVER OF CHANGE

Economics has been identified as one of the most significant forces driving change. The Cotton CRC has a two-fold approach to addressing this area: benchmarking and an extension methodology to remove the barriers to change.

Benchmarking has been identified by the industry as valuable and best undertaken by a trusted, independent organisation such as the Cotton CRC. The widely recognised Boyce Cotton Comparative Analysis reporting system was published in 2008, funded through CRDC, using figures from the 2006–07 cotton crop.

Additionally, in order to enhance the extension efforts and remove barriers to adoption of emerging research, best practice and change management, it is important to provide economic support through fundamental economics comparisons. This, in association with assessing the impact of Cotton CRC activities at an industry and community/catchment level, will be addressed through the addition of a Research Economist – Cotton, Janine Powell, in a partnership between NSW DPI and the Cotton CRC.

EVALUATION OF INVESTMENTS

An evaluation of the impacts of Cotton CRC investments in industry will be conducted at a range of levels for Cotton CRC research, education and extension. A strategic evaluation framework consistent with the DIISR model for the third year review has been established. It includes all Australian Government CRCs Program milestones, as well as additional Cotton CRC strategic goals and targets. All Cotton CRC projects are included and benchmark data are being collected to monitor progress to date and provide a reference for future progress.

COMMERCIALISATION

The Cotton CRC now has eleven research projects, either completed or in progress, in which commercial partners are involved or are being sought. In several cases these projects are based on discrete Intellectual Property (IP) or third

party project agreements and the partners are making significant cash and/or in kind contributions towards the development of commercial products.

Commercialisation of the moth attractant Magnet® continues. All barriers associated with the chemical regulatory process have been overcome, and registration is expected in time for the 2008–09 cotton season. Magnet® will be the first such commercial product in the world, and expressions of interest in market development have come from North and South America, South East Asia and New Zealand.

Other commercial projects aimed at developing environmentally friendly pest management products have received commercial support, with Growth Agriculture contributing to the development of semiochemicals for mirid and *Helicoverpa* control, and negotiations in progress with two other companies.

INTELLECTUAL PROPERTY MANAGEMENT

The Cotton CRC has adopted policies for intellectional property (IP) management at Board, management and project levels: most significantly, the Cotton CRC Intellectual Property Management

Commercialisation Agreements

Project name	Status	Agreement Type	Partner	Partner funding	Progress
Chemical ecology of insects	Completed	Discrete IP	Ag Biotech	$150,000 cash plus in kind	Registration of Magnet® imminent. Royalties flowing. New licensing agreement and new patent under negotiation
Managing green mirids with plant extracts (pilot)	Completed	Discrete IP	Native Fire	$36,497 plus in-kind	Promising results from pilot, follow-up project under negotiation
Fungal biopesticides	Completed	Discrete IP	Becker Underwood	In kind only	Follow-up project with CRDC funding is underway (not in CRC)
Behaviour modifying plant extracts	In progress	Third party	Growth Agriculture	$250,000 plus in-kind	Project agreement signed
Electrical imaging of soil water	In progress	Centre IP	Under discussion	None	Provisional patent application lodged
Bioremediation enzymes	In progress	Centre IP	Orica	None	Licensing agreement signed
Measuring fibre maturity	In progress	Discrete IP	Under negotiation	Under negotiation	Business plan developed, negotiations with commercial partners underway
New ginning technology	In progress	Discrete IP	Under discussion	Under discussion	Under negotiation
Semiochemicals for improved refuge efficiency	In progress	Discrete IP	Ag Biotech Monsanto	$100,000 cash plus in kind	Under negotiation
Managing green mirids with plant extracts	Completed	Discrete IP	Native Fire	$243,474 plus in-kind	Promising results from pilot, follow-up project under negotiation
Polymers to reduce evaporation	In progress Joint project with CRC-IF and CRC Polymers	Discrete IP	Under negotiation	Under negotiation	Pilot project completed with promising results. Two provisional patent applications by CRC Polymers. Commercialisation funds being sought from Queensland

Tool Kit, prepared by the Australian Centre for Intellectual Property in Agriculture (ACIPA). This Board and Audit Committee-approved document gives comprehensive advice on IP discovery, planning and monitoring. Commercialisation and IP management plans are required of all project applications and a quick check of IP potential is completed for each project application in conjunction with project evaluations completed by program management.

The Board can approve as discrete IP projects those projects where significant background IP is present from core participants, or where it is expected that significant IP will be generated from core participants; there are already two such projects. The Cotton CRC has seven Third Party IP Agreements in place or under negotiation with prospective and existing commercial partners, all with exciting potential.

Developing and existing IP is reported in six-monthly written project reports completed by the project leaders themselves and at Board, Audit Committee and management team meetings. The Cotton CRC maintains a register of actual and potential IP and there are already 136 projects with background, centre and/or potential IP records.

NATIONAL PRINCIPLES OF IP MANAGEMENT

There are nine national principles of intellectual property management for publicly funded research. The Cotton CRC has addressed these as shown in the table below.

Wherever appropriate, IP will be licensed to Australian companies with track records in developing innovative technology and transferring it to the Australian cotton industry. This will maximise the national benefits by increasing the productivity of the industry; however, licensees will be encouraged to develop export markets for the Cotton CRC technology where significant export income is possible. Negotiations are continuing with Ag Biotech for an International Licensing Agreement for Magnet®

END-USER INVOLVEMENT AND CRC IMPACTS ON END USERS

For End-user Involvement in CRC Activities, see the table on page 97.

National Principles of IP management

National Principle	Cotton CRC action
Institutional Policies	Cotton CRC has policies approved by the Governing Board relating to the ownership, protection and exploitation of IP
Identification of IP	Cotton CRC has procedures that provide support to researchers so that they can recognise when their discoveries may have potential commercial value and provide for a review process to identify IP that can be protected and/or exploited
Protection of IP	Cotton CRC has policies to ensure participants have policies that make clear to staff their responsibilities in relation to IP protection including, where appropriate the maintenance of research laboratory records and the prevention of premature public disclosure of research results prior to obtaining IP protection
Ownership of IP	An IP ownership policy has been agreed by participants and is described in the participants' agreement
Assessment of Existing IP	Procedures are in place to guide researchers in assessing the existing IP in the field that is likely to affect their research in order to determine their freedom to operate in that field of research
Management of IP	Cotton CRC has procedures for the regular review of IP and associated commercial activities and outcomes arising from publicly funded research. Research institutions will have procedures in place to provide advice to the creators of the IP on the options that are available for commercialising IP
Sharing of Benefits	Cotton CRC has agreed policies that recognise the rights and needs of all stakeholders involved in the research supported by public funds. (These are described in detail in the participants agreement)
Transparency and Reporting	Cotton CRC reports annually on IP management to participants and DIISR
Potential Conflict of Interest	Cotton CRC has policies and procedures that provide guidance in relation to potential conflicts of interest concerning ownership, management, protection and exploitation of IP

COMMUNICATION STRATEGY

The complexity of the Cotton CRC, the wide range of partners and affiliates involved and the extensive range of research means communication is integral to our operating as an effective organisation. To this end, we have utilised a range of communications channels to effectively communicate with our various audiences.

The Cotton CRC's second Science Forum was held in August 2007 in conjunction with Narrabri's Cotton Collective Week. These events were well attended, with over 150 delegates present. The Science Forum was held over two days, with Cotton CRC Scientists and Extension staff presenting their current projects to the wider Cotton CRC community. This forum provides an opportunity to share information, peer review activities and science, whilst gaining a greater awareness of Cotton CRC research across all five program areas.

The Cotton CRC took part in a number of major events during 2007–08, providing numerous opportunities to showcase science and extension achievements. Some of the events the Cotton CRC participated in included the Water Smart Expo (Narromine), Landcare Forum (Tamworth), Healthy Soils National Symposium (Sunshine Coast), Sustainable Industry Initiative Forum (Adelaide) Science Week schools activities (Narrabri) and the Job Links Careers Day (Tamworth), Climate Change, the Rangelands and Agriculture: impacts and adaptation in western NSW (Bourke and Griffith).

A number of new communication activities were introduced in 2007–08. One of these was an inaugural two day communication workshop for Cotton CRC PhD students, held in Sydney and hosted by E-connect Communications. This gave students the opportunity to enhance their presentation skills, learn how to pitch science stories to the wider public and meet with radio, TV and print journalists.

In addition, as the Cotton CRC's research and extension portfolio expands to encompass an increased number of partners, target audiences and end users, the need to provide information in a succinct, accessible, recognisable and credible format is necessary. In collaboration with CRDC, an integrated literature system has been developed, dividing research and extension information into four core audiences:

- Farm
- Community and People
- Catchment and Environment
- Product.

Communications activities

Above:
Cotton CRC Chair, Dave Anthony, opens the Cotton CRC Science Forum, held in Narrabri in August 2007

Below:
Climate Change workshops held in Griffith, NSW

Simple, easy to identify templates have been designed to assist in the branding, availability and access of research and extension information. Primarily, the integrated literature system provides a breakdown of information into categories such as:

What's New – highlighting emerging projects and research

In Practice – Case studies showcasing on farm activities

How To – Demonstrating the benefits of best practice.

Already a number of information series have been published including:

- 'Biodiversity on Cotton Farms' Fact sheets
- Groundwater information sheets to accompany groundwater workshops
- Wee Waa Drought Study
- Irrigation workshop information
- Mirid and Aphid series

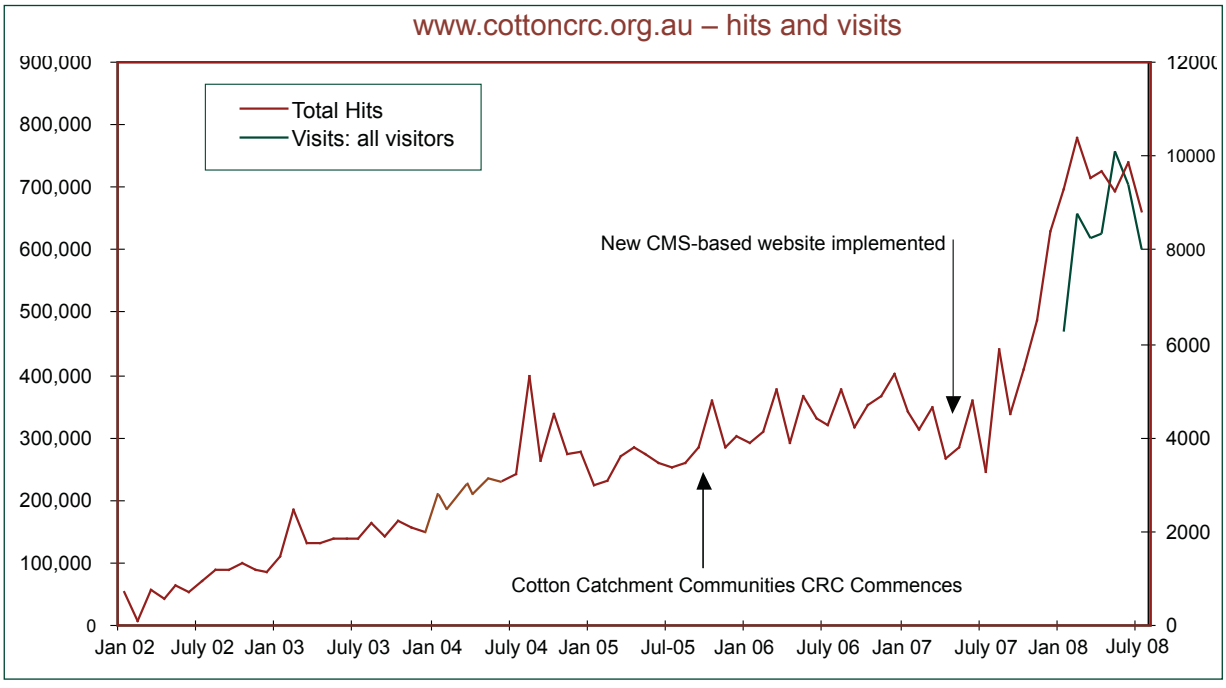
The development of the catchment and communities components of the re-launched web site delivered by a Content Management System has allowed the Cotton CRC not only to manage our knowledge better but also to deliver information to targeted audience requirements. This is demonstrated in the significant doubling of traffic accessing the new site versus the previous one.

