CRDC

ANNUAL OPERATIONAL PLAN

2018–19

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Responsible Minister

The Hon. David Littleproud MP
Minister for Agriculture and Water Resources

CRDC Board

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Deputy Chair	Kathryn Adams
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Cover Image: Ruth Redfern

About CRDC

The Cotton Research and Development Corporation (CRDC) delivers outcomes in cotton research, development and extension (RD&E) for the Australian cotton industry.

A partnership between the Commonwealth Government and cotton growers, CRDC exists to invest in world-leading RD&E to benefit Australia's dynamic cotton industry, and the wider community. We invest in innovation and transformative technologies to deliver impact, and as an organisation we are ambitious, agile, and adaptive.

Cotton is a major contributor to the economic, environmental and social fabric of rural Australia. The industry's national exports generate an average of $1.9 billion in annual revenue, and the industry is a major employer in rural and regional communities.

The industry continues to go through a period of growth: in recent years, cotton has expanded from its predominate growing base in NSW and QLD to VIC, and commercial trials are underway in the NT and WA.

RD&E and its resulting innovations are a key driving force behind our industry's continued success – and CRDC's purpose is to power the success of Australian cotton through this world-leading RD&E.

CRDC

Contents

World-leading RD&E

The Australian cotton industry is an agricultural success story. A culture of innovation within the industry, which embraces RD&E, has been a major contributor to this success.

Melanie Jenson

Introduction

CRDC's investments are governed by a five-year strategic plan, and the 2018–19 year marks the first year under CRDC's new Strategic RD&E Plan 2018–23.

The new plan builds on the success of the preceding five-year plan and provides an ambitious roadmap for CRDC's investments. Through this plan, our aim is to contribute to creating $2 billion in additional gross value of cotton production for the benefit of Australian cotton growers and the wider community.

As such, the 2018–19 year marks a crucial year for CRDC in ensuring the first round of strategic RD&E investments under this plan help set the direction for the Australian cotton industry – one of innovation, increased commercialisation and digital transformation.

To help achieve this, Australian cotton growers and the Commonwealth Government will co-invest $24.3 million through CRDC into cotton RD&E during 2018–19, across approximately 300 projects and in collaboration with around 100 research partners.

The investments will be made in five key areas identified in the new Strategic RD&E Plan:

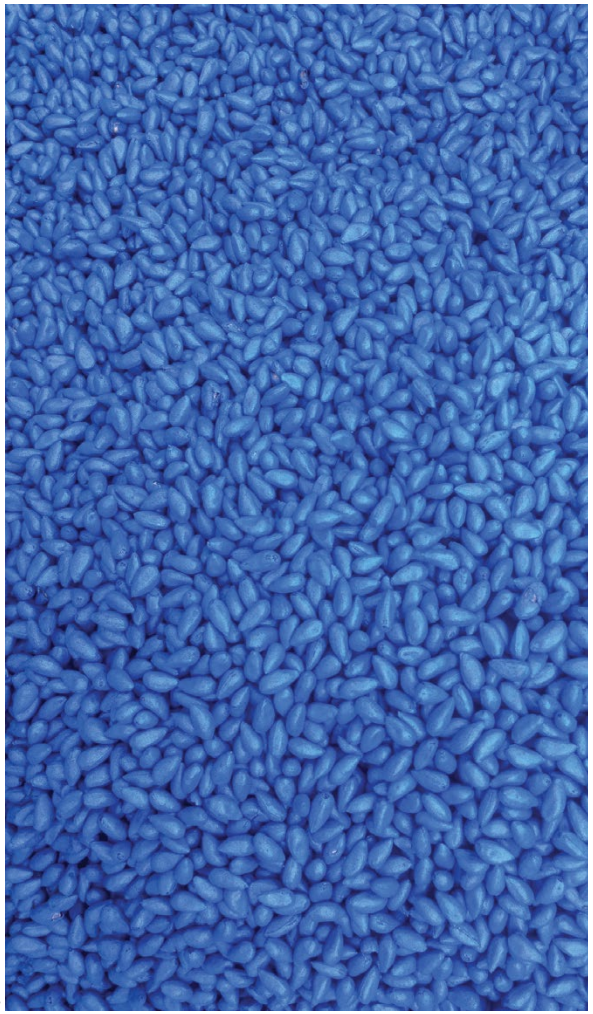
- increasing productivity and profitability on Australian cotton farms;
- improving cotton farming sustainability and value chain competitiveness;
- building the adaptive capacity of the Australian cotton industry;
- strengthening partnerships and adoption; and
- driving RD&E impact.

This Annual Operational Plan outlines these investments and the targets CRDC aims to achieve in the 2018–19 year.

Ruth Redfern

CRDC's Strategic RD&E Plan 2018–23 snapshot

GOALS	KEY FOCUS AREAS
Increase productivity and profitability on cotton farms	• Optimised farming systems • Transformative technologies • Protection from biotic threats and environmental stresses
Improve cotton farming sustainability and value chain competitiveness	• Sustainability of cotton farming • Create higher-value uses for cotton • Measurement and reporting throughout the value chain
Build adaptive capacity of the cotton industry	• Science and innovation capability, and new knowledge • Futures thinking
ENABLING STRATEGIES	**KEY FOCUS AREAS**
Strengthening partnerships and adoption	• Partnerships and collaboration • Best practice (*my*BMP) • Innovation and commercialisation
Driving RD&E impact	• Impact and effectiveness



Kym Redfern

Our R&D investment priorities: the 2018–23 CRDC Strategic RD&E Plan

CRDC has documented five strategic outcomes that it seeks to achieve under the 2018–23 Strategic RD&E Plan, which in turn are the key focus areas for R&D investment under this 2018–19 Annual Operational Plan:

GOAL 1: Increasing productivity and profitability on Australian cotton farms

GOAL 2: Improving cotton farming sustainability and value chain competitiveness

GOAL 3: Building the adaptive capacity of the Australian cotton industry

ENABLING STRATEGY 1: Strengthening partnerships and adoption

ENABLING STRATEGY 2: Driving RD&E impact

Through focusing on these five strategic priorities, CRDC will achieve its outcome of delivering *increased economic, social and environmental benefits for the Australian cotton industry, and the wider community, by investing in knowledge, innovation and its adoption.*

Achievement against these outcomes will be monitored, evaluated and reported annually, in both the Annual Report and the Portfolio Budget Statement. The Strategic RD&E Plan targets are outlined in this table.

Strategic Plan goals	Performance criteria	End of Plan targets (to achieve by 2023)	2018-19 targets
GOAL 1: Increase productivity and profitability on cotton farms	Improved yield and quality	Increase in average bales/ha to 11.6 bales/ha for irrigated cotton, and 4.7 bales/ha for dryland cotton	Annual increase of 0.35 bales per hectare for irrigated cotton, and 0.14 bales per hectare for dryland cotton.
GOAL 2: Improve cotton farming sustainability and value chain competitiveness	CRDC collaborates in global leadership for sustainability initiatives	CRDC participates in 6 global initiatives	CRDC participates in 6 global initiatives
GOAL 3: Build adaptive capacity of the cotton industry	Science and innovation capacity is strengthened and strategically fit for a digital future	50+ researchers supported through strategic career pathways	10+ new/early career researchers supported through strategic career pathways.
ENABLING STRATEGY 1: Strengthening partnerships and adoption	Partnerships are strengthened to engage multi-disciplinary and multi-institutional resources (centres of excellence)	40 per cent of CRDC investments include cross sectoral partnerships	40 per cent of CRDC investments include cross sectoral partnerships
ENABLING STRATEGY 2: Driving RD&E impact	CRDC monitors and evaluates RD&E impact	CRDC delivers 5 RD&E impact reports	One RD&E impact report per annum.

Our five key investment priorities

GOAL ONE: Increasing productivity and profitability on Australian cotton farms

Increasing the productivity and profitability on Australian cotton farms by $1.5 billion by 2023 is CRDC's aim within this goal. To achieve this, CRDC will focus investments in RD&E to deliver optimised farming systems, adapt transformative technologies and protect our industry from biotic threats and environmental stresses.

Our investment priorities will help improve production yield, quality and input efficiencies, support sustainable on-farm development and strengthen the reliability of cotton production to optimise our farming systems. RD&E will ensure that cotton growers benefit from the adaption of transformative technologies and are supported to increase their on-farm use of digital and emerging technologies.

CRDC's investments will increase our protection from biotic threats (pests, diseases and weeds) and environmental stresses (drought, extreme temperature, low rainfall and associated risks, e.g. spray drift) by improving surveillance, our understanding of the impacts, and sustainable and responsible management. RD&E will assist the Australian cotton industry to not only responsibly manage known biotic threats but to increase our preparedness for biosecurity incursions.

The combined outcomes of these research priorities will support Australian cotton growers to increase their long-term productivity and profitability. In 2018–19, CRDC's investments in this goal account for 55 per cent of our total expenditure, including RD&E investments.

GOAL TWO: Improve cotton farming sustainability and value chain competitiveness

Improving value chain competitiveness and sustainability to derive $0.5 billion in greater value for Australian cotton growers – and helping Australian cotton achieve its ambition to be the highest yielding, finest, cleanest and most responsibly produced cotton in the world – are CRDC's aims within this goal.

To achieve this, CRDC will focus investments in RD&E to create higher value uses for cotton, ensure the sustainability of cotton farming, and support measurement and reporting through the value chain.

CRDC's investment into improving the understanding of markets and trends will help identify opportunities to add value across the cotton value chain, while our investments in economic research will identify key areas for innovation and improvement. In addition, our investments into measurement and reporting will help to create transparency, ensure the continuous adoption of best practice, address emerging issues, and encourage collaboration in global leadership for sustainability.

The combined outcomes of these research priorities will ensure Australian cotton continues to be produced to the highest environmental and social standards, with increased competitiveness and sustainability. In 2018–19, CRDC's investments in this goal account for 11 per cent of our total expenditure, including RD&E investments.

GOAL THREE: Build adaptive capacity of the cotton industry

Building the adaptive capacity of the Australian cotton industry and enabling the industry to achieve its future vision is CRDC's aim within his goal. To achieve this, CRDC will focus investments to deliver science and innovation capability and new knowledge, and facilitate futures thinking.

CRDC's investments will ensure the science and innovation capacity of Australian cotton is strengthened and strategically fit for a changing and digital future. These investments will tap into the depth and diversity of industry knowledge and ability across regional communities to unearth opportunities for problem solving and innovation, and provide the industry with opportunities to develop and advance innovation skills. CRDC will also invest to enhance strategic foresighting, allowing the industry to respond and adapt to possible future eventualities.

The combined outcomes of these research priorities will strengthen our adaptive capacity. In 2018–19, CRDC's investments in this goal account for 8 per cent of our total expenditure, including RD&E investments.

Our five key investment priorities (ctd)

ENABLING STRATEGY ONE: Strengthening partnerships and adoption

Further strengthening our collaboration and relationships with our partners, and working together to ensure the effective adoption pathway for research outcomes, are CRDC's aims within this enabling strategy.

To achieve these, CRDC will focus investments in strengthening partnerships and collaboration, best practice through *my*BMP and supporting innovation and commercialisation.

CRDC will work with the industry to ensure research investments add value and remain relevant to growers. The CottonInfo and *my*BMP partnerships will be enhanced, connecting growers with best practice information that reflects the latest R&D outcomes. National and international collaborations will be fostered and cross-sectoral research strengthened to develop multi-disciplinary and multi-institutional resources, and create cotton industry centres of excellence. Commercialisation of R&D will be increased through improved processes and by ensuring intellectual property assets are managed holistically and proactively. CRDC will also work with research partners to improve adoption pathways.