The community pages of the website are a mechanism to provide base information on cotton production, the industry and the cotton catchments in which it is grown. New community issues and initiatives are highlighted in this area, including the Young Professional pages, Write-a-Reader competition and the schools program. This new capacity now allows the Cotton CRC to reach this non-traditional audience with a positive message about the industry, its innovations and the community involvement undertaken.

The catchment pages are attaining greater prominence for Natural Resource Management (NRM) and catchment issues from an industry perspective. This provides a single location for seeking NRM publications, latest reports and fact sheets, coming events and specific catchment information.

The dual information approach of providing technical industry and NRM information side-by-side will lead to more involvement by cotton growers in catchment schemes and improved on-farm resource management. The website statistics demonstrate that:

- users are accessing the Catchment pages directly, as well as navigating from the industry pages.



COMMUNICATION STRATEGY

- some users are accessing the Cotton CRC website for specific NRM information.
- others after initially accessing for industry/production information are then taking the opportunity to gain information from the Catchment pages.
- the Biodiversity Calendar is the highest accessed page on the Cotton CRC site, including the Home Page.

This year also saw the continued development of two electronic newsletters: 'Cotton CRC Chat' and 'Cotton E-News'. 'Cotton CRC Chat', a monthly electronic newsletter, is distributed to all Cotton CRC participants, affiliates, researcher and extension staff, and highlights projects, extension activities, upcoming events and research and extension achievements. 'Cotton E-News' is a regular electronic newsletter aimed more specifically at industry organisations and cotton growers.

To ensure cotton growers are kept informed of emerging research and how it relates to their specific region, the National Cotton Extension team regularly produces and distribute the technical based 'Cotton Tales'. This publication is highly regarded by the industry for its short, timely and relevant nature: a recent survey found that over 90 per cent of the industry considers 'Cotton Tales' to be a valuable resource.

Media releases are a key component of the Cotton CRC communication strategy, promoting research, extension and on-ground management changes in the cotton industry that improve the productivity and sustainability of cotton production systems. In the past twelve months the Cotton CRC has produced a range of media releases.

A number of new publications were released in 2007–08, including the *Guidelines for Ring Tank Storages* in collaboration with Irrigation Australia, *WATERpak: a guide for irrigation management in cotton*, a new Irrigation Management of Grains supplement has been developed with the collaboration of the Cotton CRC, GRDC, the CRC for Irrigation Futures and NSW Department of Primary Industries.

Field days, farm walks, workshops, seminars, school visits and community forums provide more interactive communication channels. Newspaper and magazine articles, radio and TV interviews, and presentations or lectures by Cotton CRC staff provide other avenues for communication.

The Cotton CRC has worked closely with a range of small and medium enterprises including The Cotton Grower Magazine, Cotton Outlook Magazine, The Northwest Courier Group, ABC and Radio 2VM, all of which have actively promoted Cotton CRC research and events.

For* Commercialisation and Utilisation *Outputs and Milestones, see page 87.

EDUCATION AND TRAINING

EDUCATION

dynamic education and training program is essential in attracting and retaining the best new students and scientists for the long-term benefit of the Australian cotton industry. Flexible and innovative training courses for industry personnel will ensure the industry builds its internal technical skills so it can be well placed to retain its leadership in world's best practice cotton production.

THE POSTGRADUATE PROGRAM

This 2007–08 year saw continued strong growth in the Cotton CRC postgraduate program, with 38 postgraduate students enrolled, working in areas across all of the four research programs: 19 new students started with the Cotton CRC, 19 are continuing their studies and an additional eight completed their theses. Eleven of the 13 students who transferred to the Cotton CRC from our predecessor, the Australian Cotton CRC, have now graduated, and the remaining two have submitted their theses or are in the final stages of writing up.

Of the 38 current postgraduates, 33 are enrolled for PhDs and five for Masters degrees. They are enrolled in ten partner and affiliate universities, the main ones being The University of New England (twelve), University of Sydney (eleven) and University of Queensland (five). Almost all of our students have joint supervisors from non-university research organisations in the Cotton CRC and many are jointly supervised by industry personnel.

The Cotton CRC has now reached its target for enrolments; however, an additional call for a limited number of PhD projects commencing in 2009 will be made in the latter half of 2008. These projects will be targeted towards DIISR Science Milestones that have not yet been met.

Among the postgraduate students who graduated are:

Jeff Werth from the University of Queensland, who studied resistance to glyphosate in cotton weeds and is now working with Queensland Department of primary Industries and Fisheries on a CRDC-funded project.

Samuel Lowor from The University of New England, who studied the pheromones of three insect pests of cotton and is now doing postdoctoral research in Canada.

Adriana Rodriguez from the University of Queensland, who studied the use of petroleum spray oils against cotton aphids.

Leah Mackinnon from The University of Sydney, who studied bat diversity in cotton farming systems.

Chris Vanags from The University of Sydney, who studied the geology and hydrology of paleochannels in cotton regions and their implications for irrigation water loss, and is now doing postdoctoral work in the USA.

Stella Loke from The University of Sydney, who studied the ecology of mycorrhizal fungi in cotton soils.

Cotton CRC Cotton Production Course

Cotton CRC Cotton Production course students from The University of New England and The University of Sydney join forces at the Australian Cotton Centre in Narrabri

Derek Collinge from the Australian National University, who studied gene silencing technology in the insect pest *Helicoverpa armigera.*

The Cotton CRC works hard to make students feel part of a Cotton CRC research community by ensuring that they have adequate opportunities to present their work at scientific forums, by facilitating training in communication and leadership, including IP management, and by conducting meetings and teleconferences across all Cotton CRC programs to ensure that student needs are met. The Cotton CRC provides students with subsidised accommodation while they are in Narrabri.

UNIVERSITY COURSES

Cotton CRC Cotton Production Course

The Cotton CRC continues to develop and deliver the only specialised university level qualification in cotton production in Australia. The Cotton CRC's Cotton Production Course (undergraduate diploma and graduate certificate) is run through The University of New England (UNE) and is highly regarded throughout the industry as a key avenue to gain essential skills in the production of cotton. CCA has recognised the course as a criterion for the accreditation of Certified Practicing Cotton Consultants.

The course ran successfully throughout 2007–08, although student numbers have declined along with the diminishing cotton acreages, due to the drought. Since the start of the CRC, 15 students have completed the requirements for the four units of the Cotton Production Course. Many have gone on to coursework Masters degrees, including the Cotton Production units in these degrees. A common pattern is to combine the four cotton units with four complementary units in grains production at UNE.

The first unit of the course (Applied Cotton Production) is also offered in several modes for students doing agriculture-related degrees at The University of Sydney, The University of New England and the University of Queensland. This unit reaches approximately 50 new students each year, giving a relatively large proportion of Australia's agriculturally oriented graduates a good look at the Australian cotton industry before entering the workforce.

The cotton units all have a strong practical and scientific basis. There is keen involvement by cotton researchers, consultants and growers, who provide relevant and up-to-date presentations and written material. The course coordinator endeavours to provide the material in a modern educational environment, taking advantage of new developments in adult learning, student centred learning and modern multimedia delivery systems.

The Cotton Production Course attracts many who plan on working in the cotton industry but also a significant cohort of students with other agricultural interests who view cotton as an excellent example of advanced agricultural practices in water use practices, environmental management, pest management or the use of genetically modified crops.

Summer Scholarships

2007–08 Summer Scholarship students Katie Broughton and Charles Tuck

EDUCATION

Summer Scholarships and Honours programs for undergraduates

Six university students were awarded summer scholarships during the 2008 summer to focus on the problems impacting on the cotton industry. The Cotton CRC invested $30,000 in these projects, which provide eight weeks of paid employment, together with some operating funds. Summer scholarships foster student development and create opportunities for young people in the cotton industry. Students came from a variety of different universities including The University of New England, The University of Sydney, University of Queensland and University of NSW. The Cotton CRC Summer Scholarship program won the Business/Higher Education Round Table Award for Best Collaboration with a Regional Focus in 2007. Further details can be found in Awards on page 9.

Five Honours scholarships were awarded to students at the The University of New England, The University of Sydney and University of NSW in 2007–08.

PRIZES

To help foster student achievements, the Cotton CRC sponsors a number of prizes, including:

- a prize for third year students at Sydney University in the Faculty of Agriculture and Natural Resources;
- a contribution of $1500 to Cotton Consultants Australia to fund a student bursary as part of the Chris Lehmann Trust;
- a $1500 publication bonus for PhD students who have submitted and had accepted a scientific paper to a recognised scientific journal.
- An additional $500 is available for those PhD students who prepare a four-page summary of their research in a style suitable for use in extension publications;
- several prizes for science and agriculture at Narrabri High School.

Soils workshops

Soils Workshops investigating soil health up close and personal

TRAINING

There have been a number of training-based workshops or seminars series, aligned to vocational education and training standards, developed through the Cotton CRC in 2007–08. These include:

Cotton and Grains Irrigation Workshop Series

Eight vocationally aligned workshops were developed in cooperation with the Cotton CRC, NSW Department of Primary Industries, Queensland Department of Primary Industries and Fisheries, the National Program for Sustainable Irrigation, CRC for Irrigation Futures, CRDC and GRDC, targeted at improving the management skills of cotton and grains irrigators and advisors. Contributing to recognised qualifications, the workshops are delivered on-farm and are practical courses for skills development, with the new skills and qualifications mapped to the Cotton BMP Land and Water Management Module. They can be used directly to provide evidence for BMP certification.

Healthy Soils Training Workshops

These workshops focused on soil nutrition, understanding soil testing and property planning. These vocationally aligned workshops, developed in cooperation with the Cotton CRC, NSW Department of Primary Industries, Queensland Department of Primary Industries and Fisheries and Land and Water Australia are targeted at increasing the participants' capacity in soil health, along with the sustainability and profitability of their farming practices.

Groundwater Workshops

These workshops aimed to increase understanding of groundwater systems among water users across seven cotton growing regions. The workshops were extremely well attended, with 89 participants, including growers (cotton, grains and lucerne), consultants and extension officers, along with representatives from catchment bodies and local councils. The workshops were a joint venture with the Cotton CRC, NSW Department of Primary Industries, the Water Research Laboratory, University of NSW and Australian Government Department of Agriculture, Fisheries and Forestry.

Nitrogen Use Efficiency in Cotton and Irrigated Cereals

The Cotton CRC, in partnership with the NSW Department of Primary Industries, Grains Research and Development Corporation, Namoi CMA and private organisations, Belt-wide Agriculture and GPS Ag, delivered the seminar series to producers, with specific attention to agronomy (nitrogen use efficiency), utilising precision agriculture applications.

The industry's Cotton Field to Fabric Training Course, Integrated Pest Management Short Course, Cotton Seed (Certificate II), Cotton Basics (Certificate II and III) and the implementation of recognition of prior learning (RPL) assessments continue to be delivered to enhance the suite identified above.

North West Machinery Pilot Program

This is focused on developing machinery operational skills in new industry entrants and seasonal workers. The program was funded by the NSW Department of Employment and Training and delivered by commercial provider, AgTraining, based in Toowoomba. Niel Jacobsen (Dane Consultancy) was project manager, with the Cotton CRC contributing as part of the working group that designed and implemented the program.

Certified BMP Farm Manager Award

In association with Tocal College, the National Training Coordinator, Mark Hickman, has secured the qualification of a Certified BMP Farm Manager Award through the recognition of prior learning and skills under the Vocational Training and Education system. This enables cotton growers, managers and farm workers who have been instrumental in introducing BMP to a BMP Certified cotton farm operation to apply to have this effort formally recognised with an industry award that is equivalent to a Diploma of Agriculture specialising in cotton production. The Certified BMP Farm Manager qualification presents a marketable asset, acknowledged and endorsed by the cotton industry. The qualification will be recognised by future employers within and outside the cotton industry as having achieved best practices accreditation for a managed property.

SCHOOLS PROGRAM

The Cotton CRC believes that the future of Australian science and agricultural lies with the youth of today, which is why this year saw the appointment of an Education Officer, Trudy Staines, through CSIRO. Since starting, Trudy has partnered with a number of organisations to deliver:

- Primary Science Matters, providing science kits and training for teachers in primary schools in north west NSW;
- organisation and facilitation of a visit from the Rotary Youth Agricultural Group (RYAG) from Moree and Wee Waa High Schools to the Australian Cotton Research Institute to explore science and agricultural career opportunities. RYAG is a four day cotton camp that offers students an overview of the cotton industry and jobs availability, and gives guidance and direction for career paths into the cotton industry;
- assistance in the school holiday program run by the Australian Cotton Exhibition Centre, offering cotton-based art and craft activities for primary aged school students;
- organisation, design and facilitation of a Cotton CRC cotton careers display stand and brochures for the Tamworth and Armidale Careers Expos, attended by over 3000 students across three cotton catchments;
- Cotton CRC Silver Sponsorship for the Namoi CMA and Border Rivers-Gwydir CMA property planning competition.

For* Education and Training *Outputs and Milestones, see page 99.

Primary Matters

Narrabri Primary School children enjoy Science Week with Cotton CRC Researchers – One of the Cotton CRC activities undertaken to encourage an interest in science

FINANCIAL INFORMATION

Cotton Catchment Communities CRC Limited

ABN 14 116 310 957

Independent Audit Report to the members of Cotton Catchment Communities CRC Limited

NEXIA COURT & CO

NEXIA INTERNATIONAL

CHARTERED ACCOUNTANTS

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Scope

The financial report and the directors' responsibility

We have audited the accompanying financial report of Cotton Catchment Communities CRC Limited (the 'company') which comprises the balance sheet as at 30 June 2008, and the income statement, statement of changes in equity, and cash flow statement for the year ended on that date, a summary of significant accounting policies, other explanatory notes, and the directors' declaration of the company at the year's end.

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. In note 1(b)(i), the directors also state, in accordance with Australian Accounting Standard AASB 101 Presentation of Financial Statements, that the financial report, comprising the financial statements and notes, does not comply with International Financial Reporting Standards as the company applies the specific not-for-profit requirements of Australian Accounting Standards.

Audit Approach

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 auditors' 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 the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Independence

In conducting our audit, we followed the applicable independence requirements of Australian professional ethical pronouncements and the Corporations Act 2001.

Audit Opinion

In our opinion, the financial report of Cotton Catchment Communities CRC Limited is in accordance with:

The Corporations Act 2001, including:

(i) giving a true and fair view of the company's financial position as at 30 June 2008 and of their performance for the year ended on that date; and

(ii) complying with Accounting Standards in Australia and the Corporations Regulations 2001.

Nexia Court & Co

Nexia Court & Co
Chartered Accountants

Ian Stone
Partner

Dated: 24th September 2008.
Sydney

Cotton Catchment Communities CRC Limited

ABN 14 116 310 957

Income Statement

For the Year Ended 30 June 2008

	Note	2008 $	2007 $
Revenue	2	29,681,905	28,104,805
Employee benefits expense	3	(748,534)	(536,387)
Depreciation and amortisation expense	3	(19,238)	(32,868)
Project expenses:			
- The Farm		(12,159,930)	(12,949,201)
- The Catchment		(6,241,914)	(4,217,902)
- The Communities		(260,224)	(126,330)
- The Product		(1,939,414)	(2,186,244)
- The Adoption		(8,153,612)	(7,497,645)
Administration expenses		(154,420)	(584,594)
		(29,677,286)	(28,131,171)
Results from operating activities		4,619	(26,366)
Finance income	4	340,566	121,897
Finance expenses	4	(1,482)	(3,280)
Net finance income		339,084	118,617
Profit before income tax		343,703	92,231
Income tax benefit/(expense)	6(a)	8,804	(60,241)
Profit for the year		352,507	32,010

The accompanying notes form part of the financial statements

Cotton Catchment Communities CRC Limited

ABN 14 116 310 957

Balance Sheet

As at 30 June 2008

	Note	2008 $	2007 $
ASSETS			
Current assets			
Cash and cash equivalents	8	8,193,715	4,150,178
Trade and other receivables	9	1,111,897	1,414,051
Other current assets	10	24,803	33,052
Total current assets		9,330,415	5,597,281
Non-current assets			
Plant and equipment	11	68,408	121,188
Total non-current assets		68,408	121,188
TOTAL ASSETS		9,398,823	5,718,469
LIABILITIES			
Current liabilities			
Trade and other payables	12	2,730,128	1,785,158
Interest-bearing liabilities	13	13,119	7,541
Employee Benefits	14	37,024	18,909
Current tax payable	7(a)	(1,666)	(5,975)
Provisions	15	616,830	-
Deferred Income	16	5,476,445	3,732,873
Total current liabilities		8,871,880	5,538,506
Non-current liabilities			
Interest-bearing liabilities	13	-	13,412
Employee benefits	14	15,689	7,804
Total non-current liabilities		15,689	21,216
TOTAL LIABILITIES		8,887,569	5,559,722
NET ASSETS		511,254	158,747
EQUITY			
Retained earnings		511,254	158,747
TOTAL EQUITY		511,254	158,747

The accompanying notes form part of the financial statements

APPENDICES

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
1.1 Output	**Integrated Crop Protection ("the good guys and bad guys"). Improved integrated management systems for cotton pests (insects, weeds and diseases) that are profitable, sustainable and demonstrably less reliant on inputs**	June 2012	N/A	Output not due for completion until June 2012. Several projects have been approved to meet this output (see Milestones 1.1.2, 1.1.6	Further projects will also be developed
1.1.1 Milestone	Final report submitted of ACCRC studies in Northern Australia	June 2006	Yes	NorPAK published in 2007 and launched by Western Australian Chief Scientist	
1.1.2 Milestone	Research initiated on emerging pest challenges for integrated pest management (IPM) of insects, weeds and diseases in transgenic and conventional crops	Dec 2005 recurring 2008	Yes	21 new research projects with total lifetime funding of approx. $3.10m started in 2005–06, 6 new projects, $1.65m in 2006–07, 2 new projects, $.1.04m in 2007–08	5 new projects totalling $1.61m in 2008/09
1.1.3 Milestone	Study on risks of resistance to glyphosate in roundup ready cotton completed	June 2007	Yes	PhD completed	
1.1.4 Milestone	Review goals for research in soil function and ecology and develop future projects	Dec 2006	Yes	Report published	
1.1.5 Milestone	Outcomes of research into insect, weed and disease knowledge compiled and ready for extension	June 2008 Recurring June 2009 Recurring June 2012	Yes	Revised IPM and IDM Guidelines and WEEDpak published, at least 37 Cotton Tales articles, 29 Fact Sheets and other publications	Several new projects established to contribute to recurring milestone in 2009 and 2012
1.1.6 Milestone	Initial IPM systems (insect, weeds, diseases) developed for Burdekin region and Ord Stage 2	June 2008	Yes	Initial IPM systems developed in field research and on-farm commercial trials for the Burdekin. Ord Stage 2 not yet approved by WA Govt, but IPM systems developed in Stage 1 are suitable	Ongoing project to improve IPM systems in the Burdekin, Ord progress depends on Govt policy
1.1.7 Milestone	Links between farming systems, IPM and area-wide management explored, tools expanded, and guidelines enhanced	June 2011	N/A	Output not due for completion until June 2011	Several projects established to contribute to this milestone
1.1.8 Milestone	Economic analysis of IPM, IDM and AWM strategies	June 2012	N/A	Output not due for completion until June 2012	Economist appointed to analyse economic benefits of projects in Milestone 1.1.2
1.2 Output	**Water use efficiency ("more crop per drop"). Enhanced understanding of the water balance in cotton farming systems and tools developed and commercialised to maximise on-farm water use efficiency**	June 2010	N/A	Output not due for completion until December 2010. Several projects have been approved to meet this output (see Milestones 1.2.2, 1.2.3	Further projects will also be developed
1.2.1 Milestone	Complete initial study and report of irrigation management for West Kimberly	June 2006	Yes		
1.2.2 Milestone	Deep drainage Lysimeters established	Sept 2005	Yes	2005/06 4 new projects established, total lifetime funding $0.56m, 2006/07 2 new projects $0.79m. About 35 lysimeters installed	

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
1.2.3 Milestone	Research initiated with commercial partners to evaluate water application, measurement and irrigation scheduling technologies and integrate across levels (farm, field, furrow, plant)	June 2006 Recurring Dec 2008	Yes	2005/6 7 new projects total lifetime funding $0.78m 2006–07 6 new projects $1.33m 2007–08 2 new projects $1.28m established	
1.2.4 Milestone	Establish two collaborative PhD projects with CRC Irrigation Futures	Dec 2006	Yes	CRC-IF leading first student project. Student has been enrolled. Cotton CRC is leading 2nd project, student has been enrolled	
1.2.5 Milestone	Develop projects to understand and complete water balance research established including deep drainage, nutrient and salt movements (links with Program 2)	Dec 2006 Recurring 2008	Yes	See Milestones 1.2.2 and 1.2.3 Additional project with lifetime funding of $0.38m funded 2007/8 in the Catchment	
1.2.6 Milestone	Review options to reduce losses and implications of deep drainage and nutrient / salt movement and to improve water management (link with Program 2)	June 2009	N/A	Output not due for completion until June 2009	Several projects established to contribute to this Milestone (see Milestones 1.22 and 1.25)
1.2.7 Milestone	Water losses from storages and channels (evaporation and seepage) characterised, and options for minimising explored	June 2010	N/A	Output not due for completion until June 2010	$1m additional funds obtained from NWI
1.2.8 Milestone	Economic assessment of the value of the CRC input into improving water use (links with Program 2)	June 2010	N/A	Output not due for completion until June 2010	Economist has been appointed to analyse benefits of projects in Milestones 1.22 and 1.25
1.3 Output	**Plants and soils ("growing the crop"). Systems to improve the management of the plant and soil, commercialised where practical, that ensure profitable production and stewardship of the soil**	June 2012	N/A	Output not due for completion until June 2012 Several projects have been approved to meet this Milestone (see Milestones 1.3.1, 1.3.4 to 1.39)	Several projects have been funded in this area; Further projects will be developed
1.3.1 Milestone	Research on relationship between crop agronomy and fibre quality initiated (with Program 4)	Aug 2005	Yes	2005/6, 2 new projects total lifetime funding $0.96m (See The Product)	
1.3.2 Milestone	Research on relationships between crop agronomy and fibre quality compiled and ready for extension	June 2009	N/A	Output not due for completion until June 2009 But 3 Field to Fibre courses run, FIBREpak undated, at least 8 Cotton Tales articles and other extension publications	Two projects established to contribute to this Milestone (see Milestone 1.3.1)

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
1.3.3 Milestone	Finalise research on minimum tillage systems for cotton in NW Australia and review future research needs	June 2006	Yes	NorPAK contains minimum tillage material, final report of Ord minimum tillage project received	
1.3.4 Milestone	Initiate integrated farming systems researcher in central Queensland and scope new Burdekin region needs with commercial partners	June 2007	Yes	2005/6, 1 new project established for CQ total funding $0.67m (joint CRDC/GRDC funding). 2007–08 - 1 project for Burdekin $0.57m. Researchers located in regions	
1.3.5 Milestone	Research initiated into agronomic requirements of transgenic cotton for existing and new regions, including northern Australia, and new technology for nutritional assessment explored	June 2006 Recurring Dec 2008	Yes	Several new projects established (see Milestones 1.3.6 to 1.3.9)	
1.3.6 Milestone	Results from research in agronomic requirements of transgenic cotton in existing and new regions, including northern Australia, and new technology for nutritional assessment	June 2009 Recurring June 2011	N/A	Output not due for completion until June 2009	Several projects established to contribute to this milestone (see Milestone 1.3.5)
1.3.7 Milestone	Research conducted to understand links between soil function, diversity, productivity and farming systems	June 2009	N/A	Output not due for completion until June 2009	Several projects established to contribute to this Milestone
1.3.8 Milestone	Review research requirements for cotton nutrition and develop new projects	June 2006 Recurring June 2009	Yes	Project established to facilitate liaison between private enterprise and CRC researchers for prioritising nutrition research	
1.3.9 Milestone	Farming systems scientist approved to research and coordinate high yield and profit systems R&D	June 2007	Yes	Project established ($0.67m) and farming systems scientist appointed	
1.3.10 Milestone	Cotton and grains farming systems inputs optimised for yields, economic returns and inputs	June 2011	N/A	Output not due for completion until June 2011 but several projects established 2005/6, 2 projects $0.49m 2006–07 4 projects $1.98m 2007/8, 1 project $0.48m	Further projects will be established
1.4 Output	**Enabling technologies for precision farming ("smart farming"). Tools and technologies developed for more precise placement, timing or application to allow optimal use of inputs and resources**	June 2009	N/A	Output not due for completion until June 2010 2005/6 1 project established lifetime funding $0.35m 2006–07 2 projects $0.40m	Further projects will be established