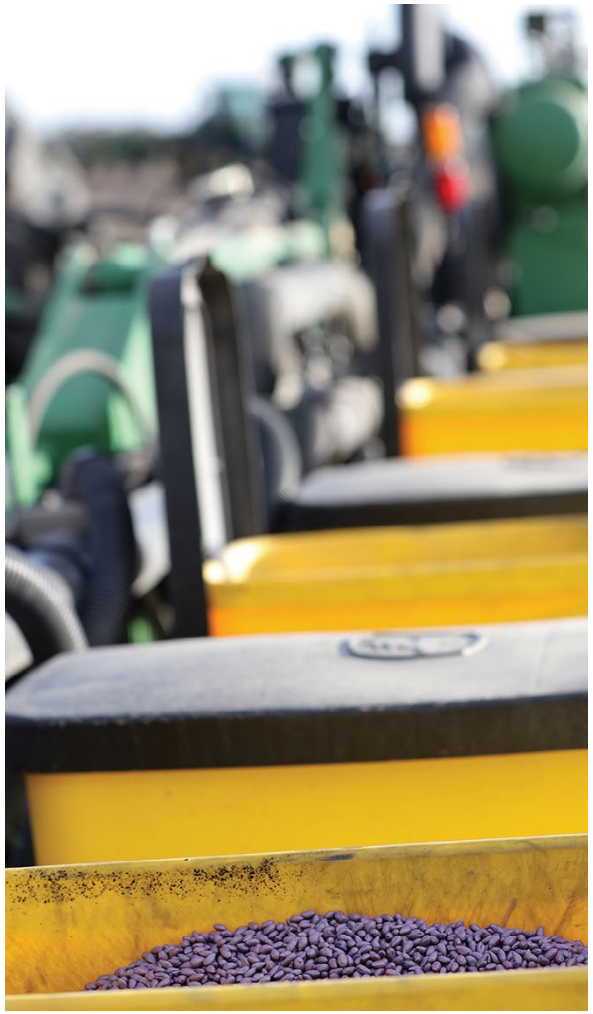
In 2018-19, CRDC's investments in this enabling strategy account for 5 per cent of our total expenditure, including RD&E investments.

ENABLING STRATEGY TWO: Driving RD&E impact

Ensuring CRDC's investments deliver impact and effectiveness, therefore creating value for our stakeholders, is CRDC's aim within this enabling strategy. To achieve this, CRDC will ensure our RD&E investments meet grower, industry and government needs and our projects align with stakeholder priorities.

To demonstrate the delivery of RD&E impact, CRDC will use a monitoring and evaluation framework to report on performance against desired impacts, and assess the capacity to which funded projects demonstrate value and provide a positive return on investment. We will ensure that growers, the wider industry and government are informed and aware of the impact of the RD&E.

In 2018-19, CRDC's investments in this enabling strategy account for 5 per cent of our total expenditure, including RD&E investments.



Melanie Jenson

Setting the priorities

CRDC works with the Australian cotton industry to determine the sector's key RD&E priorities; with Government to determine its overarching agricultural RD&E priorities; and with both the industry and Government to determine the Cotton Sector RD&E Strategy.

In turn, these priorities help to shape CRDC's strategic RD&E priorities, which are formalised under the 2018–23 Strategic RD&E Plan.

Industry accountability

CRDC is accountable to the cotton industry through its representative organisation, Cotton Australia. As the industry peak body, Cotton Australia is responsible for providing advice on industry research priorities.

CRDC engages with Cotton Australia in a formal process of consultation in the development and implementation of the Strategic RD&E Plan including R&D investments. This engagement ensures industry research priorities are regularly reviewed; emerging issues are actively considered; and facilitates the uptake of research in the form of best practices and the overall performance of the Australian industry.

Cotton industry priorities for RD&E:

- Invest in the skills, strengths and occupational health and safety of the human resources in the cotton industry and its communities.
- Improve the sustainability of the cotton industry and its catchments.
- Improve the profitability of the cotton industry.
- Create and support a strong, focused and committed research program.

Government accountability

CRDC is accountable to the Australian Government through the Minister for Agriculture and Water Resources. Government communicates its expectations of CRDC through Ministerial direction, enunciation of policy, administration of the *Primary Industries Research and Development (PIRD) Act 1989*, and priorities (Science and Research Priorities and Rural RD&E Priorities). CRDC responds to government expectations through regular communication; compliance with the Funding Agreement, policy and legislated requirements; and the development of Strategic RD&E Plans, Annual Operational Plans and Annual Reports.

Government research priorities

The PIRD Act makes provision for funding and administration of primary industry research and development with a view to:

- increasing the economic, environmental and social benefits to members of primary industries and to the community in general by improving the production, processing, storage, transport or marketing of the products of primary industries;
- achieving the sustainable use and sustainable management of natural resources;
- supporting the development of scientific and technical capacity;
- developing the adoptive capacity of primary producers; and
- improving accountability for expenditure upon research and development activities in relation to primary industries.

The Australian Government describes Science and Research Priorities and Rural RD&E Priorities.

The Science and Research Priorities are:

- Food
- Soil and water
- Transport
- Cybersecurity
- Energy
- Resources
- Advanced manufacturing
- Environmental change
- Health

The Rural RD&E Priorities are:

- Advanced technology
- Biosecurity
- Soil, water and managing natural resources
- Adoption of R&D

National Primary Industries RD&E Framework and the Cotton Sector RD&E Strategy

The Australian, state and territory governments, rural research and development corporations (RDCs), CSIRO, and universities have jointly developed the National Primary Industries Research, Development and Extension Framework to encourage greater collaboration and promote continuous improvement in the investment of RD&E resources nationally.

National research, development and extension strategies have been or are being developed for the following primary industry and cross industry sectors:

- cotton, beef, dairy, fisheries and aquaculture, forests, grains, horticulture, pork, poultry, sheep meat, sugar, wine, wool, and new and emerging industries;
- animal biosecurity, animal welfare, biofuels and bioenergy, climate change and variability, food and nutrition, soils, plant biosecurity and water use in agriculture.

CRDC, research organisations, industry and government are committed to the implementation of the Cotton Sector RD&E Strategy and its five research priorities:

- Better plant varieties.
- Improved farming systems.
- People business and community.
- Product and market development.
- Development & delivery.

CRDC provides the secretariat for the Cotton Innovation Network which is responsible for implementing the Cotton Sector RD&E Strategy. CRDC is also committed to supporting the implementation of the cross sectoral strategies including climate change, soils, plant biosecurity and water use.

Johnelle Rogan

Our structure: CRDC governance

CRDC Board

CRDC is managed by a Board consisting of up to nine Directors. The Chair and five to seven non-executive directors are appointed by the Minister for Agriculture and Water Resources. The Executive Director is appointed by the Board. The CRDC Board sets the Corporation's strategic direction and delegates responsibility of day-to-day management to the Executive Director.

The Board is committed to high standards of corporate governance that ensure CRDC meets its obligations to government and industry stakeholders, and appropriately manages resources to achieve its outcome and strategic plan goals.

The Board has established a governance framework and systems that enhance performance and ensures that CRDC is operating according to accountability provisions of the PIRD Act and the *Public Governance, Performance and Accountability (PGPA) Act 2013.*

The Board's functions include:

- Establishing goals and setting strategic direction.
- Developing and approving a five-year RD&E Plan, Annual Operational Plan, Statements of Intent, and producing an Annual Report.
- Establishing policies and instructions for the operation of CRDC.
- Ensuring that risk assessment and management frameworks are in place to minimise business and financial risk.

Remuneration of Directors

The Chairperson and Non-Executive Directors are remunerated under the PIRD Act in accordance with such remuneration as is determined by the Remuneration Tribunal established under the *Remuneration Tribunal Act 1973*. Under the PIRD Act, the Executive Director's remuneration is determined by the Board through the recommendation of the Remuneration Committee.

The total budgeted remuneration for the Chair, Executive Director and six non-executive Directors in 2018-19, including superannuation, is $494,825.

Payment to representative bodies

The Corporation's industry representative body in 2018–19 is Cotton Australia. The role of the industry representative body involves:

- Participation in the development and review of the five-year Strategic RD&E Plan. This ensures CRDC's strategic planning continues to address evolving industry R&D needs.
- A meeting to receive and discuss the CRDC Annual Report for the preceding year. This enables the industry representative body to assess whether CRDC's activities for that year have met its strategic objectives, and to question senior staff on many matters of interest and concern.
- Other RD&E related activities which vary from year to year.

While CRDC does not pay a fee for service to the industry representative body it may fund discrete RD&E projects and contribute to the expenses incurred as authorised under the PIRD Act.

In 2018-19, CRDC has budgeted to pay Cotton Australia $25,000 for the direct meeting costs incurred in consultation activities involving its research and development advisory panels which consist of voluntary members (cotton growers and ginners). The advice received from Cotton Australia's research and development advisory panels is used by CRDC in considering changes to its research strategy, priorities and in making research investment decisions.

CRDC Corporate standards

In carrying out the functions of the Corporation, Directors and staff members are required to:

- Commit to excellence and productivity.
- Be accountable to stakeholders.
- Act legally, ethically, professionally and responsibly in the performance of duties.
- Strive to maximise return on investment of industry and public funds invested through CRDC.
- Strive to make a difference in improving the knowledge base for sustainable cotton production in Australia.
- Value strategic, collaborative partnerships with research providers, other research and development bodies, industry organisations, stakeholders and clients, for mutual industry and public benefits; including cooperation with kindred organisations to address matters of national priority.
- Value the contribution, knowledge and expertise of the people within our organisation and that of our contractual consultants, external program coordinators and research providers.
- Promote active, honest and effective communication.
- Commit to the future of rural and regional Australia.
- Comply with and promote best practice in corporate governance.
- Commit to meeting all statutory obligations and accountability requirements in a comprehensive and timely manner.

CRDC revenue sources

CRDC's revenue is drawn from two main sources:

1 Cotton farmers pay a levy based on production. The main source of levies is from cotton ginned in Australia based on $2.25 for each 227-kilogram bale of cotton. A new levy was introduced on 1 April 2017 for seed cotton exports of $4.06 per tonne of exported seed cotton. Australian ginning and export of seed cotton occurs from March to September of each calendar year. Therefore, cotton levy revenue in any financial year is drawn from two consecutive cotton crops.

2 The Australian Government matches expenditure of levies on eligible R&D, capped at 0.5 per cent of the three-year average gross value of production or the cumulative levy receipts, whichever is the lesser. The setting and collection of the industry levy is enabled by the *Primary Industries Levies and Charges Collection Act 1991* and the *Primary Industries (Excise) Levies Act 1999*.

The Australian Government general matching of industry contributions is expected to be limited by either the value of levies collected or 0.5 per cent of the cotton industry's three-year average Gross Value of Production (GVP). Which trigger will apply depends on the price of cotton, timing of the harvest and ginning, and the variability of the crop size.

Royalties from the sale of domestic and international planting seed, interest on investments, external grant revenue and research project refunds make up the balance of CRDC's income.

Ensuring efficiency

Ensuring continuous improvement in organisational efficiency and productivity is a key focus for CRDC, to optimise our own input efficiency. CRDC is charged with investing in RD&E on behalf of cotton growers and the Government, so ensuring these funds are used to best effect is critically important. CRDC has invested in improved systems and infrastructure to ensure continuous improvement in the organisation's productivity.

Additionally, in order to achieve both industry and national RD&E efficiency, CRDC works in collaboration with other cotton industry organisations, the Cotton Innovation Network and other rural RDCs to achieve greater strategic outcomes for the cotton and other rural industries. CRDC's collaborative approach underpins our investment strategy: we partner in approximately 80 per cent of RD&E projects conducted in the cotton sector.

In addition, at present, 35 per cent of all CRDC investments are made in cross-sectoral RD&E. This is expected to reach 40 per cent during 2018–19, through round four of the Australian Government's Rural R&D for Profit program. CRDC has led three projects under this program to date, all of which have involved many partners, including other RDCs and research providers. The funding of these projects requires co-investment from all participants to ensure both organisational and industry efficiency.