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
1.4.1 Milestone	Research conducted with commercial partner(s), for linking crop data to yield maps, ground truthing, quality control and data sharing between electronic formats. Initiate research to explore the economic benefits of precision agriculture	June 2010	N/A	Output not due for completion until June 2010 1 project established 2006–07 $0.36m	
1.4.2 Milestone	Develop 'smart' science to interpret and use precision agriculture data to identify and manage problems	June 2008	No	Milestone has been delayed due to difficulties in establishing the key project in precision agriculture	Key project is now established and will run until 2010
1.4.3 Milestone	Linkages developed to enable DSS to link with geographic information systems (GIS) to provide site-specific information	June 2009	No	Industry has decided not to continued supporting this area of research. CRDC and subsequently Telstra have withdrawn support for this research as well	
1.4.4 Milestone	Validation of remote sensing techniques for accurately assessing crop vigour and development of tools to apply smart science to provide diagnoses	June 2009	N/A	Output not due for completion until June 2009	Key project is established and will run until 2010
1.5 Output	**New tools and technologies («improving the tool kit»). Development of new tools or techniques to address current or future challenges to crop management and allow reduced use of inputs**	June 2012	N/A	Output not due for completion until June 2012 2005/6 3 new projects total lifetime funding $0.69m 2006–07 1 new project $0.08m 2007/8 2 new projects $0.92m	Several projects established to contribute to this milestone
1.5.1 Milestone	Targets and opportunities for novel products developed. Research initiated in priority areas both independently and with commercial partners	Dec 2006	Yes	Several scoping studies and commercial-in-confidence business plans prepared	
1.5.2 Milestone	Reporting on applications of molecular technologies and implications for cotton production	June 2008	Yes	One PhD thesis completed in this area, diagnostic tools developed for studying pests and diseases	The CRC does not have sufficient resources to continue ongoing work in this area
1.5.3 Milestone	Develop biopesticides and semiochemicals for mirids and other pests with commercial partners	Dec 2010	N/A	Output not due for completion until December 2010 2005/6 2 new projects established, lifetime funding $0.64m; 2006–07, 1 new project 0.08m; 2007/8, 2 new projects $0.92m	One semiochemical product is likely to be registered in September 2008

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
Output 2.1	**Knowledge to underpin the integrated management of river flows to ensure profitable irrigation industries and the sustainable ecological condition of floodplain river ecosystems**	June 2012	N/A	Output not due for completion until June 2012	A series of projects are now in place to address this output. Further projects will also be developed
Milestone 2.1.1	Growers, catchment management authorities and government agencies engaged research plans finalised, field research sites and baselines established	Dec 2006	Yes	Projects involving the Namoi CMA, Border Rivers- Gwydir CMA, QMDC, Condamine Alliance, NSW DWE, QNR&W have been developed. Project applications have been approved, field sites established and research activities have commenced	
Milestone 2.1.2	River health indicators defined and key flow variability responses-variables identified	June 2008	Yes	Several projects which deliver on this milestone have been completed. Other projects not yet completed are expected to further deliver on this milestone in the coming years	
Milestone 2.1.3	Imaging technology used to describe riverine flow – habitat relationships	June 2008	Yes	Projects are in place to deliver on this milestone in the Border Rivers-Gwydir Valley region. These are 3 year projects and will be completed in 2009	
Milestone 2.1.4	Mapping of sub-catchment water flows completed, salt balance assessed in key areas to improve efficiency in water delivery	Dec 2009	N/A	A project is in place to deliver on this milestone in the Condamine and QMDC catchment areas	
Milestone 2.1.5	Final research results reported on manipulation of flows and their impacts on cotton profits and river health in two floodplain catchments	Dec 2011	N/A	Projects addressing milestones 2.1.1 to 2.1.5 contribute to this milestone	
Output 2.2	**An improved understanding of the current condition of groundwater systems in cotton catchments and the demonstration of best practice scientific approaches for determining sustainable groundwater yields**	June 2012	N/A	Output not due for completion until June 2012	A series of projects is now in place to address this output. Further projects will also be developed
Milestone 2.2.1	Growers, catchment management authorities and government agencies engaged, research plans finalized, field research sites and baselines established	June 2007	Yes	Projects involving the Namoi CMA, Border Rivers- Gwydir CMA, QMDC, Condamine Alliance, NSW DWE, QNR&W have been developed. Project applications have been approved, field sites established and research activities have commenced	
Milestone 2.2.2	Ground water health indicators defined	Dec 2006	Yes	Projects addressing this milestone are underway in the Namoi and Gwydir valleys	

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
Milestone 2.2.3	Imaging technology developed to assess ground water flow and interaction	Dec 2008	N/A	Projects addressing this milestone have commenced in the Namoi valley	
Milestone 2.2.4	Groundwater scoping study completed	June 2007	Yes	All groundwater scoping studies have been completed and are publicly available on the Cotton CRC website	
Milestone 2.2.5	High risk groundwater sites selected for detailed assessment	June 2007	Yes	The groundwater scoping studies identified areas within each region where further research is required. The Cotton CRC is working with the relevant catchment bodies, irrigators, industry representatives and state agencies to develop further projects which address these key research priorities	
Milestone 2.2.6	Recharge and river flow interaction assessed for selected sites	June 2008	Yes	A number of projects addressing this milestone have been established in the Namoi valley. These projects are not due to be completed until 2009–10	
Milestone 2.2.7	Demonstrated best practice approach for determining groundwater sustainable yield completed	June 2010	N/A	Projects addressing milestones 2.2.3, 2.2.4 and 2.2.6 will contribute to this milestone	
Milestone 2.2.8	Demonstration of 3D geological modelling and data representation capabilities to the Namoi CMA as part of improved aquifer management	June 2010	N/A	A project to address this milestone is underway	
Milestone 2.2.9	Advice to stakeholders responsible for the development of groundwater allocation plans	June 2011.	N/A	Projects addressing milestones 2.2.1 to 2.2.8 contribute to this milestone	
Output 2.3	**Establish baseline for on-farm water quality and develop remediation processes with the capacity to deliver both farm and catchment benefits**	Dec 2011	N/A	Output not due for completion until December 2011	A series of projects are now in place to address this output. Further projects will also be developed
Milestone 2.3.1	Research plans finalised; growers engaged and field sites established	June 2006	Yes	Scoping study completed. Targets for bioremediation identified. Project applications have been approved, field sites established and research activities have commenced	

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
Milestone 2.3.2	Develop guidelines and technical resources for assessing on-farm water quality options for remediation	June 2008	Yes	Several projects addressing this milestone have commenced and some technical resources have been developed. Further guidelines and resources are expected to be developed once more research findings are available	
Milestone 2.3.3	Establish the commercial feasibility of applying bioremediation enzymes for use on cotton farms	Jan 2009	N/A	A project addressing this milestone has commenced	
Milestone 2.3.4	Obtain research results on managing water levels and aquatic biodiversity in storages	June 2009	N/A	A PhD project addressing this milestone has is due for completion in the next 12 months.	
Milestone 2.3.5	Develop an improved understanding of nutrient and pesticide transport pathways on irrigated fields and farms	Dec 2010	N/A	Projects addressing milestones 2.3.2 contribute to this milestone. Further projects have recently been commissioned	
Milestone 2.3.6	Incorporate research outcomes and risk analysis into best management practices	June 2011	N/A	Projects addressing milestones 2.3.2, 2.3.4 and 2.2.5 will contribute to this milestone	
Output 2.4	**Best-practice guidelines for managing terrestrial biodiversity and ecosystem services on farms enabling growers to sustain production and assisting catchment bodies achieve catchment targets**	June 2011	N/A	Output not due for completion until June 2011	A series of projects are now in place to address this output. Further projects will also be developed
Milestone 2.4.1	Research plans finalised; growers, area-wide groups and catchment management authorities engaged and field research sites and baselines established	June 2006	Yes	Projects involving the Namoi CMA, Border Rivers- Gwydir CMA, QMDC and Condamine Alliance have been developed. Project applications have been approved, field sites established and research activities have commenced	
Milestone 2.4.2	Review and evaluate indicators and impacts on the terrestrial biodiversity of cotton farms and catchment	June 2008	Yes	Projects addressing this milestone have been established and research activities are underway. Some project findings have been published with further findings to be available once projects near their completion	
Milestone 2.4.3	Develop and test techniques and guidelines for assessing, managing and monitoring biodiversity and ecosystems services on cotton farms	June 2010	N/A	Projects addressing this milestone have been established	

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
Milestone 2.4.4	Apply condition assessments and ecologically based landscape design principles at farm and catchment scales	June 2011	N/A	Projects addressing this milestone have been established	
Output 2.5	**Development of science-based information resources for cotton growers and catchment bodies which promote well informed, best practice natural resource management decisions and activities in cotton catchments**	June 2012	N/A	Output not due for completion until March 2012	A series of projects are now in place to address this output. Further projects will also be developed
Milestone 2.5.1	Engage stakeholders (research groups, growers, area-wide groups, catchment management authorities and government agencies) to define land and water use problems and finalise research plans	June 2006	Yes	Meetings with relevant stakeholders have been held and a project is in place which will continue to engage stakeholders	
Milestone 2.5.2	Development of best practice, science-based farm and catchment scale management tools in consultation with, and for use by key stakeholders including industry, catchment management authorities and government agencies	June 2010	N/A	The research findings generated from Outputs 2.1 to 2.4 contribute to this milestone. Several extension projects have been established which ensure this milestone is achieved	
Milestone 2.5.3	Deliver and support the application of tools and best practice science-based natural resource management strategies to key stakeholders including industry, catchment management authorities and government agencies	June 2011	N/A	The research findings generated from Outputs 2.1 to 2.4 contribute to this milestone. Several extension projects have been established which ensure this milestone is achieved	
Milestone 2.5.4	Use best science as a basis for updating and developing information resources and training material for enhancing industry knowledge of natural resource management	March 2012	N/A	The research findings generated from Outputs 2.1 to 2.4 contribute to this milestone. Several extension projects have been established which ensure this milestone is achieved	
Milestone 2.5.5	Report on the impact of the science and tools developed for natural resource management and decision making processes by key stakeholders in cotton growing catchments	March 2012	N/A	Information relevant to this milestone is constantly being collected by the Cotton CRC and a report addressing this milestone will be generated in the final year of the Cotton CRC	
Milestone 2.5.6	Report on the contribution of the cotton industry in assisting catchment management authorities reach catchment targets	March 2012	N/A	Information relevant to this milestone is constantly being collected by the Cotton CRC and a report addressing this milestone will be generated in the final year of the Cotton CRC	

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
3.1 Output	**Detailed socio-economic analysis examining the impact of the cotton industry in key cotton growing regions**	June 2012	N/A	Output not due for completion until June 2012	Further projects will also be developed
3.1.1 Milestone	Parameters of study area and data sources and Local Government Area (LGA) personnel involvement established. Research coordinator commissioned and primary data collection underway	Dec 2005	Yes	Meetings with LGAs conducted, workshops on scoping study held	
3.1.2 Milestone	Analysis, preliminary reporting and regional workshops to verify results	Dec 2006	Yes	The scoping study has been completed and the report distributed to LGA and industry representatives. Meetings have been held to discuss findings and establish research requirements	
3.1.3 Milestone	Detailed socio-economic analysis undertaken in key cotton growing communities benchmarking the impact of the cotton industry	June 2008	Yes	A socio-economic project has been established to fulfil this milestone and is nearing completion	
3.1.4 Milestone	Work with industry, LGA's and government agencies to assist them in understanding the implications of the socio-economic analysis and how this information can be integrated into future strategic planning process	March 2012	N/A	Output not due for completion until March 2012	The study commissioned to address milestone 3.1.3 is contributing to this milestone. A second, follow-up socio-economic study to be commissioned in 2011 will also contribute to this milestone
3.2 Output	**Document the past impact of changing agricultural technologies, emerging industries and drought on employment patterns in cotton communities**	June 2012	N/A	Output not due for completion until March 2012	
3.2.1 Milestone	Regional employment baselines, including an understanding of the contribution of the cotton industry to regional employment, investigated and documented	June 2008	Yes	The socio-economic project commissioned to achieve Milestone 3.1.3 and 3.1.4 is collecting and documenting this information	A research brief will be released soon requesting a project to further develop this milestone and address the remaining milestones under Outputs 3.2 and 3.3
3.2.2 Milestone	Research to establish the past impact of changing agricultural technologies, emerging industries and drought on employment opportunities in the cotton industry and key cotton communities undertaken	June 2009	N/A	Output not due for completion until June 2009. A project examining the impact of drought on Wee Waa was undertaken this year. A project recently approved to address Output 3.4 will also contribute to this milestone. Further projects will also be developed	A research brief will be released soon requesting a project to address this and the remaining milestones under Outputs 3.2 and 3.3

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
3.2.3 Milestone	Research to establish current skills, availability and capacity of workers in existing jobs in cotton communities	June 2009	N/A	Output not due for completion until June 2009	A research brief will be released soon requesting a project to address this and the remaining milestones under Outputs 3.2 and 3.3
3.2.4 Milestone	Develop information resources and scenarios for industry, local businesses and LGA's which outline the likely impact and management implications of the issues addressed in 3.2.1, 3.2.2, 3.2.3	March 2012	N/A	Output not due for completion until March 2012	Information resources have been developed from projects addressing this output. Future projects will also focus on the development of scenarios as well as information resources
3.3 Output	**Identification of emerging industries and transforming technologies, and their likely impact on the socio-economic status of communities and the productive capacity of the cotton industry**	June 2012	N/A	Output not due for completion until March 2012	
3.3.1 Milestone	Database of technology developers/providers focusing on the cotton and irrigation industries. Development of protocols for cataloguing technologies and impacts	Dec 2005	Yes	The Cotton CRC has a database which has been integrated into the Adoption Program projects	
3.3.2 Milestone	Identify and undertake investigation into the likely impact of emerging industries and transforming technologies in specific cotton communities	Dec 2008	N/A	The socio-economic study addressing Output 3.1 is collecting baseline data for this milestone	A research brief will be released soon requesting a project to address this and the remaining milestones under Outputs 3.2 and 3.3
3.3.3 Milestone	Undertake research to establish the necessary skills, availability and capacity of workers required to fill jobs in cotton communities	June 2010	N/A	Output not due for completion until June 2010	A research brief will be released soon requesting a project to address this and the remaining milestones under Outputs 3.2 and 3.3
3.3.4 Milestone	Finalise investigations and develop information resources outlining the likely future impact of these industries and technologies on employment and socio-economic conditions for regional communities and the cotton industry	June 2011	N/A	Output not due for completion until June 2011	A research brief will be released soon requesting a project to address this and the remaining milestones under Outputs 3.2 and 3.3
3.3.5 Milestone	Work with industry, local business and LGA's to assist them integrate the information generated in Output 3.2, 3.3.2, 3.3.3 and 3.3.4 into their future management plans	March 2012	N/A	Output not due for completion until March 2012	A research brief will be released soon requesting a project to address this and the remaining milestones under Outputs 3.2 and 3.3

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
3.4 Output	**Identify innovative regional businesses and options for economic growth in cotton communities**	June 2012	N/A	Output not due for completion until March 2012	
3.4.1 Milestone	Engage with LGA stakeholders to identify potential opportunities to stimulate and/or attract new industry development	June 2006	Yes	Meetings have been held with LGAs and other key stakeholders to define regions of interest and to establish research requirements	
3.4.2 Milestone	Identify local examples of innovative and successful businesses that have been able to adjust to changing social, economic and environmental conditions	Dec 2007	No	A research brief to address Output 3.4 and its associated milestones was released to Cotton CRC participants in 2007. The submissions received required further refinement The Cotton CRC has been working with the provider to refine the proposal and a revised research proposal has been received	The revised project has recently been approved. This project will address milestones 3.4.2, 3.4.3 and 3.4.4. Additionally it will also contribute to milestones 3.2.2 to 3.2.4
3.4.3 Milestone	Document and develop information resources that outline those technologies which have enabled the businesses identified in 3.4.2 to remain successful	Dec 2010	N/A	Output not due for completion until December 2010	This milestone will be addressed by the recently commissioned project
3.4.4 Milestone	Work with industry, local business and LGAs to assist them to integrate the information generated into future business management plans	March 2012	N/A	Output not due for completion until March 2012	This milestone will be addressed by the recently commissioned project
3.5 Output	**Work with regional indigenous communities and the cotton industry to undertake joint projects which foster a greater cultural understanding, especially in relation to employment, needs and opportunities**	June 2012	N/A	Output not due for completion until March 2012	
3.5.1 Milestone	Consultation with Indigenous community across regions and steering committee established and research priorities set. Documentation of the process and thematic research areas disseminated. Cross-program collaboration investigated	Dec 2006	Yes	Consultation with several indigenous community groups has occurred. A scoping study identifying opportunities for indigenous participation in the cotton industry has been completed and the results disseminated	
3.5.2 Milestone	Initiate and pilot joint projects which actively engage both the industry and indigenous community	June 2008	Yes	A PhD project has been funded along with a Schools-Based Traineeship project with the Aboriginal Employment Strategy. Further projects addressing this milestone will also be established	

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
3.5.3 Milestone	Extend results and key learning's of the research to the industry and wider community	June 2011	N/A	Output not due for completion until June 2011	The findings from those projects addressing milestone 3.5.2 are, and will continue to be, collated and extended
3.5.4 Milestone	Work with industry and the wider community to increase their capacity in the area of indigenous engagement and assist in the adoption of key principles, learning's or pilot programs	March 2012	N/A	Output not due for completion until June 2011	The findings from those projects addressing the earlier milestones are, and will continue to be, collated and extended
3.6 Output	**Understanding the barriers and drivers to collective natural resource management by industry, community and government**	June 2011	N/A	Output not due for completion until December 2011	
3.6.1 Milestone	Undertake research into the barriers and drivers for industry, community and government to collectively achieve natural resource management outcomes	June 2008	Yes	A scoping study examining natural resource governance in the cotton industry has been completed A brief requesting the development of a research proposal to address Outputs 3.6 and 3.7 and their associated milestones was released to Cotton CRC participants in 2007. The received submission required further refinement including greater consultation with key end-users. This consultation has now taken place and a refined application is being finalised	A draft project application consisting of 2 PhD projects and an overarching project is now being finalised. The project will address all of the milestones under Outputs 3.6 and 3.7
3.6.2 Milestone	Identify examples of where the cotton industry, the community and key stakeholders have successful and unsuccessfully worked together to achieve natural resource management outcomes	June 2009	N/A	Output not due for completion until June 2009	The two PhD projects and overarching project currently being finalised will address this milestone
3.6.3 Milestone	Document and develop information resources that outline the lessons learnt and the techniques that will foster future successful outcomes	Dec 2011	N/A	Output not due for completion until December 2011	The two PhD projects and overarching project currently being finalised will address this milestone
3.7 Output	**Identify the likely impact of future water and natural resource management policies on the cotton industry and the socio-economic consequences for regional communities**	June 2012	N/A	Output not due for completion until March 2012	A draft project application consisting of 2 PhD projects and an overarching project is now being finalised. The project will address all of the milestones under Outputs 3.6 and 3.7

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
3.7.1 Milestone	Conduct a detailed analysis of the current suite of policy instruments and governance frameworks	Dec 2006	Yes	A scoping study examining natural resource governance in the cotton industry has been completed. Discussions have been held with key stakeholders to define regions of interest and to establish research requirements	
3.7.2 Milestone	Undertake research into the socio-economic impacts of current natural resource management policies on cotton communities	Dec 2009	N/A	Output not due for completion until December 2009	The two PhD projects and overarching project currently being finalised will address this milestone
3.7.3 Milestone	Develop a range of scenarios which identify how changing environmental, social and policy issues may impact on cotton communities in the future	Dec 2010	N/A	Output not due for completion until December 2010	The two PhD projects and overarching project currently being finalised will address this milestone
3.7.4 Milestone	Illustrate through a range of scenarios, how changes associated with natural resource management policies will impact on regional communities, along with state-wide and national impacts	Dec 2011	N/A	Output not due for completion until December 2011	The two PhD projects and overarching project currently being finalised will address this milestone
3.7.5 Milestone	Demonstrate to the community, industry, LGAs, state and federal government the likely impacts and adjustments that these policies may require	March 2012	N/A	Output not due for completion until December 2012	The two PhD projects and overarching project currently being finalised will address this milestone

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
4.1 Output	**Objective measurement system for fibre fineness and maturity adopted internationally for trading cotton**	June 2011	N/A	Output not due for completion until June 2011	Further projects will also be developed
4.1.1 Milestone	Develop novel fibre measurement technology specifically for targeting direct assessment of fibre maturity	June 2007	Yes	Progressing to commercialisation	
4.1.2 Milestone	Completion of extension and training to key Australian and overseas mill customers demonstrating the value of the new measurements	December 2011	N/A	Output not due for completion until December 2011	Several projects established to contribute to this milestone
4.2 Output	**Agronomic factors affecting fibre quality and processing performance identified and optimised**	June 2009	N/A	Output not due for completion until June 2009	Several projects established to contribute to this milestone
4.2.1 Milestone	Development of guidelines on acceptable variation in fibre quality parameters for acceptable textile processing performance	June 2009	N/A	Output not due for completion until June 2009.	Several projects established to contribute to this milestone
4.2.2 Milestone	Development of guidelines on acceptable variation in fibre quality parameters for acceptable textile processing performance	June 2008	Yes	Collaborative arrangement are been established with merchants and international mills to assess new fibre parameters	
4.3 Output	**Improved harvesting and ginning processes to preserve fibre length**	June 2008	Yes	Slight improvements achieved – research continues to make improvements	New project established to contribute to this milestone
4.3.1 Milestone	Undertake a desk top study of the fibre damage that occurs during harvesting and assess potential for improvements to preserve fibre quality	June 2008	Yes	New research areas identified	
4.3.2 Milestone	Identification of new technology to preserve fibre quality during ginning/harvesting (fibre length preserved with corresponding reductions in short fibre content and neps.)	June 2009	N/A	Output not due for completion until June 2009	Several projects established to contribute to this milestone
4.4 Output	**Technical requirements to support marketing an Australian Cotton Brand or eco label**	June 2009	N/A	ACSA and CA continue discussions with international merchants. ACSA develop a new BMP web site to help promote BMP to mills Output not due for completion until June 2008	Several projects established to contribute to this milestone
4.4.1 Milestone	Identification of the key R&D requirements along the international supply chain for this marketing initiative	June 2006	Yes and continuing	New BMP to be developed for farm and management of cotton post farm	Future work in this area will be continued by CRDC

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
4.4.2 Milestone	Examination of the supply chain and development of any necessary technical or auditing protocols to meet marketing/labelling requirements	June 2007	Yes	New opportunities identified for premium cotton market	
4.4.3 Milestone	In conjunction with supply chain partners identify and assist to develop best practice procedures for cotton processing	June 2009	N/A	Output not due for completion until June 2009 New BMP to be developed for farm and management of cotton post farm	Several projects established to contribute to this milestone
4.5 Output	**Contamination in Australian cotton reduced by at least 50%**	June 2008	Yes	Completed	
4.5.1 Milestone	Quantify the extent and nature of contamination of Australian cotton	June 2007	Yes	Level of contamination determined	Repeat work in 2011
4.5.2 Milestone	Assist in the identification of appropriate practices and systems to minimise contamination in Australian Cotton	June 2008	Yes		
4.6 Output	**Aquaculture products from cotton farms**	June 2012	N/A	Output not due for completion until June 2012	Two projects established to contribute to this milestone
4.6.1 Milestone	Construct resource inventory of land, water and infrastructure suitable for aquaculture on cotton farms in NSW and Queensland with commercial partners	June 2006	Yes	Two projects established (funding $65,000 in 2005–06, $163,000 in 2006–07) have done inventories	
4.6.2 Milestone	Define projects and appoint students to investigate appropriate issue	June 2006	Yes	Completed	
4.6.3 Milestone	Reports of research complied and ready for extension	June 2009	Ongoing	Output not due for completion until June 2009	Several projects established to contribute to this milestone
4.6.4 Milestone	Studies completed and industry targets for aquaculture on cotton farms achieved	June 2012	Ongoing	Guidelines being developed	One project established to contribute to this milestone