The year ahead: 2018–19 industry and financial outlook

Industry

The 2017–18 cotton season saw 500,000 hectares of irrigated and dryland (rain-grown) cotton planted, capitalising on stored irrigation water and above average forward cotton prices. This was just shy of the 2016–17 crop, the largest planting in five years.

Cotton production for the 2017–18 year is expected to reach 4.5-4.6 million bales, due to favourable seasonal conditions for irrigated summer crops. A lack of rainfall during the season meant it was too dry for many dryland crops.

The yield for 2017–18 is expected to average near 10 bales per hectare; a tremendous recovery from the challenging season of 2016–17, when yields averaged only 7 bales per hectare.

The latest ABARES estimate for cotton production in 2018–19 is 3.6 million bales, which reflects current low levels of stored irrigation water and assumes average seasonal conditions through to next summer. Cotton prices remain well above long term averages and any improvement in seasonal conditions leading up to cotton planting could see a significant increase in forecast cotton production.

Financial

CRDC has budgeted for revenue of $22.9 million in 2018–19 and expenditure of $24.3 million, providing for a net deficit of $1.4 million, decreasing reserves to an estimated $36.0 million at 30 June 2019.

Wherever possible, CRDC will aim to use its reserves to maintain research investment at a consistent level despite years where crop levels are below average due to climatic conditions. The use of CRDC's reserves complies with the organisation's Financial Reserves Policy which ensures the organisation maintains sufficient financial reserves to ensure the efficient and effective performance of its business, the achievement of its strategic RD&E outcomes, and capacity to meet its fiduciary responsibilities.

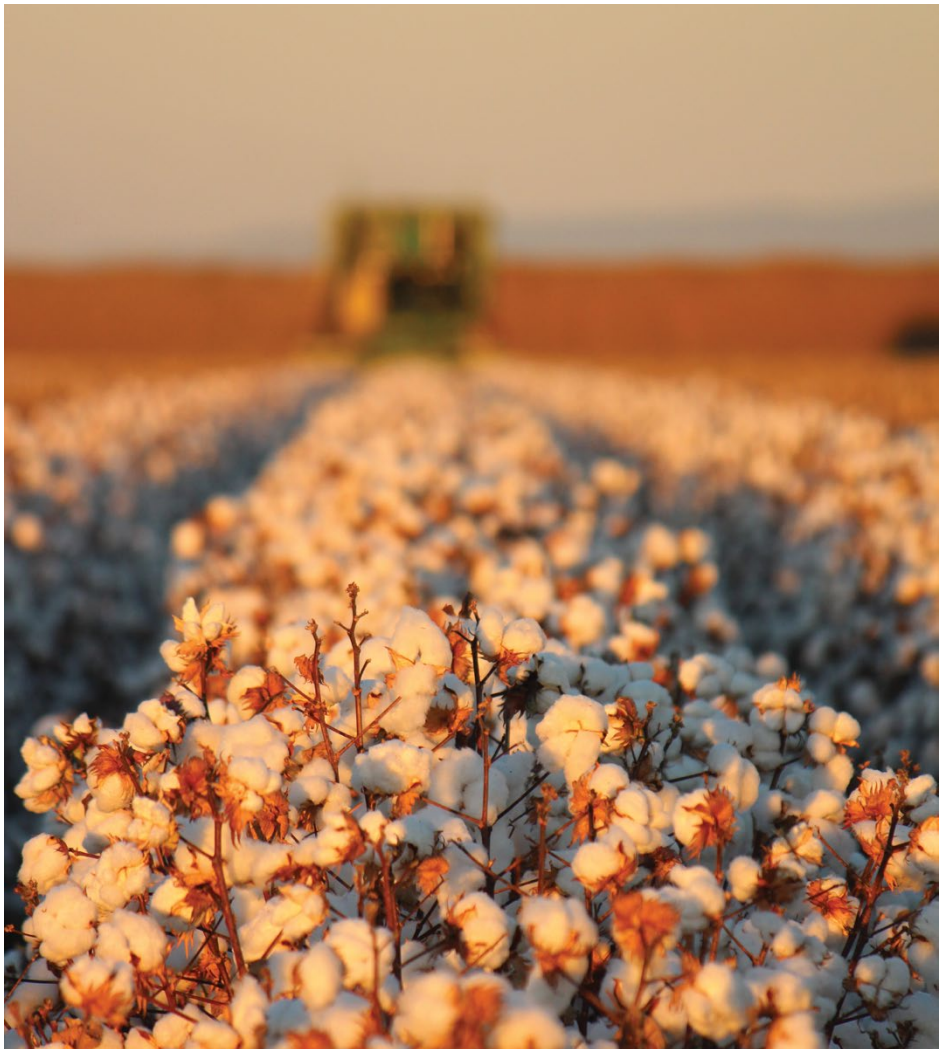
Ruth Redfern

Our 2018–19 investment portfolio

CRDC's total planned expenditure including RD&E investment in 2018–19 is $24.3 million. CRDC estimated total expenditure over the five years of the CRDC 2018–23 RD&E Plan is approximately $125 million. CRDC's objective is to achieve a balanced RD&E portfolio that considers distribution of investment across:

- The RD&E strategies.
- The type of research including basic, applied, blue sky, development and delivery.
- In-project risks.
- Researcher experience and capacity.
- Research providers.
- Timeframe to outcomes.
- The likely return on investment for projects and programs.
- Expenditure on RD&E management.

Of this expenditure, $8.4 million is to be invested in new research commencing in 2018–19 as part of the total RD&E portfolio.

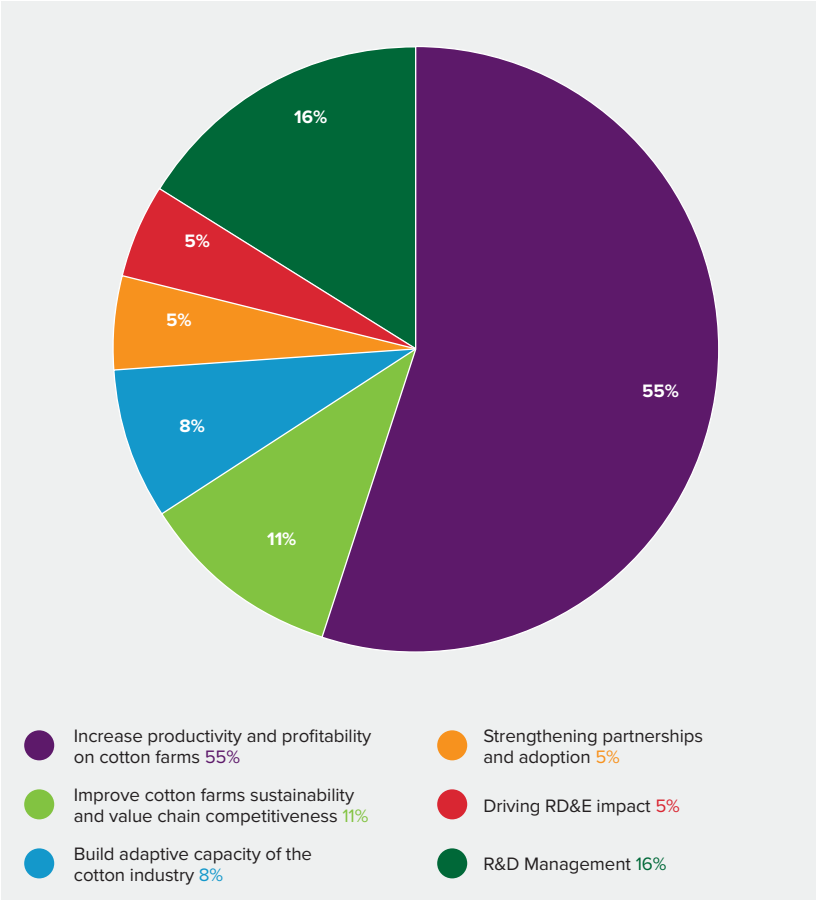


Ruth Redfern

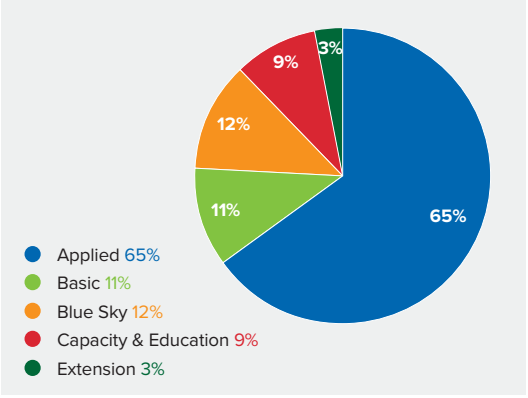
CRDC 2018–19 portfolio balance

Each year CRDC reviews the portfolio balance together with the measures of success for each program to inform decisions on any adjustments to research priorities and the allocation of resources.

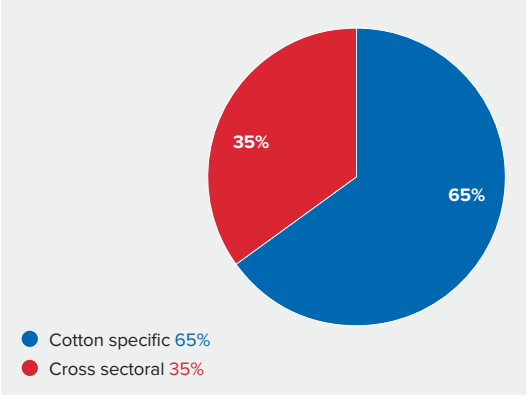
Expenditure including RD&E - investment by the five CRDC priority areas



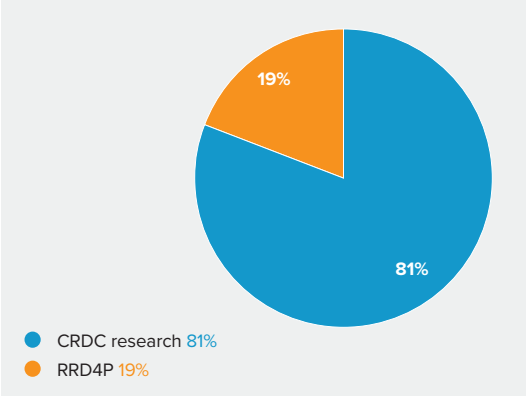
Investment by research type



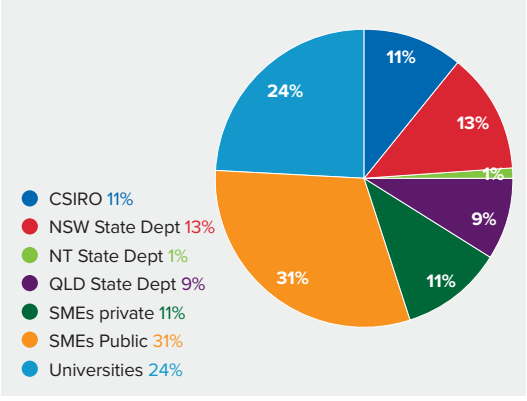
Investment by sector – cotton specific and cross sectoral RD&E



Investment from the Rural R&D for Profit program grants



Investment by CRDC in the RD&E projects led by key research partners



Our investment process

The process of deciding where to invest CRDC's annual RD&E funding is a collaborative one, involving all major stakeholders.

CRDC works closely with the industry's peak representative body, Cotton Australia, and the Australian Government on an annual basis to identify and evaluate the cotton industry's requirements for RD&E. Cotton Australia provides ongoing advice to the CRDC on research projects and where research dollars should be invested, guided by the priorities established in the 2018–23 Strategic RD&E Plan.

In line with this Plan, CRDC holds an annual research priority forum, bringing together the Cotton Australia research and development advisory panels to identify the gaps in the existing research portfolio and opportunities for new research. CRDC also holds a series of discipline forums with research partners, to identify any emerging research priorities.

From here, CRDC issues a targeted annual call for research proposals against these identified priorities. In determining which proposals are successful, CRDC again undertakes a process of consultation with growers, via the Cotton Australia panels. The final decision-making authority lies with the CRDC Board.

Successful proposals become contracted projects with CRDC and are delivered by our research partners. Critically, CRDC's success in delivering RD&E outcomes to growers and the industry is contingent upon strong relationships with our research partners, who deliver projects on our behalf. The full list of research partners for 2018–19 can be found in the attachments to this AOP.

2018–19 R&D priorities

The 2018–19 priorities forum, held in May 2017, identified key areas of focus for future RD&E investment. These key areas formed the basis of the targeted call, with 49 expressions of interest developed on these areas to guide researchers in developing their proposals. The key areas of focus included:

- Control options for feather top Rhodes grass and fleabane;
- Ecology of silverleaf whitefly parasitic wasps;
- Improving management and thresholds for silverleaf whitefly;
- Plant hormones/fruit retention/defoliation under heat stress;
- Compaction;
- Decision support for irrigation;
- Silverleaf whitefly resistance;
- Managing and mitigating spray drift;
- Alternative strategies for healthy water systems;
- Building credibility for natural resource management social licence;
- Understanding the impact of weather, harvest and storage on cotton colour;
- Supply chain information needs and transfer;
- Agribusiness workforce gaps and training needs;
- The social science barriers to address best practice spray application.

Through the 2018–19 procurement process, CRDC has invested in projects to directly target these key needs.

Blue sky research

In addition to immediate cotton industry priorities, CRDC also identifies and invests in longer-term priorities, specifically around ensuring a future for the industry that is profitable, sustainable and competitive. Investments are made into potentially transformational R&D projects, known as blue sky research. In 2018–19, 12 per cent of CRDC's R&D investment is blue sky research.

Our 2018–19 investments by priority area

GOAL ONE: Increasing productivity and profitability on Australian cotton farms

Outcome	Key Activity	R&D Investments 2018–19	Collaborative Partners
OPTIMISED FARMING SYSTEMS			
Improved yield and quality	Investigating and communicating the application of beneficial new on-farm technologies and scientific approaches	• A new project investigating the opportunity for increased yield through improved management of soil constraints. • Continuing research into precision management for improved cotton quality.	USQ CSIRO
Improved input efficiencies	Investing in real time monitoring, building adoption capacity and developing benchmarks, decision tools and practices to support on-farm resource efficiency decisions	• A new project to optimise the management of manures in southern NSW cotton production systems. • A new project to improve nitrogen use efficiency through better understanding the role of dissolved organic nitrogen. • A new project to improve objective measurement for improved water productivity in fully and partially irrigated systems. • 2 continuing projects to improve water use efficiency in a changing climate • 2 continuing demonstration trials show casing automated irrigation systems and recycling of irrigation water • 14 continuing cross-sectoral projects as part of the Rural R&D More Profit from Nitrogen program	Deakin University CSIRO CSIRO UNSW IREC NSW DPI, QUT, UTAS, UQ, NTDPIR, QDAF, UMELB
On-farm sustainable development is supported	Testing and providing information on the social, environmental and economic viability of new farming systems	• A new project providing science leadership for cotton development in northern Australia. • Continuing support for the National Soils RD&E Strategy. • Continuing support for the National Water RD&E Strategy.	CSIRO CSIRO CSIRO
Improved reliability of cotton production	Investigating the drivers behind farming system volatility and potential mitigations	• A continuing project investigating opportunities in dryland cotton with Bollgard 3. • A continuing project to optimise seedling emergence. • A continuing project to minimise in field yield variability. • A collaborative project with GRDC to quantify the effectiveness of cover crops as a means of increased water infiltration. • A new project to investigate the use of smart sprayable polymers for improved cotton productivity.	QDAF NSW DPI NSW DPI GRDC CSIRO

TRANSFORMATIVE TECHNOLOGIES			
New technologies are adapted for use in cotton	Investigating and facilitating the development (by third parties) and adaption of beneficial new technologies and systems for cotton farms	• A new project assessing the potential of a new monitoring tool for managing sucking insect pests. • 3 new projects to develop precise real time automated cotton irrigation systems for improved water productivity. • A continuing project focusing on the commercial development and evaluation of a machine vision weed spot sprayer. • A continuing project to develop a platform for monitoring and analysing the cotton crop canopy to assess nitrogen status and yield. • A continuing project to develop and apply molecular tools to monitor resistance allele frequency in *Helicoverpa Spp*.	NSW DPI USQ, Deakin University, GVIA USQ Fluorsat Pty Ltd CSIRO
Cotton farms are digitally enabled	Working with partners to develop strategies to support digital applications and develop frameworks for digital agricultural tools in Australia	• CRDC is yet to invest in this new outcome under the new 2018-23 Strategic RD&E Plan.	
PROTECTION FROM BIOTIC THREATS AND ENVIRONMENTAL STRESSES			
Increased understanding of the impact of pests, diseases and weeds, and environmental stresses	Investigating and monitoring the economic, environmental and social impacts of biotic threats and environmental stresses	• A new IPM project to support management of emerging cotton pests. • A continuing project to understand the ecology of reinform nematodes in cotton. • A continuing project investigating the biology of *Amaranthus hybridus, mitchelli* and *powelli*. • A continuing project to transform *verticillium dahliae* the causal agent of verticillium wilt of cotton.	CSIRO QDAF UQ NSW DPI
Improved identification, surveillance and management systems for pests, diseases and weeds, and environmental stresses	Investigating and delivering new and improved tools, systems and strategies for the surveillance, prevention and sustainable and responsible management of biotic threats and environmental stresses	• A new project to improve the management of silverleaf whitefly. • A new project to develop ready to use soil tests to manage the risks associated with black root rot. • A new project to provide technical leadership for the management of cotton diseases. • A new project to provide technical leadership in IPM systems for high yielding cotton. • A new project to assess the fitness costs of VIP3A and Cry1Ac resistance in *Helicoverpa punctigera*. • A new project to run a biosecurity preparedness exercise for cotton producers. • 17 continuing projects investigating biosecurity threats, insect weed and disease management issues in cotton systems.	QDAF Microbiology Laboratories Australia NSW DPI QDAF CSIRO PHA NSW DPI, QDAF, UQ, CSIRO, HIA
Industry is prepared for a biosecurity incursion	Working collaboratively with growers and consultants to deliver industry-led biosecurity preparedness activities and address identified knowledge gaps	• A new project to run a large-scale biosecurity scenario to support cotton industry preparedness. • A continuing project to support the Plant Biosecurity Research Initiative.	PHA HIA

GOAL TWO: Improve cotton farming sustainability and value chain competitiveness

Outcome	Key Activity	R&D Investments 2018–19	Collaborative Partners
SUSTAINABILITY OF COTTON FARMING			
Improved environmental footprint for cotton farms	Undertaking research on how to improve the most significant components of cotton's environmental footprint, including water and nitrogen management, native vegetation and soil carbon	• A new project to identify alternative energy technologies and policy solutions for the Australian cotton industry.	UTS
		• A new project aimed at minimising evaporation losses from water storages.	UMELB
		• A new project to identify management strategies for healthy water systems.	TBA
		• A new project to increase natural capital (biodiversity) on cotton farms.	UNE
		• A continuing project to improve precision agriculture and environmental performance for the Australian cotton industry.	ANU
		• A continuing project to quantify the potential environmental impacts of pesticides used on cotton.	NSW DPI
	Understanding and informing the methodologies and metrics used to assess the footprint of raw materials and their value chains	• A new project to understand the environmental and resource impacts with changing demand for Australian cotton.	Integrity Agricultural Services
		• A new project to understand the methodologies and data being used in life cycle impact assessments.	Cotton Incorporated
		• A continuing project to improve the ability of the Australian cotton industry to report its sustainability.	QUT
		• A continuing project to develop appropriate land use methodology for Australian life cycle assessments.	UQ

CREATE HIGHER VALUE USES FOR COTTON			
Increased value for Australian cotton	Identifying opportunities for improving cotton product performance, and high-value uses for cotton	• A new project to commercialise ever-dry self-cooling cotton fabric innovation. • A new project to identify high value uses for recycled cotton. • A continuing project exploring nanofibrous coating on cotton fabric with versatile protection and dynamic comfort. • A continuing project to develop an eco-friendly treatment to improve the look and handle of cotton fabric. • A continuing project to develop renewable fine chemicals from cotton biomass. • A continuing project to develop novel anti wetting and self-sterilising cotton fabrics. • A continuing project for continuous mercerisation of loose stock cotton without fibre shrinkage.	Deakin University Deakin University RMIT Deakin University SRA Deakin University RMIT
Increased understanding of market requirements & opportunities throughout the value chain	Investigating market requirements and opportunities throughout the value chain, and communicating those to industry	• A new project investigating consumer perceptions of Australian cotton with Roy Morgan. • A new project for improving labour conditions within the Australian cotton value chain. • A continuing project investigating the generation of micro-particles from the laundering of cotton and other fabrics. • A continuing project to investigate the bio degradation of dyed cotton fabrics.	Cotton Australia QUT NCSU NCSU
MEASUREMENT AND REPORTING THROUGHOUT THE VALUE CHAIN			
CRDC collaborates in global leadership for sustainability initiatives	Facilitating and participating in global sustainability forums	• A continuing project supporting membership of the sustainable apparel coalition.	SAC
The value chain is transparent and understood by participants to improve market opportunities	Providing information to the value chain	• A new project to undertake a sustainable value chain analysis of the Australian cotton industry.	QUT

GOAL THREE: Build adaptive capacity of the cotton industry

Outcome	Key Activity	R&D Investments 2018–19	Collaborative Partners
SCIENCE AND INNOVATION CAPABILITY, AND NEW KNOWLEDGE			
Science and innovation capacity is strengthened and strategically fit for a digital future	Facilitating and participating in global initiatives, supporting researchers to use new technologies and uses for data, and creating and facilitating opportunities for national and international RD&E exchange	• A new project to support international exchange of PhD students and early career researchers.	NSW DPI, CSIRO
		• A new project to support international exchange of leading cotton researchers.	CSIRO, NSW DPI, QDAF, Deakin University
		• 3 continuing projects supporting Horizon scholars.	AgriFutures Australia
		• A new project to support a Nuffield scholar, and 2 continuing projects to support Nuffield scholars.	Nuffield Australia
		• A continuing project to develop agri-intelligent systems for cotton farmers.	QUT
		• A continuing project to establish precision/decision agriculture at a demonstration site.	USYD
Increased understanding of and participation from the diverse human capital in regional communities	Investigating regional community demographics and available service providers and supporting opportunities for greater diversity in the cotton industry	• A new project to understand the motivational factors for improved spray application on cotton farms.	UNE
		• A continuing project to understand and plan for the future cotton workforce.	USQ
Increased opportunities for innovation skills development	Working collaboratively with cross-sectorial partners to support regional innovation	• 3 new projects to support the development of real time automated irrigation systems for improved water productivity.	USQ, Deakin University, GVIA
		• A new project to develop the 'future farm' concept.	GRDC
		• A new project to investigate increased yield through improved management of soil constraints.	USQ
		• A new project to run a large-scale biosecurity exercise across cotton growing regions.	PHA
		• 14 continuing cross-sectoral projects as part of the Rural R&D More Profit from Nitrogen program.	NSW DPI, QUT, DSITI, NTDPIR, UTAS, QDAF
		• A continuing project to quantify the effectiveness of cover crops as a means of increase water infiltration.	GRDC
		• 2 continuing projects to improve the management of cotton diseases within the cotton farming system.	QDAF, NSW DPI
		• A continuing project to develop a spray hazard prediction system.	MRES
		• A continuing project with X-Lab to support improved innovation and commercialisation of CRDC research.	X-Lab