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
1.1 Output	**Development of new tools or techniques to address current or future challenges to crop management to maximise intellectual property for commercial returns**	June 2012	N/A	Output not due for completion until June 2012	Further projects will also be developed
1.1.1 Milestone	Review and scope commercial opportunities, with potential commercial partners, to use technology to improve data acquisition and use, including hands-free direct to DSS data recording, use of high-speed mobile phone technology for downloading dat	Sept 2006	Yes		
1.1.2 Milestone	Initiate business plan with commercial partners on biopesticides and semiochemicals for mirids and other pests with commercial partners. Path for future development and validation defined	Dec 2007	Yes for semio-chemicals No for bio-pesticides	Agreements signed with Ag Biotech and Growth Agriculture for semiochemicals Partners withdrew biopesticide project from CRC	Opportunities for new biopesticide projects being investigated, however, given the long lead time from identification to commercialisation, this milestone may only be partially completed
1.1.3 Milestone	Negotiations with commercial partners for development of 'hands-free' and high speed downloading tools for crop checking	Dec 2008	N/A	Milestone not due for completion until Dec 2008	Student working on project
1.1.4 Milestone	Initiate discussions with commercial partner for electrical imaging	Dec 2008	N/A	Milestone not due for completion until Dec 2008	Provisional patent being examined
1.1.5 Milestone	Negotiations with commercial partners for evaporation polymer product	Dec 2008	N/A	Milestone not due for completion until Dec 2008	Joint project with CRC Polymers and CRC-IF is well advanced
1.1.6 Milestone	Commercialisation of new technologies with identified royalty flows to the CRC. Re-investment in enhancement of existing or discovery of new opportunities	June 2010	N/A	Milestone not due for completion until June 2010	
1.1.7 Milestone	Royalties flow to CCC CRC	June 2012	N/A	Milestone not due for completion until June 2012	
2.1 Output	**Knowledge to underpin the integrated management of river flows to ensure profitable irrigation industries and sustainable ecological condition of floodplain ecosystems**	June 2012	N/A	Output not due for completion until June 2012	
2.1.1 Milestone	Published system maps and current knowledge of environmental flows in Gwydir catchment extended to stakeholders	June 2008	Yes	A series of community newsletters have been developed and distributed to stakeholders. A recent Gwydir wetlands forum was held in Moree with key stakeholders showcasing the latest research in this area	More will also be done as current projects near completion

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
2.1.2 Milestone	Packaged flows model in tool kit and presented to stakeholders	June 2010	N/A	Milestone not due for completion until June 2010	
2.1.3 Milestone	River health indicators defined and distributed to stakeholders	June 2012	N/A	Milestone not due for completion until June 2012	
2.2 Output	**An improved understanding of the current condition of groundwater systems in cotton catchments and the demonstration of best practice scientific approaches for determining sustainable groundwater yields**	June 2012	N/A	Output not due for completion until June 2012	
2.2.1 Milestone	Published scoping report for stakeholders distributed on groundwater	June 2007	Yes	The groundwater scoping study for the Namoi catchment has been completed and several meetings held with key stakeholders to discuss the findings. Draft copies of the scoping studies for the Condamine Alliance, QMDC, Border Rivers-Gwydir, Lachlan and Macquarie have or are in the process of being reviewed. Delays have been due to relevant information not always being readily available	Once the review process is complete, the remaining scoping studies will be distributed to key stakeholders in October 2007
2.2.2 Milestone	Demonstration of 3D geological modelling and data representation capabilities and advice to irrigators and stakeholders responsible for the development of groundwater allocation plans	June 2010	N/A	Milestone not due for completion until June 2010	Additional funds have been obtained from National Water Initiative
2.2.3 Milestone	Ground water and surface water interactions models completed and extended to stakeholders	June 2012	N/A	Milestone not due for completion until June 2012	
2.3 Output	**Establish baselines for on-farm water quality and develop remediation processes with the capacity to deliver both farm and catchment benefits**	Dec 2011	N/A	Output not due for completion until Dec 2011	
2.3.1 Milestone	Published guidelines for growers on storage design criteria for biodiversity outcomes completed	June 2007	Yes	Guidelines addressing this milestone have been developed and the resulting information distributed via an industry wide mail out	
2.3.2 Milestone	Published guidelines for growers on storage management for irrigation and biodiversity outcomes	June 2010	N/A	Milestone not due for completion until June 2010	
2.3.3 Milestone	Commercial feasibility of bioremediation products for use in on-farm water ways and storages completed	December 2011	N/A	Milestone not due for completion until Dec 2011	

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
2.4 Output	**Best-practice guidelines for managing terrestrial biodiversity and ecosystem services on farms enabling growers to sustain production and increase profits and assisting catchment bodies achieve catchment targets**	June 2012	N/A	Output not due for completion until June 2012	
2.4.1 Milestone	Published guidelines for management of remnant vegetation and re-vegetation options on cotton farms and the implications for terrestrial biodiversity and ecosystem services	June 2008	Yes	A 2008 calendar and fact sheet series promoting management strategies for improving biodiversity on cotton farms based on the latest science was developed	
2.4.2 Milestone	Calculator for some aspects of ecosystem services completed	June 2009	N/A	Milestone not due for completion until June 2009	
2.4.3 Milestone	Packaged techniques and extension services on values of ecosystem services and monitoring terrestrial biodiversity to cotton growers and catchment communities completed	June 2011	N/A	Milestone not due for completion until June 2011	
2.5 Output	**Development of science-based information resources for cotton growers and catchment bodies which promote well informed, best practice natural resource management decisions and activities in cotton catchments**	June 2012	N/A	Output not due for completion until June 2012	
2.5.1 Milestone	Developed property and catchment planning tools and process-oriented to integrate land and water use decision making	June 2012	N/A	Milestone not due for completion until June 2012	
3.1 Output	**Detailed socio-economic analysis examining the impact of the cotton industry in key cotton growing regions**	June 2012	N/A	Output not due for completion until June 2012	
3.1.1 Milestone	Regional workshops completed and scoping study published and distributed	March 2006	Yes	The scoping study has been completed and the report distributed to LGA and industry representatives. Meetings have been held to discuss findings and establish research requirements	
3.1.2 Milestone	Major report completed. Report figures distributed via regional media	June 2008 Dec 2007	Yes	A major socio-economic report is nearing completion. Some of the findings have already been made publicly available and more will be done once the project is complete	The socio-economic project will be completed soon and as part of the dissemination of these research findings, stakeholder meetings will be held to explain the research. This will also be tied to more media releases

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
3.1.3 Milestone	Major analysis report completed. Participatory action project involving stakeholders.	Dec 2010	N/A	Milestone not due for completion until Dec 2010	
3.2 Output	**Work with regional indigenous communities and the cotton industry to undertake joint projects in which foster a greater cultural understanding, especially in relation to employment needs and opportunities**	June 2012	N/A	Output not due for completion until Dec 2012	
3.2.1 Milestones	Consultation with indigenous community across regions and steering committee established and research priorities set. Documentation of the process and thematic research areas disseminated	Dec 2006	Yes	Consultation with several indigenous community groups has occurred. A scoping study identifying opportunities for indigenous participation in the cotton industry has been completed and the results disseminated	
3.2.2 Milestone	Results and key learning's from projects extended to the industry and wider community.	June 2011	N/A	Milestone not due for completion until June 2011	
3.2.3 Milestone	Extension phase to work with industry and the wider community to increase their capacity in the area of indigenous engagement and assist in the adoption of key principles, learnings or pilot programs	March 2012	N/A	Milestone not due for completion until March 2012	
3.3 Output	**Identify the likely impact of future water and natural resource management policies on the cotton industry and the socio-economic consequences for regional communities**	June 2012	N/A	Output not due for completion until June 2012	
3.3.1 Milestones	Scoping study completed, including engagement with peak stakeholders as part of extension process and network establishment	Dec 2006	Yes	A scoping study examining natural resource governance in the cotton industry has been completed. Discussions have been held with key stakeholders to discuss findings and to establish networks and identify opportunities for further joint projects	
3.3.2 Milestone	Develop a range of scenarios which illustrate how changes associated with natural resource management policies will impact on industry and regional communities	December 2011	N/A	Milestone not due for completion until Dec 2011	
4.1 Output	**Objective measurement system for fibre fineness and maturity adopted internationally for trading cotton**	June 2011	N/A	Output not due for completion until June 2011	
4.1.1	Ratification of the instrumentation by the ITMF - Fibre Fineness and Maturity Working Group for commercialisation development	June 2007	Yes		

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
4.1.2 Milestone	Ratification of the instrumentation by the ITMF - Fibre Fineness and Maturity Working Group for commercialisation development	June 2009	N/A	Milestone not due for completion until June 2009	
4.1.3 Milestone	Completion of extension and training to key Australian and overseas mill customers demonstrating the value of the new measurements	June 2011	N/A	Milestone not due for completion until June 2011	
4.2 Output	**Agronomic factors affecting fibre quality and processing performance identified and optimised**	June 2012	N/A		
4.2.1 Milestone	Delivery of an industry extension initiative that links with all related industry information initiatives, focusing on management for enhanced fibre quality	June 2012	N/A	Milestone not due for completion until June 2012	
4.3 Output	**Improved harvesting and ginning processes to preserve fibre length**	June 2010	N/A	Milestone not due for completion until June 2010	
4.3.1 Milestone	Undertake a desk top study of the fibre damage that occurs during harvesting and assess potential for improvements to preserve fibre quality	June 2008	No	A project call was made for assessing picking technologies, but was unsuccessful.	A commissioned project is being planned for 2009
4.3.2 Milestone	Identification of new technology to preserve fibre quality during ginning/harvesting (fibre length preserved with corresponding reductions in short fibre content and neps)	June 2009	N/A	Milestone not due for completion until June 2009	
4.3.3 Milestone	Development and technology transfer of a package appropriate to the wider Australian harvesting and ginning industry	June 2011	N/A	Milestone not due for completion until June 2011	
4.4 Output	**All technical requirements in place to support a marketing initiative (Eco-label cotton) for environmentally friendly consumer products if industry business plan is viable**	June 2009	N/A	Output not due for completion until June 2009	
4.4.1 Milestone	In conjunction with supply chain partners identify and assist to develop best practice procedures for cotton processing	June 2009	N/A	Milestone not due for completion until June 2009	
4.5 Output	Contamination in Australian cotton reduced by at least 50%	June 2008	Yes	Completed	
4.5.1 Milestone	Quantify the extent and nature of contamination of Australian cotton	June 2007	Yes	Level of contamination determined	

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
4.5.2 Milestone	Assist in the identification of appropriate practices and systems to minimise contamination in Australian Cotton	June 2008	Yes	BMP have been developed for the Ginning sector	Contamination to be include within FIBREpak manual which addresses fibre quality across the value chain
4.6 Output	**Value adding to existing cotton farm infrastructure through aquaculture**	June 2012	N/A	Output not due for completion until June 2012	
4.6.1 Milestone	Inventory of land, water and infrastructure suitable for aquaculture on cotton farms in NSW and Queensland with commercial partners to generate potential market providers	June 2006	Yes	Inventories completed work progressing in NSW only	Aquaculture projects were reviewed April 2007. Queensland project related to this milestone was cancelled owing to shift in priorities of commercial partner
4.6.2 Milestone	Develop guidelines for developing aquaculture on cotton farms	Achievement date June 2009	N/A	Milestone not due for completion until June 2009	
4.6.3 Milestone	Extension sites established	June 2010	N/A	Milestone not due for completion until June 2010	
4.6.4 Milestone	Guidelines, including economic assessment of aquaculture on cotton farms completed	2010	N/A	Milestone not due for completion until June 2010	
5.1 Output	**Knowledge transfer by national extension network**	June 2012	N/A	Milestone not due for completion until June 2012	
5.1.1 Milestone	Plan implementation of recommendations from the 2005 Review of Extension in the Cotton Industry	Sept 2005	Yes	Re-investment and re-establishment of the National Cotton Extension Team Completed in 2007	
5.1.2 Milestone	Appoint Education and Extension manager	Oct 2005	Yes	Extension and Knowledge manager Appointed	
5.1.3 Milestone	Initial national extension programs developed and implemented	June 2006	Yes	Extension programs operational, however have been enhanced in 2006–07	
5.1.4 Milestone	Evaluate effectiveness and targets and implement revised strategies	June 2007	Yes	NCET approach re-developed around a regional and national framework aligned to regional priorities identified by a Regional Advisory Panel and core Industry Issues as aligned to key Industry Research areas	
5.1.4 Milestone	Evaluate outcomes and effectiveness and compile business plan in relation to end of CRC life	June 2010	N/A	Milestone not due for completion until June 2010	
5.1.5 Milestone	Knowledge and utilisation transfer by national extension network achieved	June 2012	N/A	Milestone not due for completion until June 2012	
5.2 Output	**CRC Information Centre delivery to markets information products and services**	June 2012	N/A	Milestone not due for completion until June 2012	