FUTURES THINKING			
Australian cotton growers are able to adapt to change	Assessing and monitoring grower resilience and on-farm natural capital, and supporting and communicating initiatives to address knowledge gaps	• A new project investigating thresholds of resilience in rural communities. • New projects to continue the work of the Primary Industries Health and Safety Partnership and CRDC's Grassroots Grants program. • A continuing project to support the 19th Australian Cotton Conference.	UMELB AgriFutures Australia, CRDC Cotton Australia
Increased opportunities for strategic fore-sighting	Investigating existing and future markets for Australian cotton and communicating this to the industry	• A new project to build capacity with the cotton growers on the research and development advisory panels.	Cotton Australia

ENABLING STRATEGY ONE: Strengthening partnerships and adoption

Outcome	Key Activity	R&D Investments 2018–19	Collaborative Partners
PARTNERSHIPS AND COLLABORATION			
Growers/consultants value CRDC farming systems research outcomes	Investing in research that meets the needs of growers and consultants and working with partners to tailor and disseminate research outcomes	• A new project to conduct annual quantitative and qualitative surveys of cotton crop consultants. • A new project developing videos to communicate best practice cotton production. • A continuing project to assess grower sentiment and issues relating to RD&E. • A continuing project to measure and report the value of capacity building on farms and in research.	CCA QDAF Intuitive Solutions Qualdata
CottonInfo partnership is maintained and practice change improved	Working collaboratively with CottonInfo to demonstrate, build and communicate practical applications for R&D outcomes	• 4 new projects to provide technical leadership in cotton diseases; weed management; IPM for high yielding cotton crops; and Bt stewardship and support of the IRMS. • A new project to communicate cotton best production practices. • 6 continuing projects providing technical leadership in the areas of fibre quality, water use efficiency and crop productivity, biosecurity and disease extension, natural resource management, nutrition and water.	NSW DPI, QDAF, Ceeney Agricultural Consultants QDAF CSIRO, NSW DPI, QDAF
Partnerships are strengthened to engage multi-disciplinary and multi-institutional resources (centres of excellence)	Working collaboratively for mutual benefit	• CRDC currently invests in 71 new and continuing collaborative/cross sectoral projects representing 35 per cent of our investment portfolio in 2018–19.	Various
BEST PRACTICE (*my*BMP)			
Best practice is based on science and measured impact	Working closely with partners to ensure R&D outcomes are included in *my*BMP practice modules	• 13 technical and module lead projects to update *my*BMP modules from R&D outcomes annually.	CSIRO, NSW DPI, QDAF
INNOVATION AND COMMERCIALISATION			
Improved R&D innovation and commercialisation	Working with research partners from development to proof of concept and commercialisation (where a strong business case exists)	• CRDC is yet to invest in this new outcome under the new 2018–23 Strategic RD&E Plan.	

ENABLING STRATEGY TWO: Driving RD&E impact

Outcome	Key Activity	R&D Investments 2018–19	Collaborative Partners
IMPACT AND EFFECTIVENESS			
CRDC's RD&E investments meet grower, industry and government needs	Engaging with stakeholders and partners annually to identify and prioritise the challenges and opportunities facing the Australian cotton industry	• A continuing project to support engagement with grower panels to identify and prioritise RD&E issues and opportunities to benefit the Australian cotton industry.	Cotton Australia
CRDC monitors and evaluates RD&E impact	Assessing and monitoring the effectiveness of RD&E investments and the extent to which stakeholder priorities are addressed	• A new project surveying cotton consultants to quantitatively and qualitatively assess practice change and the impact of RD&E. • A continuing project that identifies how RD&E priorities identified by cotton growers have been addressed. • A continuing project surveying cotton growers about their on-farm practices.	CCA Cotton Australia Intuitive Solutions
CRDC funded projects demonstrate value and return on investment	Assessing the impact and return on investment from RD&E projects	• A new project to assess the impact and ROI of selected clusters of research conducted in accordance with the CRRDC evaluation methodology and framework.	AgTrans
Growers, the cotton industry and government are informed and aware of RD&E outcomes	Effectively communicating the outcomes and impacts of RD&E investments to stakeholders	• Continuing projects supporting the CottonInfo initiative that communicate outcomes and impacts of RD&E investments. • A continuing project to communicate RD&E outcomes and impacts to government and grower stakeholders.	CottonInfo CRDC

Our 2018-19 financial budget statements

TABLE 1.1: RESOURCE STATEMENT

	2017–18 Estimated actual $'000	2018–19 Estimate $'000
Opening balance/cash reserves at 1 July	**35,071**	**37,716**
Funds from Government		
Special appropriations[a]		
Primary Industries Research and Development Act 1989 s.30(3) –		
Cotton R&D Corporation	19,218	17,840
Total special appropriations	**19,218**	**17,840**
Total funds from Government	**19,218**	**17,840**
Funds from industry sources		
Levies[b]	9,610	8,920
less amounts paid to the CRF	(9,610)	(8,920)
Total funds from industry sources	-	-
Funds from industry sources		
Interest	798	720
Royalties	1,069	1,221
Other	4,823	3,150
Total funds from other sources	**6,690**	**5,091**
Total net resourcing for CRDC	**60,979**	**60,647**

	2017–18	2018–19
Average staffing level (number)	15	15

Cotton Australia

(a) CRDC is not directly appropriated as it is a corporate Commonwealth entity under the PGPA Act. Appropriations are made to the Department of Agriculture and Water Resources and then paid to CRDC and are considered departmental for all purposes.

(b) Levies imposed and collected under the following legislation: *Primary Industries Research and Development Act 1989* (PIRD Act), *Primary Industries (Excise) Levies Act 1999, Primary Industries Levies and Charges Collection Act 1991* and associated legislation.

CRF – Consolidated Revenue Fund.

Prepared on a resourcing (i.e. appropriations available) basis.

Please note: All figures shown above are GST exclusive - these may not match figures in the cash flow statement.

Our 2018–19 financial budget statements

TABLE 2.1: BUDGETED EXPENSES FOR OUTCOME 1

Outcome 1: Adoption of innovation that leads to increased productivity, competitiveness and environmental sustainability through investment in research and development that benefits the Australian cotton industry and the wider community.

	2017–18 Estimated actual $'000	2018–19 Budget $'000	2019–20 Forward estimate $'000	2020–21 Forward estimate $'000	2021–22 Forward estimate $'000
PROGRAM 1.1: COTTON RESEARCH AND DEVELOPMENT CORPORATION					
Revenue from Government					
Special appropriations					
Primary Industries Research and Development Act 1989 s. 30(3) –					
Cotton R&D Corporation	9,608	8,920	8,705	8,705	8,705
Special appropriations – Industry Levies	9,610	8,920	8,705	8,705	8,705
Revenues from other independent sources	6,690	5,091	5,033	4,993	4,938
Reserves	99	1,400	2,161	2,757	3,378
Total expenses for program 1.1	**26,007**	**24,331**	**24,604**	**25,160**	**25,726**
OUTCOME 1 TOTALS BY RESOURCE TYPE					
Revenue from Government					
Special appropriations	9,608	8,920	8,705	8,705	8,705
Special appropriations – Industry Levies	9,610	8,920	8,705	8,705	8,705
Revenues from other independent sources	6,690	5,091	5,033	4,993	4,938
Reserves	99	1,400	2,161	2,757	3,378
Total expenses for Outcome 1	**26,007**	**24,331**	**24,604**	**25,160**	**25,726**

	2017–18	2018–19
Average staffing level (number)	15	15

Our 2018-19 financial budget statements

TABLE 2.2: PERFORMANCE CRITERIA FOR OUTCOME 1

Outcome 1: Adoption of innovation that leads to increased productivity, competitiveness and environmental sustainability through investment in research and development that benefits the Australian cotton industry and the wider community.

PROGRAM 1.1: COTTON RESEARCH AND DEVELOPMENT CORPORATION

Objectives	**Increase productivity and profitability on cotton farms** Deliver RD&E for cotton producers to increase productivity, successfully protect crops from biotic threats and environmental stresses, adopt transformative technologies and innovate for improved profitability.	Delivery
	Improve cotton farming sustainability and value chain competitiveness Deliver RD&E and innovation to create higher value uses for cotton and assist the industry achieve its ambition to be the highest yielding, finest, cleanest and most responsibly produced cotton in the world.	
	Build adaptive capacity of the cotton industry Deliver RD&E to develop science and innovation capacity as well as new knowledge to strengthen adaptive capacity.	
	Strengthening partnerships and adoption Deliver RD&E and innovation through collaborative partnerships to ensure adoption of best practice, new knowledge, products and services.	
	Driving RD&E impact Deliver assessments of the impact of CRDC's RD&E investments that inform future investment direction and continuous improvement.	

Increase productivity and profitability on cotton farms Strategically prioritise investment in basic, applied and blue-sky research collaboratively with research and cross-sectoral partners to develop new knowledge, practices and adapt transformative technologies for on-farm application that also protect industry from biotic threats and environmental stresses.	
Improve cotton farming sustainability and value chain competitiveness Strategically prioritise investment in basic, applied and blue-sky research collaboratively with research, industry and cross-sectoral partners to develop new knowledge, practices, processes, higher value products and innovative approaches to improve the sustainability of cotton farming and strengthen value chain competitiveness.	
Build adaptive capacity of the cotton industry Strategically prioritise investment in RD&E collaboratively with research, industry and cross-sectoral partners to develop new knowledge, futures thinking, science and innovation capability.	
Strengthening partnerships and adoption Strategically prioritise investment in the effective adoption of research by strengthening partnerships and collaboration, development of best practice and supporting innovation and commercialisation.	
Driving RD&E impact Strategically prioritise investment in research, data capture, analysis and reviews with stakeholders and partners to demonstrate that RD&E investments deliver impact.	

PERFORMANCE INFORMATION

Year	Performance criteria	Targets
2017–18	**Farmers – cotton is profitable and consistently farmers' crop of choice** Industry productivity growth per hectare per annum.	3.0 per cent per hectare per annum. Estimated achievement of 3.0 per cent average growth in yield per hectare per annum since 2013.
	Industry – the Australian cotton industry is the global leader in sustainable agriculture. Industry reports to customer needs for sustainability indicators.	Achieved through responses to the 2014 Australian Grown Cotton Sustainability Report and Third Environmental Assessment.
	Customers – the Australian cotton industry captures the full value of its products. Customers continue to demand Australian cotton products.	Double the premium for Australian cotton. The Australian cotton industry receives a premium for its product – at times double the premium paid for cotton from other countries – further RD&E investment is required to successfully sustain premiums.
	People – capable and connected people driving the cotton industry. Implementation of the Cotton Industry Workforce Strategy.	Measured improvement in the capacity of farmers to attract, retain and develop people. Educational attainment in cotton is commensurate with regional Australia, with 28 per cent possessing post-school qualifications.
	Performance – measured performance of the Australian cotton industry and its RD&E drives continuous improvement. Coverage of Best Management Practice systems across Australian cotton industry.	80 per cent of cotton farms participating. Estimated achievement of 75 per cent participation.
2018–19	**Increase productivity and profitability on cotton farms.** Improved yield and quality.	Annual increase of 0.35 bales per hectare for irrigated cotton and 0.14 bales per hectare for dryland cotton.

2018–19 (continued)	**Improve cotton farming sustainability and value chain competitiveness.** CRDC collaborates in global leadership for sustainability initiatives.	Participates in six global initiatives.
	Build adaptive capacity of the cotton industry. Science and innovation capacity is strengthened and strategically fit for a digital future.	10+ new/early career researchers supported through strategic career pathways.
	Strengthening partnerships and adoption. Partnerships are strengthened to engage multi-disciplinary and multi-institutional resources.	40 per cent of annual RD&E investments are through cross sectoral partnerships.
	Driving RD&E impact. CRDC monitors and evaluates RD&E impact.	One RD&E impact report per annum.
2019–20 and beyond	**Increase productivity and profitability on cotton farms.** As per 2018–19.	As per 2018–19.
	Improve cotton farming sustainability and value chain competitiveness. As per 2018–19.	As per 2018–19.
	Build adaptive capacity of the cotton industry. As per 2018–19.	20+ new/early career researchers supported through strategic career pathways.
	Strengthening partnerships and adoption. As per 2018–19.	As per 2018–19.
	Driving RD&E impact. As per 2018–19.	As per 2018–19.

Our 2018-19 financial budget statements

TABLE 3.1: COMPREHENSIVE INCOME STATEMENT (SHOWING NET COST OF SERVICES) FOR THE PERIOD ENDED 30 JUNE

	2017–18 Estimated actual $'000	2018–19 Budget $'000	2019–20 Forward estimate $'000	2020–21 Forward estimate $'000	2021–22 Forward estimate $'000
EXPENSES					
Employee benefits	2,104	2,449	2,497	2,546	2,607
Supplier expenses	1,528	1,238	1,077	1,150	1,252
Grants	22,051	20,342	20,728	21,162	21,565
Depreciation and amortisation	324	302	302	302	302
Total expenses	**26,007**	**24,331**	**24,604**	**25,160**	**25,726**
LESS:					
OWN-SOURCE INCOME					
Own-source revenue					
Interest	798	720	660	620	565
Rental income	5	-	-	-	-
Royalties	1,069	1,221	1,223	1,223	1,223
Other Grants	4,412	2,900	2,900	2,900	2,900
Other	406	250	250	250	250
Total own-source revenue	**6,690**	**5,091**	**5,033**	**4,993**	**4,938**
Net cost of (contribution by) services	**19,317**	**19,240**	**19,571**	**20,167**	**20,788**
Revenue from Government[(a)]					
Commonwealth contribution	9,608	8,920	8,705	8,705	8,705
Industry contributions	9,610	8,920	8,705	8,705	8,705
Total revenue from Government	**19,218**	**17,840**	**17,410**	**17,410**	**17,410**
Surplus/(deficit) attributable to the Australian Government	**(99)**	**(1,400)**	**(2,161)**	**(2,757)**	**(3,378)**
Total comprehensive income/(loss) attributable to the Australian Government	**(99)**	**(1,400)**	**(2,161)**	**(2,757)**	**(3,378)**

(a) Revenue from Government includes a Commonwealth contribution under the PIRD Act and levies collected from industry by the Department of Agriculture and Water Resources for R&D activities.

Prepared on Australian Accounting Standards basis.

Our 2018-19 financial budget statements

TABLE 3.2: BUDGETED DEPARTMENTAL BALANCE SHEET (AS AT 30 JUNE)

	2017–18 Estimated actual $'000	2018–19 Budget $'000	2019–20 Forward estimate $'000	2020–21 Forward estimate $'000	2021–22 Forward estimate $'000
ASSETS					
Financial assets					
Cash and cash equivalents	6,716	5,112	3,883	5,139	5,423
Trade and other receivables	2,910	2,911	2,910	2,909	2,909
Investments	31,000	31,000	30,000	26,000	22,000
Total financial assets	**40,626**	**39,023**	**36,793**	**34,048**	**30,332**
Non-financial assets					
Land and buildings	831	861	891	921	951
Property, plant and equipment	359	547	511	554	747
Intangibles	267	252	327	242	357
Total non-financial assets	**1,457**	**1,660**	**1,729**	**1,717**	**2,055**
Total assets	**42,083**	**40,683**	**38,522**	**35,765**	**32,387**
LIABILITIES					
Payables					
Suppliers	200	200	200	200	200
Grants	4,000	4,000	4,000	4,000	4,000
Total payables	**4,200**	**4,200**	**4,200**	**4,200**	**4,200**
Provisions					
Employee provisions	447	447	447	447	447
Total provisions	**447**	**447**	**447**	**447**	**447**
Total liabilities	**4,647**	**4,647**	**4,647**	**4,647**	**4,647**
Net assets	**37,436**	**36,036**	**33,875**	**31,118**	**27,740**
EQUITY*					
Reserves	255	255	255	255	255
Retained surplus	37,181	35,781	33,620	30,863	27,485
Total Equity	**37,436**	**36,036**	**33,875**	**31,118**	**27,740**

* 'Equity' is the residual interest in assets after deduction of liabilities.
Prepared on Australian Accounting Standards basis.

Our 2018-19 financial budget statements

TABLE 3.3: DEPARTMENTAL STATEMENT OF CHANGES IN EQUITY - SUMMARY OF MOVEMENT (BUDGET YEAR 2018-19)

	Retained earnings $'000	Asset revaluation reserve $'000	Total equity $'000
OPENING BALANCE AS AT 1 JULY 2018			
Balance carried forward from previous period	37,181	255	37,436
Adjusted opening balance	**37,181**	**255**	**37,436**
COMPREHENSIVE INCOME			
Surplus (deficit) for the period	(1,400)	-	(1,400)
Total comprehensive income	**(1,400)**	**-**	**(1,400)**
of which:			
Attributable to the Australian Government	(1,400)	-	(1,400)
Estimated closing balance as at 30 June 2019	**35,781**	**255**	**36,036**
Closing balance attributable to the Australian Government	**35,781**	**255**	**36,036**

Prepared on Australian Accounting Standards basis.

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Our 2018-19 financial budget statements

TABLE 3.4: BUDGETED DEPARTMENTAL STATEMENT OF CASH FLOWS (FOR THE PERIOD ENDED 30 JUNE)

	2017–18 Estimated actual $'000	2018–19 Budget $'000	2019–20 Forward estimate $'000	2020–21 Forward estimate $'000	2021–22 Forward estimate $'000
OPERATING ACTIVITIES					
Cash received					
Industry contributions	10,524	8,920	8,705	8,705	8,705
Revenue from Government	10,726	8,920	8,705	8,705	8,705
Interest	640	720	660	620	565
Net GST received	1,916	1,772	1,781	1,823	1,910
Other Grants	4,853	3,190	3,190	3,190	3,190
Other	1,670	1,618	1,620	1,620	1,620
Total cash received	**30,329**	**25,140**	**24,661**	**24,663**	**24,695**
Cash used					
Employees	2,064	2,449	2,497	2,546	2,607
Suppliers	1,698	1,414	1,222	1,293	1,442
Grants	23,141	22,376	22,801	23,278	23,722
Total cash used	**26,903**	**26,239**	**26,520**	**27,117**	**27,771**
Net cash from (used by) operating activities	**3,426**	**(1,099)**	**(1,859)**	**(2,454)**	**(3,076)**
INVESTING ACTIVITIES					
Cash received					
Investments	46,000	42,000	45,000	42,000	37,000
Total cash received	**46,000**	**42,000**	**45,000**	**42,000**	**37,000**
Cash used					
Purchase of property, plant and equipment	781	505	370	290	640
Purchase of investment	57,000	42,000	44,000	38,000	33,000
Total cash used	**57,781**	**42,505**	**44,370**	**38,290**	**33,640**
Net cash from (used by) investing activities	**(11,781)**	**(505)**	**630**	**3,710**	**3,360**
Net increase (decrease) in cash held	**(8,355)**	**(1,604)**	**(1,229)**	**1,256**	**284**
Cash and cash equivalents at the beginning of the reporting period	15,071	6,716	5,112	3,883	5,139
Cash and cash equivalents at the end of the reporting period	**6,716**	**5,112**	**3,883**	**5,139**	**5,423**

Prepared on Australian Accounting Standards basis.

Our 2018-19 financial budget statements

TABLE 3.5: DEPARTMENTAL CAPITAL BUDGET STATEMENT

	2017–18 Estimated actual $'000	2018–19 Budget $'000	2019–20 Forward estimate $'000	2020–21 Forward estimate $'000	2021–22 Forward estimate $'000
PURCHASE OF NON-FINANCIAL ASSETS					
Funded internally from departmental resources[(a)]	781	505	370	290	640
TOTAL	**781**	**505**	**370**	**290**	**640**
RECONCILIATION OF CASH USED TO ACQUIRE ASSETS TO ASSET MOVEMENT TABLE					
Total purchases	781	505	370	290	640
Total cash used to acquire assets	**781**	**505**	**370**	**290**	**640**

(a) Includes the following sources of funding:
- internally developed assets

Consistent with information contained in the Statement of Asset Movements and the Budgeted Statement of Cash Flows.

Our 2018-19 financial budget statements

TABLE 3.6: STATEMENT OF ASSET MOVEMENTS (BUDGET YEAR 2018-19)

	Land	Buildings	Other property, plant and equipment	Computer software and intangibles	Total
	$'000	$'000	$'000	$'000	$'000
As at 1 July 2018					
Gross book value	190	688	591	796	2,265
Accumulated depreciation/amortisation and impairment	-	(47)	(232)	(529)	(808)
Opening net book balance	**190**	**641**	**359**	**267**	**1,457**
CAPITAL ASSET ADDITIONS					
Estimated expenditure on new or replacement assets					
By purchase – other	-	50	290	165	505
Total additions	**-**	**50**	**290**	**165**	**505**
Other movements					
Depreciation/amortisation expense	-	(20)	(102)	(180)	(302)
Total other movements	**-**	**(20)**	**(102)**	**(180)**	**(302)**
As at 30 June 2019					
Gross book value	190	738	881	961	2,770
Accumulated depreciation/amortisation and impairment	-	(67)	(334)	(709)	(1,110)
Closing net book balance	**190**	**671**	**547**	**252**	**1,660**

Prepared on Australian Accounting Standards basis.

Attachment A: CRDC 2018-19 Investments listing

Note: List current as at 9 May 2018. Additional projects will be funded throughout the year, bringing the total number of projects invested in by CRDC during 2018-19 to approximately 300.

Key focus area	Outcome	Project title	Project code	Researcher	Organisation	Commenced in:	To be completed in:
GOAL 1: INCREASED PRODUCTIVITY AND PROFITABILITY ON COTTON FARMS							
1.1 Optimised farming systems	1.1.1 Improved yield and quality	Increased yield through improved management of soil constraints in cotton farming systems	1819FRP073	Bennett, John	USQ	Jul-18	Jun-21
		Precision management for improved cotton quality	CMSE1802	Long, Robert	CSIRO	Jul-17	Jun-20
	1.1.2 Improved input efficiencies	Improving the nitrogen use efficiency of cotton crops through better understanding the role of dissolved organic nitrogen	1819FRP018	Macdonald, Bennett	CSIRO	Jul-18	Jun-21
		Improving water use efficiency in a changing climate	UNSW1802	Triantafilis, John	UNSW	Jul-17	Jun-20
		Improving water use efficiency in a changing climate	CSP1804	Broughton, Katrina	CSIRO	Jul-17	Jun-20
		IREC Field Station Automated Irrigation	IREC1801	Ayliffe, Emma	IREC	Apr-18	Jun-19
		IREC Field Station: Automation of recycle system	IREC1701	Houghton, Rob	IREC	Mar-17	Aug-18
		More Profit from Nitrogen - enhancing nutrient use efficiency in cotton	RRDP1712	Schwenke, Graeme	NSW DPI	Jul-16	Jun-21
		More Profit from Nitrogen - Improved nitrogen use efficiency through accounting for deep soil and mineralisable N supply, and deployment of Enhanced Efficiency Fertilisers to better match crop N demand	RRDP1717	Van Zwieten, Lukas	NSW DPI	Jul-16	May-20
		More Profit from Nitrogen - Increasing nitrogen use efficiency in dairy pastures	RRDP1714	Rowlings, David	QUT	Jul-16	Nov-19
		More Profit from Nitrogen - Optimising nutrient management for improved productivity and fruit quality in cherries	RRDP1721	Swarts, Nigel	UTAS	Aug-16	Jun-21
		More Profit from Nitrogen - Optimising nutrient management for improved productivity and fruit quality in mangoes	RRDP1720	Bristow, Mila	NTDPIR	Aug-16	Jun-21
		More Profit from Nitrogen - PMA Meetings	RRDP1722	Williams, Allan	CRDC	Jul-16	Jun-20
		More Profit from Nitrogen - Project Communications	RRDP1735	Williams, Allan	CRDC	Jul-16	Apr-20
		More Profit from Nitrogen - Quantifying the whole farm systems impact of nitrogen	RRDP1716	Eckard, Richard	UMELB	Jul-16	Apr-20