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
5.2.1 Milestone	Information Centre established	Aug 2005	Yes	Officer appointed and project will continue into the future	
5.2.2 Milestone	Information and knowledge needs strategies completed	June 2006	Yes	Ongoing process of CRC	
5.2.3 Milestone	Information suite of products (CDs, paks, publications, video, etc) produced from synthesized data from research projects	June 2006	Yes	New Cotton Paks CD released	
5.2.4 Milestone	Information suite of products (CDs, paks, publications, video, etc) produced from synthesized data from research projects	June 2007	Yes	Ongoing process of CRC	
5.2.5 Milestone	Information suite of products (CDs, paks, publications, video, etc) produced from synthesized data from research projects	Dec 2008	N/A	Milestone not due for completion until Dec 2008	
5.2.6 Milestone	Information suite of products (CDs, paks, publications, video, etc) produced from synthesized data from research projects	June 2009	N/A	Milestone not due for completion until June 2009	
5.2.7 Milestone	Information suite of products (CDs, paks, publications, video, etc) produced from synthesized data from research projects.	June 2010	N/A	Milestone not due for completion until June 2010	
5.2.8 Milestone	Evaluate benefits of resource centre and plan exit strategy and review	June 2010	N/A	Milestone not due for completion until June 2010	
5.2.9 Milestone	Information suite of products (CDs, paks, publications, video, etc) produced from synthesized data from research projects	June 2011	N/A	Milestone not due for completion until June 2011	
5.2.10 Milestone	Information suite of products (CDs, paks, publications, video, etc) produced from synthesized data from research projects	June 2012	N/A	Milestone not due for completion until June 2012	
5.2.11 Milestone	Key products (packs, CDs, brochures etc) and services delivered	June 2012	N/A	Milestone not due for completion until June 2012	
5.3 Output	**Decision Support tools in use by market clients**	June 2012	N/A	Output not due for completion until June 2012	
5.3.1 Milestone	Decision Support System Business Plan developed	June 2006	Yes		
5.3.2 Milestone	Opportunities from business plan progressed and enhanced decision support tools and packages developed and released. Markets monitored	June 2007	Yes	Business plan reviewed by investors (CSIRO& CRDC) Decision made to end some projects	A program has been retained by Cotton CRC to deliver web based tools

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
5.3.3 Milestone	New suite of tools released	June 2009	N/A	Milestone not due for completion until June 2009	
5.3.4 Milestone	Decision support systems and information packages developed and delivered to industry	June 2012	N/A	Milestone not due for completion until June 2012	
5.4 Output	**Web site for knowledge diffusion to CRC markets and general Australian public**	July 2012	N/A	Milestone not due for completion until June 2012	
5.4.1 Milestone	New CRC web site established	Dec 2005	Yes	www.cotton.crc.org.au	Revised domain name www.cottoncrc.org.au
5.4.2 Milestone	Website use and effectiveness reviewed	June 2006	Yes	Review underway and plans in place to enhance website for new technologies	
5.4.3 Milestone	New web based decision tools operating	June 2006	Yes	A new water quality calculator is available on the CRC website	
5.4.4 Milestone	Website use and effectiveness reviewed and restructured with new features. Major Update	June 2007	Yes	A review of the prior website was undertaken and a scoping across several forums and all participants was undertaken to understand evolving requirements of the CRC. Against these needs a new website based on a content management system was developed, to better cater to the expansion of information and knowledge management for the Cotton Catchment Communities CRC. This was launched on the 29th of June 2007	
5.4.5 Milestone	Website use and effectiveness reviewed	June 2010	N/A	Milestone not due for completion until June 2010	
5.4.5 Milestone	Website delivered CRC knowledge	June 2012	N/A	Milestone not due for completion until June 2012	
5.5 Output	**Media release for knowledge diffusion to markets and Australian public**	June 2012	N/A	Milestone not due for completion until June 2012	
5.5.1 Milestone	Communications Unit established	Aug 2005	Yes	Communications Unit fully functional for meeting Output requirements	
5.5.2 Milestone	Communications strategy developed 20 media releases dispatched	June 2006	Yes	24 media releases dispatched	

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
5.5.2 Milestone	20 media releases dispatched	June 2007	Yes	40 media releases dispatched	
5.5.3 Milestone	20 media releases dispatched	June 2008	Yes	45 media releases dispatched	
5.5.4 Milestone	20 Media releases dispatched	June 2009	N/A	Milestone not due for completion until June 2009	
5.5.5 Milestone	20 Media releases dispatched	June 2010	N/A	Milestone not due for completion until June 2010	
5.5.6 Milestone	20 Media releases dispatched	June 2011	N/A	Milestone not due for completion until June 2011	
5.5.7 Milestone	20 Media releases dispatched	June 2012	N/A	Milestone not due for completion until June 2012	
5.6 Output	**Cotton Exhibition Centre providing knowledge products to community**	June 2012	N/A	Milestone not due for completion until June 2012	
5.6.1 Milestone	Fund water and catchment exhibit	Aug 2005	Yes	Exhibit funded and has been being constructed. Excellent visitor feedback being received	
5.6.2 Milestone	Water exhibit launched with other partners	March 2006	Yes	Minister for Environment and Water Resources, the Hon John Cobb MP officially launched water exhibit on 7th August 2007	
5.6.3 Milestone	Review exhibits for technical content	June 2006	Yes		
5.6.4 Milestone	Review exhibits for technical content	June 2007	Yes	A major technical review and scoping for new exhibits was undertaken in August 2007 by multiple stakeholders	
5.6.5 Milestone	Review exhibits for technical content. Upgrade Water exhibit	June 2009	N/A	Milestone not due for completion until June 2009	
5.6.6 Milestone	Review exhibits for technical content	June 2011	N/A	Milestone not due for completion until June 2011	
5.7 Output	**Technical support provided for the adoption of the cotton industry's Best Management Practices program in collaboration with Cotton Australia**	June 2012	N/A	Output not due for completion until June 2012	

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
5.7.1 Milestone	Cotton Australia team inducted to CRC	Dec 2005	Yes	Partnership with regional NRM bodies is aiding in delivery of BMP program Series of BMP Land and Water Management workshops held with Cotton Australia. Joint activity will continue in 2006–07	
5.7.2 Milestone	Business plan for technical support to BMP Land and Water developed	June 2006	Yes		Cotton Industry is completing a major review of BMP in 2006
5.7.3 Milestone	Publication products and technical service networks to support BMP Land and Water Management module operating	June 2006	Yes		
5.7.4 Milestone	General Manager BMP appointed	June 2007	Yes	Cotton Australia Growers Service Managers are involved in the regional planning and National Priority Teams to provide practical integration of BMP and Extension Services	A BMP General Manager has been jointly-funded by industry to drive the implementation of a 'new' way of delivering the BMP Program
5.7.5 Milestone	New BMP Business Plan and Product operating	June 2008	Yes	Framework for delivery has been developed with product currently being piloted. Due for wide scale release 2009	
5.7.6 Milestone	Products and technical service network s to support BMP operating	June 2009	N/A	Milestone not due for completion until June 2009	
5.7.7 Milestone	Products and technical service network s to support BMP operating	June 2010	N/A	Milestone not due for completion until June 2010	
5.7.8 Milestone	Products and technical service network s to support BMP operating	June 2011	N/A	Milestone not due for completion until June 2011	
5.7.9 Milestone	Publication products and technical service network to support BMP operating	June 2012	N/A	Milestone not due for completion until June 2012	
5.9 Output	**Establish and maintain key data sets for monitoring practice change and evaluating Triple Bottom line outcomes**	2010	N/A	Milestone not due for completion until 2010	
5.9.1 Milestone	Major report published and distributed	June 2008	Yes	Ongoing evaluation occurring to form the basis of the published 3rd year review	Baseline reports collected in 2006, 2007 and 2008
5.9.2 Milestone	Major report published and distributed	June 2010	N/A	Milestone not due for completion until June 2010	

End-user name	Relationship with CRC	Type of activity and end-user location	Nature / scale of benefits to end-user	Actual or expected benefit to end-user
Ag Biotech Pty Ltd	Industry Affiliate	Commercialisation	Licence to use CRC research Project 1.05.02 'Chemical ecology of insects' for a period of time to undertake product development	Sales of product. Royalties are earned by the Cotton CRC from these sales and are commercial in confidence
Australian Cotton Growers Research Association	Industry Participant	Advising of research directions and strategy and providing on ground resources for grower trials Implementation of research	Increase in productivity, reduced costs and increased sustainability for growers	In the long term, economic benefits amounting to $1 billion is expected from CRC research
Aquatech	Industry Affiliate	Contract research to the CRC	Participation in water use efficiency and water storage projects will raise profile and increase sales of monitoring equipment	Project recently commissioned. Cotton Growers benefiting from predicted water use efficiency gains
Cotton Seed Distributors	Industry Participant	Adoption of CRC research. Assistance with extension of research outputs/	Increased sales of cotton seed through a more productive and expanded cotton industry	Current limitations in the availability of water make it difficult to assess long term benefits at this stage
Dunavant Enterprises Pty Ltd	Industry Affiliate	Adoption of CRC research	Reduced contamination in Australian cotton will mean fewer quality discounts and a better reputation in the marketplace	Project has already identified areas in which contamination can be reduced
Incitec Pivot Ltd Nutrient Monitoring Systems	Industry Affiliate Project Partner	Adoption of CRC research	Increased revenue from more effective methods of soil testing and better decisions	Fertiliser sales and cost savings for growers
Monsanto Australia Inc	Industry Affiliate	Adoption of CRC research	Increased use of transgenic cotton, generating more license revenue and improved sustainability of GM technology	Approximately 95% of the Australian crop is now transgenic, and CRC research underpins the sustainability. Monsanto have increased their contribution to the CRC
Growth Agriculture Pty Ltd	Project Partner	Commercialisation	New product and sales	Product Sales
Borders Rivers-Gwydir Catchment Management Systems	Project Partner	Adoption of CRC research	Ability to meet catchment targets	Improved water use efficiency Improved farm practice
Aboriginal Employment Strategy Pty Ltd	Community Affiliate	Employment	Improved ability to place aboriginal job seekers in cotton-related work	Project underway with 5 student traineeships based at the Australian Cotton Research Institute
Australian Cotton Shippers Association	Industry Affiliate	Adoption of CRC research	Reduced contamination in Australian cotton will mean fewer quality discounts and a better reputation in the marketplace	Project has already identified areas in which contamination can be reduced
Boyce Chartered Accountants	Industry Affiliate	Contracted research from CRC	All cotton growers benefit from the knowledge	Report on profitability of cotton published
Cotton Australia	Industry Participant	Adoption of CRC research	Training programs will upskill operators in several sections of the industry	Implementation of BMP program, which has economic outcomes for growers

End-user name	Relationship with CRC	Type of activity and end-user location	Nature / scale of benefits to end-user	Actual or expected benefit to end-user
Crop Consultants Australia Inc. (Formerly Cotton Consultants Australia)	Industry Affiliate	Adoption of CRC research, contracted research from CRC	CRC adoption projects will transfer knowledge to consultants, who are key agents in knowledge transfer to growers. CCA also contracted to survey growers for triple bottom line monitoring	Increased knowledge and capacity for members and member grower customers
Primary Science Matters (Non-Participant)	Community Project Partner	Financial assistance from CRC	Science in a Box	CRC contributed $10,900 to this schools-based education program Education and knowledge of science in schools
National Water Commission	Project Partner	Adoption of CRC research	Improved water use efficiency and reduced evaporation and seepage losses	CRC water research is expected to improve WUE by 50%
Namoi Catchment Management Authority	Catchment Affiliate	Adoption of CRC research	Ability to meet catchment targets	Improved water use efficiency Improved farm practice Improved riparian and environmental outcomes
Central West Catchment Management Authority	Project Partner	Adoption of CRC research	Ability to meet catchment targets	Improved water use efficiency Improved farm practice Improved riparian and environmental outcomes
Condamine Alliance	Catchment Affiliate	Adoption of CRC research	Ability to meet catchment targets	Improved water use efficiency Improved farm practice Improved riparian and environmental outcomes
Queensland Murray Darling Committee	Catchment Affiliate	Adoption of CRC research	Ability to meet catchment targets	Improved water use efficiency Improved farm practice Improved riparian and environmental outcomes
SACOA Pty Ltd	Project partner	Adoption of CRC research	CRC research will enable the use of petroleum spray oils against new insect pests, thus increasing revenue	Product sales
Inverell Shire Council	Community Affiliate	Adoption of CRC research	Improved ability to predict and target local government services to meet regional community needs	Socio Economic study understanding of benefits of a cotton to the community
Millmerran Shire Council	Community Affiliate	Adoption of CRC research	Improved ability to predict and target local government services to meet regional community needs	Socio Economic study understanding of benefits of a cotton industry to the community
Narrabri Shire Council	Community Affiliate	Adoption of CRC research	Improved ability to predict and target local government services to meet regional community needs	Socio Economic study understanding of benefits of a cotton industry to the community
Narromine Shire Council	Community Affiliate	Adoption of CRC research	Improved ability to predict and target local government services to meet regional community needs	Socio Economic study understanding of benefits of a cotton industry to the community
Warren Shire Council	Community Affiliate	Adoption of CRC research	Improved ability to predict and target local government services to meet regional community needs	Socio Economic study understanding of benefits of a cotton industry to the community