1.1 Optimised farming systems (cont).	1.1.2 Improved input efficiencies (cont).	More Profit from Nitrogen - Science leadership and project coordination	RRDP1711	White, Marguerite	ICD	Nov-16	Jun-20
		More Profit from Nitrogen - Smart blended use of enhanced efficiency fertilisers to maximise sugarcane profitability	RRDP1718	Wang, Weijin	DSITI	Jul-16	Apr-20
		More Profit from Nitrogen - YourData platform	RRDP1727	Coutts, Jeff	Coutts J&R	Feb-17	Jun-21
		More Profit from Nitrogen - Improving dairy farm nitrogen efficiency using advanced technologies	RRDP1715	Suter, Helen	UMELB	Jul-16	Nov-19
		More Profit from Nitrogen - New technologies and managements: transforming nitrogen use efficiency in cane production	RRDP1719	Redding, Matthew	QDAF	Sep-16	Jun-21
		Optimising the management of manures in southern NSW cotton production II	1819FRP035	Quayle, Wendy	Deakin University	Jul-18	Jun-21
		PhD: Monitoring soil water dynamics for improving water use efficiency	UNSW1801	Zare, Eshan	UNSW	Jul-17	Jun-20
		PhD: Next-generation fertilisers for nutrient stewardship in cotton production	UQ1702	Pirie, Rhys	UQ	Jan-17	Jan-20
		PhD: The impact of irrigation methods and management strategies on nitrogen fertiliser recovery in cotton in southern QLD	UQ1502	Smith, John	UQ	Jul-14	Dec-20
		Utilising plant-based sensing techniques for improving water profitability in fully and partially irrigated cotton	1819FRP043	Jamali, Hizbullah	CSIRO	Jul-18	Jun-21
	1.1.3 On-farm sustainable development is supported	National Soils RD&E Strategy	COMM			Jul-18	Jun-19
		National Water RD&E Strategy	COMM			Jul-18	Jun-19
		Science leadership for cotton development in Northern Australia	1819FRP013	Yeates, Steve	CSIRO	Jul-18	Jun-21
	1.1.4 Improved reliability of cotton production	A sprayable water barrier to line irrigation channels - scoping study	CSE1802	Bristow, Keith	CSIRO	Oct-17	Sep-18
		Biodegradable sprayable polymer to improve crop water productivity in cotton production systems	1819FRP069	Bristow, Keith	CSIRO	Jul-18	Jun-21
		Minimising yield variability to maximise yield in a cotton farming system	DAN1801	Nachimuthu, Gunasekhar	NSW DPI	Jul-17	Jun-21
		Opportunities for dryland cotton with Bollgard 3	DAQ1703	Grundy, Paul	QDAF	Jul-16	Jun-21
		Optimising seedling emergence	DAN1701	Slinger, Deb	NSW DPI	Jul-16	Jun-19
		PhD: Utilising novel plant growth regulators to develop resilient future cotton systems	CSP1604	Welsh, Claire	CSIRO	Apr-16	Mar-19
		Quantifying the effectiveness of cover crops as a means of increased water infiltration and reduced evaporation in the northern region	GRDC1801	Lawrence, David	GRDC	May-17	Apr-20

1.2 Transformative technologies	1.2.1 New technologies are adapted for use in cotton	Application of molecular tools to monitoring for resistance alleles in Helicoverpa spp.	CSE1801	Walsh, Tom	CSIRO	Jul-17	Jun-20
		Assessing the potential of a new monitoring tool (Zappa trap) for managing sucking pests on cotton	1819FRP006	Mensah, Robert	NSW DPI	Jul-18	Jun-19
		Commercial development and evaluation of a machine vision-based weed spot sprayer	NEC1402	McCarthy, Cheryl	NCEA	Jul-13	Apr-19
		Future Farm (Phase II): Technology solutions for improved nitrogen application decisions	COMM			Jul-18	Jun-21
		Identifying sensors for better IPM in cotton	1819FRP019	Long, Derek	USQ	Jul-18	Jun-21
		PhD: Characterisation of brassinosteroid effects and brassinosteroid-responsive genes in cotton for growth and stress tolerance enhancement	UNE1605	Al-amery, Anahid A Essa	UNE	Sep-15	Feb-19
		Precise real-time automated cotton irrigation for improved water productivity	1819FRP064	Foley, Joseph	NCEA	Jul-18	Jun-21
		Precise real-time automated cotton irrigation for improved water productivity	1819FRP084	Hornbuckle, John	Deakin University	Jul-18	Jun-21
		Precise real-time automated cotton irrigation for improved water productivity	1819FRP098	Gall, Louise	GVIA	Jul-18	Jun-21
		The platform for monitoring and analysis of cotton canopy nitrogen status and yield projection using calibrated aerial and satellite imagery	FLUR1801	Volkova, Anastasiia	FluroSat Pty Ltd	Dec-17	Aug-18
1.3 Protection from biotic threats and environmental stresses	1.3.1 Increased understanding of the impact of pests, diseases and weeds, and environmental stresses	IPM to support management of emerging cotton pests	1819FRP038	Heimoana, Simone	CSIRO	Jul-18	Jun-21
		PhD: Biology of Amarathus hybridus, A. mitchelli, and A. powelii	UQ1703	Khan, Asad	UQ	Jan-17	Dec-19
		Transformation of Verticillium dahliae, causal agent of Verticillium wilt of cotton, with the GFP gene	DAN1809	Gregson, Aphrika	NSW DPI	Dec-17	Dec-19
		Understanding the ecology of reniform Nematodes in cotton	DAQ1803	Smith, Linda	QDAF	Nov-17	Jun-19
	1.3.2 Improved identification, surveillance and management systems for pests, diseases and weeds and environmental stresses	Biological based products for improved cotton production	1819FRP076	Singh, Brajesh K	UWS	Jul-18	Jun-21
		Biological control and taxonomic advancement for management in the Noogoora burr complex	DAN1805	Johnson, Stephen	NSW DPI	Sep-17	Jun-19
		Conventional insecticide resistance in Helicoverpa - monitoring, management and novel mitigation strategies in Bollgard 3	DAN1506	Bird, Lisa	NSW DPI	Jul-14	Jun-19
		Cotton Disease Technical Lead (CottonInfo and *my*BMP)	1819FRP077		NSW DPI	Jul-18	Jun-21
		Development of a spray drift hazard prediction system	MRES1701	Tepper, Graeme	MRES	Jul-16	Jun-19
		Digital technologies for dynamic management of disease, stress and yield program	AGWA1701	Waters, Liz	AGWA	Jul-16	Jun-19
		Fitness cost of Vip3A and Cry1Ac resistance in HP	COMM	Walsh, Tom	CSIRO	Jul-18	Jun-21
		Improved management of silverleaf whitefly on cotton farms	1819FRP066	Sequeira, Richard	QDAF	Jul-18	Jun-21
		Improving plant pest management through cross industry deployment of smart sensor, diagnostics and forecasting	HIA1802	Tay, Wee tek & Brooks Dean	HIA	Feb-18	May-22

1.3 Protection from biotic threats and environmental stresses (cont).	1.3.2 Improved identification, surveillance and management systems for pests, diseases and weeds and environmental stresses (cont).	Improving the management of cotton diseases in Australian cotton farming systems	RRDP1724	Smith, Linda	QDAF	Jul-16	Jun-19
		Innovative solutions to cotton diseases	DAN1703	Le, Duy	NSW DPI	Jul-16	Dec-20
		IPM Technical lead and pest management for high yield research	1819FRP107	Grundy, Paul	QDAF	Jul-18	Jun-21
		Managing Climate Variability Program (Phase 5)	MLA1701	Tom Davison	MLA	Jul-16	Jun-21
		Managing Verticillium risk for cotton	RRDP1723	Kirkby, Karen	NSW DPI	Jul-16	Jun-19
		Mirid and mealybug best practice management	DAQ1802	Sequeira, Richard	QDAF	Jul-17	Jun-20
		Monitoring silverleaf whitefly insecticide resistance	DAQ1701	Hopkinson, Jamie	QDAF	Jul-16	Jun-19
		Novel products and agronomy to maintain yields under high heat stress conditions	CSP1601	Bange, Michael	CSIRO	Jul-15	Jun-19
		Novel topical vegetable & cotton virus protection BIOCLAY	HIA1803	Mitter, Neena	UQ	Jul-17	Jun-20
		PHA Membership	COMM	Fraser, Greg	PHA	Jul-18	Jun-19
		PHA Secretariat support (Biosecurity RD&E strategy)	COMM	Fraser, Greg	PHA	Jul-18	Jun-19
		PHA Secretariat support (National Working Party on Pesticides Applications)	COMM	Fraser, Greg	PHA	Jul-18	Jun-19
		PhD: Building climate resilience in cotton through translational physiology	ANU1704	Gamble, Demi	ANU	Feb-17	Mar-20
		Ready to use soil test to manage black root rot risks	1819FRP048	Manjarrez, Maria	Microbiology Laboratories Australia	Jul-18	Jun-20
		Reducing cotton discolouration risk (stages 2 & 3)	COMM		Xinova	Jul-18	Jun-19
		Reducing the impact of weather, insects and microbes on cotton colour	1819FRP060	Heimoana, Simone	CSIRO	Jul-18	Jun-21
		Regional approach to weed management	COMM			Jul-18	Jun-21
		Resistance research and monitoring to enhance stewardship of Bt cotton and management of Helicoverpa spp.	CSE1701	Downes, Sharon	CSIRO	Jul-16	Jun-19
		Staying ahead of weed evolution in changing cotton systems	UQ1501	Chauhan, Bhagirath	UQ	Jul-14	Jun-19
		Surveillance and studies for endemic and exotic virus diseases of cotton	DAQ1601	Sharman, Murray	QDAF	Jul-15	Jun-19
		The sustainable chemical control and resistance management of aphid, mites and mirids in Australian cotton, 2014-2019	DAN1507	Herron, Grant	NSW DPI	Jul-14	Jun-19
		The use of area wide management, IPM, detergents and oils for the suppression of whitefly population in cotton for the reduced reliance and use of chemical controls	CRDC1803	Ayliffe, Emma	Elders	Jul-17	Jun-19
	1.3.3 Industry is prepared for a biosecurity incursion	Large scale biosecurity scenario to support cotton industry preparedness	1819FRP053	Dibley, Stephen	PHA	Jul-18	Jun-19
		Plant Biosecurity Research Initiative	HIA1801	Luck, Jo	HIA	Jul-17	Jun-20