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
1.1 Output	**50 post graduate students graduated**	June 2012	N/A	Output not due for completion until June 2012	Currently have 40 students projects underway with further projects to be start in year 3
1.1.1 Milestone	Commence 15 PhD and Masters scholarships Rnd 1	Feb 2006	Yes – 20 enrolled		
1.1.2 Milestone	Commence 15 PhD and Masters scholarships Rnd 2	Feb 2007	Yes – 11 enrolled		
1.1.3 Milestone	Commence 15 PhD and Masters scholarships Rnd 3	Feb 2008	Yes – 16 enrolled		
1.1.4 Milestone	Commence 5 PhD and Masters scholarships Rnd 4	Feb 2009	N/A	Milestone not due for completion until Feb 2009	
1.1.5 Milestone	Graduate 10 PhD and Masters Students Rnd 1	June 2009	N/A	Milestone not due for completion until June 2009	
1.1.6 Milestone	Graduate 15 PhD and Masters Students Rnd 2	June 2010	N/A	Milestone not due for completion until June 2010	
1.1.7 Milestone	Graduate 15 PhD and Masters Students Rnd 3	June 2011	N/A	Milestone not due for completion until June 2011	
1.1.8 Milestone	Graduate 10 PhD and Masters Students Rnd 4	June 2012	N/A	Milestone not due for completion until June 2012	
1.2 Output	**13 Honours/Internships scholarships completed**	Dec 2011	N/A	Output not due for completion until Dec 2011	
1.2.1 Milestone	1 internship completed	Dec 2005	Yes – 1 completed		
1.2.2 Milestone	2 Honours/ internships completed	Dec 2006	Yes – 3 completed		
1.2.3 Milestone	2 Honours/ internships completed	Dec 2007	Yes – 3 completed		
1.2.4 Milestone	2 Honours/ internships completed.	Dec 2008	Yes – 2 completed		
1.2.5 Milestone	2 Honours/ internships completed	Dec 2009	N/A	Milestone not due for completion until Dec 2009	
1.2.6 Milestone	2 Honours/ internships completed	Dec 2010	N/A	Milestone not due for completion until Dec 2010	

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
1.2.7 Milestone	2 Honours/ internships completed	Dec 2011	N/A	Milestone not due for completion until Dec 2011	
1.3 Output	**38 Summer Scholarships completed for undergraduate students from partner universities**	March 2012	N/A	Output not due for completion until March 2012	
1.3.1 Milestone	5 Summer scholarships completed	March 2006	Yes – 5 completed		
1.3.2 Milestone	6 Summer scholarships completed	March 2007	Yes – 7 completed		
1.3.3 Milestone	6 Summer scholarships completed	March 2008	Yes – 6 completed		
1.3.4 Milestone	6 Summer scholarships completed	March 2009	N/A	Milestone not due for completion until March 2009	
1.3.5 Milestone	6 Summer scholarships completed	March 2010	N/A	Milestone not due for completion until March 2010	
1.3.6 Milestone	5 Summer scholarships completed	March 2011	N/A	Milestone not due for completion until March 2011	
1.3.7 Milestone	4 Summer scholarships completed	March 2012	N/A	Milestone not due for completion until March 2012	
1.4 Output	**Pathways for articulation towards a Masters of Agriculture Course in Cotton Production through partner Universities and professional doctorate (PhD status) following masters program**	June 2008	N/A	Output not due for completion until June 2008	
1.4.1 Milestone	Develop a course of appropriate units from specialist disciplines offered by partner universities for study in cotton production at Masters level.	Jan 2007	No	This process has commenced and will be completed in 2007–2008.	Preliminary plan received, expanded version with more exploration of potential opportunities to enhance the tertiary Cotton Course is to be delivered in December 2008
1.4.2	Offer a pathway to a Professional Doctorate through cotton related units appropriate to cotton industry employment objectives	June 2008	Yes		
1.5 Output	**125 Graduates of Post Grad Certificate and Certificate in Cotton Production**	June 2012	N/A	Output not due for completion until June 2012	

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
1.5.1 Milestone	Develop and progress course business plan	Dec 2006	No	Business plan is being developed in 2007–2008	Preliminary plan received, expanded version with more exploration of potential opportunities to enhance the tertiary Cotton Course is to be delivered in December 2008
1.5.2 Milestone	10 course graduates	June 2006	No	3 graduations, demand reduced due to drought	
1.5.3 Milestone	15 course graduates	June 2007	No	4 graduations, change in UNE regulations means delay in graduation	A large number of graduations is expected in 2008 following regulation changes
1.5.4 Milestone	15 course graduates	June 2008	No	A total of 30 students have completed the requirements for the Certificate courses since 2005, but many have subsumed the award into other degrees eg Masters	Business plan being developed will include market research and promotion activities for the course
1.5.5 Milestone	20 course graduates	June 2009	N/A	Milestone not due for completion until June 2009	
1.5.6 Milestone	20 course graduates	June 2010	N/A	Milestone not due for completion until June 2010	
1.5.7 Milestone	20 course graduates	June 2011	N/A	Milestone not due for completion until June 2011	
1.5.8 Milestone	20 course graduates	June 2012	N/A	Milestone not due for completion until June 2012	
1.6 Output	**Tailored cotton short-courses to Agribusiness**	June 2011	N/A	Output not due for completion until June 2011	
1.6.1 Milestone	Develop a business plan for tailored short-courses for growers and agribusiness in irrigation, nutrition, pest management, fibre quality or other topics	June 2006	Yes		
1.6.2 Milestone	Complete short course pilots courses for 30 people	June 2006	Yes	CRC has delivered a number of short courses through various projects	
1.6.3 Milestone	Complete short course pilots courses for 60 people	June 2007	Yes	CRC has delivered a number of short courses through various projects	
1.6.4 Milestone	Complete short course pilots courses for 60 people	June 2009	N/A	Milestone not due for completion until June 2009	
1.6.5 Milestone	Complete short course pilots courses for 60 people	June 2011	N/A	Milestone not due for completion until June 2011	
Output 1.7	**Vocational education courses for growers and consultants**	June 2012	N/A	Output not due for completion until June 2012	

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
1.7.1 Milestone	Establish working group of partner vocational education providers to scope existing training and develop new resources	Dec 2005	Yes	Working group established. Discussions will be ongoing	
1.7.2 Milestone	Appoint a Vocational Education Training coordinator	June 2006	Yes	Ongoing	
1.7.3 Milestone	Establish articulation-learning pathways for certificate trade level students to achieve higher education qualifications	June 2007	Yes	Ongoing	
1.7.4 Milestone	Relevant course operating and people completing	June 2008	Yes	CRC has delivered a number of VTE aligned short courses through various projects including Soils Health workshops and the Irrigated Cotton and Grains Seminar Series. Additionally, the BMP Farm Manger qualification has just been recognised within the VTE system.	
1.7.5 Milestone	Relevant course operating and people completing	June 2009	N/A	Milestone not due for completion until June 2009	
1.7.6 Milestone	Relevant course operating and people completing	June 2010	N/A	Milestone not due for completion until June 2010	
1.7.7 Milestone	Relevant course operating and people completing	June 2011	N/A	Milestone not due for completion until June 2011	
1.7.8 Milestone	Relevant course operating and people completing	June 2012	N/A	Milestone not due for completion until June 2012	
Output 1.8	**Relevant cotton related science in syllabus of primary and high schools**	June 2011	N/A	Output not due for completion until June 2011	
1.8.1 Milestone	Contribute to Primary Science matters at 3 schools (June 2006)	June 2006	Yes	5 schools supported	
1.8.2 Milestone	Develop business strategy for schools	Dec 2006	Yes	Strategy has now been completed (Sep 2007)	
1.8.3 Milestone	Integrate CRC outputs into Primary Schools	June 2008	Yes	Schools Liaison Officer appointed and school visits occurring	
1.8.4 Milestone	Integrate CRC outputs into High Schools	June 2009	N/A	Milestone not due for completion until June 2009	
Output 1.9	**Scientific exchanges**	June 2011	N/A	Output not due for completion until June 2011	

Output / Milestone Number	Description	Contracted Achievement Date	Achieved (Yes or No)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
1.9.1 Milestone	5 completed.	June 2007	Yes – 9 completed		Another call planned in 2008
1.9.2 Milestone	5 completed.	June 2008	Yes – 18 completed		5 more approved for 2008–09
1.9.3 Milestone	5 completed.	June 2009	N/A	Milestone not due for completion until June 2009	
1.9.4 Milestone	5 completed	June 2010	N/A	Milestone not due for completion until June 2010	
1.9.5 Milestone	2 completed.	June 2011	N/A	Milestone not due for completion until June 2011	

GLOSSARY OF TERMS

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ACGRA	Australian Cotton Growers Research Association
ACIPA	Australian Centre for Intellectual Property in Agriculture
ACRI	Australian Cotton Research Institute
ACSA	Australian Cotton Shippers Association
ANU	Australian National University
AWA	Department of Agriculture and Food, Western Australia
BMP	Best Management Practices program
CARE	Centre for Agricultural and Regional Economics
CCA	Crop Consultants Australia Ltd. *(formerly Cotton Consultants Australia Ltd)*
CCAA	Cotton Classers' Association of Australia
CMSE	CSIRO Materials Science and Engineering
CRC	Cooperative Research Centre
CRC IF	CRC for Irrigation Futures
CTFT	CSIRO Textile and Fibre Technology. *(now a program within CSIRO Materials Science and Engineering)*
CMA	Catchment Management Authority
Cotton CRC	Cotton Catchment Communities Cooperative Research Centre
CRDC	Cotton Research and Development Corporation
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSU	Charles Sturt University
CWA	Country Women's Association
DBIRD	Northern Territory Department of Business, Industry and Resource Development
DEST	Australian Government Department of Education, Science and Training *(now the Department of Education and Workplace Relations. This Department formerly administered the Australian Government CRCs Programme)*
DIISR	Australian Government Department of Industry, Innovation, Science and Research. *(This Department now administers the Australian Government CRCs Programme)*
FUSCOM	Fusarium Committee
GM	Genetically modified
GRDC	Grains Research and Development Corporation
IPM	Integrated Pest Management
IWM	Integrated Weed Management
LGA	Local Government Authority
LWA	Land and Water Australia
NCEA	National Centre for Engineering in Agriculture
NHT	National Heritage Trust
NRM	Natural resource management
NSW DET	New South Wales Department of Education and Training
NSW DPI	New South Wales Department of Primary Industries
NSW TAFE	New South Wales Technical and Further Education
QDPI&F	Queensland Department of Primary Industries and Fisheries
QDNRW	Queensland Department of Natural Resources and Water
QUT	Queensland University of Technology
TIMS	Transgenic and Insect Management Strategy Committee
UCQ	University of Central Queensland
UNE	The University of New England
UNSW	University of New South Wales
UQ	University of Queensland
US	The University of Sydney
UTS	University of Technology, Sydney
WUE	Water Use Efficiency

www.cottoncrc.org.au

CRC Participants

ACGRA

Australian Government
Cotton Research and Development Corporation

COTTON AUSTRALIA

NSW DEPARTMENT OF PRIMARY INDUSTRIES

Queensland Government
Department of Primary Industries and Fisheries

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