Key focus area	Outcome	Project title	Project code	Researcher	Organisation	Commenced in:	To be completed in:
GOAL 2: IMPROVE COTTON FARMING SUSTAINABILITY AND VALUE CHAIN COMPETITIVENESS							
2.1 Sustainability of cotton farming	2.1.1 Improved environmental footprint for cotton farms	Alternative energy technologies and policy solutions for the Australian cotton	1819FRP056	Li, Li	UTS	Jul-18	Jun-21
		Alternative irrigation pump management strategies for healthy water systems	EOI0161			Jul-18	Jun-21
		Appropriate land-use methodology for Australian cotton life-cycle assessments	UQ1701	Visser, Francois	UQ	Jul-16	Jun-19
		CottonMap	COMM	Cottee, Nicola	CA	Jul-18	Jun-19
		Development of next generation evaporation mitigation technology with increased resistance to wind	UM1801	Qiao, Greg	UMELB	Sep-17	Aug-18
		Evaporation mitigation solutions for Australian cotton farm water storages	1819FRP087	Qiao, Greg	UMELB	Jul-18	Jun-21
		Feasibility study of managed aquifer recharge for improved water productivity	1819FRP005	Jakeman, Anthony	ANU	Jul-18	Jun-21
		Improved natural capital (biodiversity) on Australian cotton farms	1819FRP031	Smith, Rhiannon	UNE	Jul-18	Jun-21
		Improving the ability of the Australian cotton industry to report its sustainability performance	QUT1705	Peterson, Erin	QUT	Jul-16	Oct-19
		Managing natural landscapes on Australian cotton farms to increase the provision	GU1701	Capon, Samantha	Griffith University	Jul-16	Jun-19
		National Residue Survey for Cotton	CA1705	Cottee, Nicola	CA	Feb-17	Feb-19
		PhD: Improving precision agriculture and environmental performance for the Australia	ANU1602	Latimer, James	ANU	Feb-16	Jun-19
		PhD: Sustainable water extractions: Low flow refugia and critical flow thresholds	UNE1406	Pearson, Marita	UNE	Jan-14	Dec-19
		Post doc: Oliver Knox - Professor of soil biology	UNE1403	Knox, Oliver	UNE	Jan-14	Dec-18
		Quantifying the nitrogen cycle: from farm gate to catchments, groundwater and atmosphere	ANSTO1801	Cendon, Dioni	ANSTO	Jul-17	Jun-20
		Quantifying the potential environmental impacts of pesticides used on cotton farms	DAN1803	Rose, Mick	NSW DPI	Jul-17	Jun-20
		Scoping study: Understanding the methodologies and data being used in life cycle impact assessments to assess the impact of man-made fibres in cotton	COMM			Jul-18	Jun-21
		Soil System Research – physical, chemical and biological processes for plant growth and nutrient cycling down the whole soil profile	UNE1601	Knox, Oliver	UNE	Jul-15	Jan-19
		Synthesis of natural resource assets in the cotton growing region of eastern Australia	FWPA1801	Wall, Julian	EcoLogical Aust	Jul-17	Jun-20
		Understanding environmental impacts and resource impacts with changing demand for Australian cotton, assessed using a change modelling life cycle assessment approach	1819FRP108	Wiedemann, Stephen	Integrity Ag Services	Jul-18	Jun-20

2.2 Create higher value uses for cotton	2.2.1 Increased value for Australian cotton	An eco-friendly treatment to improve look and handle of cotton fabric	DU1701	Rajkhowa, Rangam	Deakin University	Oct-16	Sep-18
		Continuous mercerisation of loose-stock cotton without fibre shrinkage	RMIT1802	Padhye, Rajiv	RMIT	Feb-18	Dec-18
		Developing renewable fine chemicals from cotton biomass	SRA1601	Doherty, William	SRA	Feb-16	Apr-19
		Ever-dry self-cooling fabrics - commercialisation investigation phase	COMM		Deakin University	Jul-18	Jun-21
		Exploring nanofibrous coating on cotton fabric with versatile protection and dynamic comfort	RMIT1702	Gavrilenko, Olga	RMIT	Feb-17	Jan-20
		Identifying high value uses for recycled cotton	1819FRP030	Zhang, Jin	Deakin University	Jul-18	Jun-21
		Managing cotton quality to maintain Australia's premium status	CMSE1801	Van der Sluijs, Rene	CSIRO	Jul-17	Jun-20
		Novel anti-wetting and self-sterilising cotton fabrics	DU1802	Lui, Xin & Zhao, Yan	Deakin University	Jan-18	Dec-18
		Scoping study: Identifying opportunities for blending cotton with high tech / novel textile materials	1819FRP063	Miao, Menghe	CSIRO	Jul-18	Jun-19
	2.2.2 Increased understanding of market requirements and opportunities throughout the value chain	Bio-degradation of dyed cotton fabrics	NCSU1701	Vinueza, Nelson	NCSU	Jan-16	Dec-18
		Consumer perceptions of Australian cotton - Roy Morgan	EOI172		CA	Jul-18	Jun-19
		Micro particles generated from laundering of cotton and other fabrics	NCSU1702	Venditti, Richard	NCSU	Jan-17	Dec-18
		Strategies for improving labour conditions within the Australian cotton value	1819FRP051	Payne, Alice	QUT	Jul-18	Jun-21
2.3 Measurement and reporting throughout the value chain	2.3.1 CRDC collaborates in global leadership for sustainability initiatives	Sustainable Apparel Coalition Membership 2017	CRDC1817	Robinson, Glen	SAC	Aug-17	Jul-18
	2.3.2 The value chain is transparent and understood by participants	PhD: Sustainable value chain analysis of the Australian cotton industry	1819FRP052	Payne, Alice	QUT	Jul-18	Jun-21

Key focus area	Outcome	Project title	Project code	Researcher	Organisation	Commenced in:	To be completed in:
GOAL 3: BUILD ADAPTIVE CAPACITY OF THE COTTON INDUSTRY							
3.1 Science and innovation capability, and new knowledge	3.1.1 Science and innovation capacity is strengthened and strategically fit for a digital future	2015 Horizon Scholarship - Scott Nevison	RIRDC1503	Nevison, Scott	AgriFutures	Mar-15	Dec-18
		2016 Horizon Scholarship - Sam Knight	RIRDC1602	Knight, Sam	AgriFutures	Jul-15	Dec-19
		2017 Cotton Young Farming Champions Program	CRDC1728	Strong, Lynne	PYIA	Dec-16	Jan-19
		2017 Horizon Scholarship - Holly Chandler	RIRDC1702	Chandler, Holly	AgriFutures	Jul-16	Dec-19
		2018 Australian Future Cotton Leaders Program	CA1806	Eady, Jo	CA	Mar-18	Dec-18
		Accelerating Precision to decision (Phase 2): Industry digital strategies the foundations for success	COMM		D2D CRC	Jul-18	Jun-21
		AgCatalyst 2018	CSP1805	Purtell, Gavin	CSIRO	Aug-18	Aug-18
		Agri-intelligence in cotton production systems (Stage 1)	QUT1701	Perez, Tristan	QUT	Jan-17	Dec-18
		ARLP Cotton Industry Leadership Development	COMM	Woodhill, Phillipa	ARLF	Jul-18	Jun-19
		Australian Rural Leadership Course 24 - Richard Malone	RIR1802	Malone, Richard	ARLF	Aug-17	Oct-18
		Australian Rural Leadership Course 24 - Timothy Chaffey	RIR1801	Chaffey, Timothy	ARLF	Aug-17	Oct-18
		CRDC Summers/Honours Scholarships	COMM		CRDC	Jul-18	Jun-19
		Data analytics capacity and solutions developed for digitising the Australian cotton industry	COMM			Jul-18	Jun-21
		Design of versatile protective cotton fabrics with colour and patterns	RMIT1801	Williamson, Olivia	RMIT	Feb-18	Nov-18
		Evaluation of relative damage caused by two-spotted mite, bean spider mite and strawberry mite in cotton	DAN1808	Shafto, Christopher	NSW DPI	Jan-18	Dec-20
		Facilitate Start Up Alley at the 19th Australian Cotton Conference	XL1802	Parsons, Tim	XLAB	May-18	Aug-18
		Honours: Establishing precision/digital agriculture at 'Llara'	US1802	Ginns, Bradley	USYD	Dec-17	Nov-18
		Honours: Estimating soil water use in cotton systems	CSP1803	Gaynor, Harry	CSIRO	Jan-18	Nov-18
		Improving grower decisions in complex systems	1718FRP017	Wunsch, Geraldine	USQ	Mar-18	Jun-21
		Irrigation data science research capacity for the Australian cotton industry	1819FRP080	Roth, Guy	USYD	Jul-18	Jun-21
		Nuffield Australia Farming Scholarship 2017 - Daniel Kahl	CRDC1711	Kahl, Daniel	Nuffield	Jul-16	Sep-18
		Nuffield Australia Farming Scholarship 2018 - Luke McKay	CRDC1801	McKay, Luke	Nuffield	Jul-17	Sep-19
		Nuffield Australia Farming Scholarship 2019	COMM	Dean, Jodie	Nuffield	Jul-18	Jun-19
		Partnership with Deakin University for fibre and textile R&D capacity	COMM		Deakin University	Jul-18	Jun-23
		Start Up Alley at the 19th Australian Cotton Conference	CA1805	Anderson, Fleur	CA	May-18	Aug-18

3.1 Science and innovation capability, and new knowledge (cont).	3.1.2 Increased understanding of the diverse human capital in regional communities	People on farm - Employment Starter Kit Initiative (ESKi)	DA1502	Hellwege, Shane	DA	Jul-14	Jun-20
		Rural Womens' Awards	COMM	Medway, Jennifer	AgriFutures	Jul-18	Jun-19
		Understanding and planning for the future cotton workforce	USQ1801	McDonald, Nicole	USQ	Oct-17	Oct-20
		Understanding motivational factors for improved spray application on farms	1819FRP093	Hine, Don	UNE	Jul-18	Jun-20
	3.1.3 Increased opportunities for innovation skills development	Catapult program CRDC Innovation (Phase I)	XL1801	Taylor, Ian	XLAB	Apr-18	Jun-19
3.2 Futures thinking	3.2.1 Australian cotton growers are able to adapt to change	19th Australian Cotton Conference Foundation Sponsorship	CA1804	Anderson, Fleur	CA	Dec-17	Sep-18
		Collaborative Partnership Primary Industries Health & Safety	COMM	Medway, Jennifer	AgriFutures	Jul-18	Jun-19
		CRDC Grassroots Grants	COMM		CRDC	Jul-18	Jun-19
		Thresholds for resilience in regional communities	1819FRP028	Nettle, Ruth	UMELB	Jul-18	Jun-20
	3.2.2 Increased opportunities for strategic foresighting	Cotton Australia Board Portal	COMM	Cottee, Nicola	CA	Jul-18	Jun-19
		Grower RD&E advisory panels - Capacity Building	COMM	Cottee, Nicola	CA	Jul-18	Jun-19
		Grower RD&E advisory panels - Travel	COMM	Cottee, Nicola	CA	Jul-18	Jun-19

Key focus area	Outcome	Project title	Project code	Researcher	Organisation	Commenced in:	To be completed in:
GOAL 4 (ENABLING STRATEGY 1): STRENGTHENING PARTNERSHIPS AND ADOPTION							
4.1. Partnerships and collaboration	4.1.2 CottonInfo partnership is maintained and practice change improved	Benchmarking water use efficiency and crop productivity in the Australian cotton industry	DAN1505	Chaffey, Alison	NSW DPI	Jul-14	Jun-19
		Climate and energy for cotton farming businesses	AE1801	Welsh, Jon	AgEcon	Jul-17	Jun-20
		Communicating cotton best production practices with video	1819FRP091	Grundy, Paul	QDAF	Jul-18	Jun-21
		Cotton industry database management	CRDC1804	Armson, Lee	Making Data Easy	Jul-17	Jun-20
		CottonInfo: field demonstrations	COMM	Waters, Warwick	CRDC	Jul-18	Jun-19
		CottonInfo: monitoring and evaluation support system	CRDC1818	Coutts, Jeff	Coutts J&R	Jul-17	Jun-19
		IPM and Insect Resistance Technical Lead (CottonInfo and *my*BMP)	1819FRP034	Ceeney, Sally	Ceeney Agricultural Consultants	Jul-18	Jun-21
		National biosecurity and disease extension and coordination and CQ regional extension	DAQ1801	Holman, Sharna	QDAF	Jul-17	Jun-20
		NRM Technical Lead and extension campaigns (CottonInfo and *my*BMP)	CRDC1805	Vogel, Stacey	Stacey Vogel Consulting	Jul-17	Jun-20
		Technical Lead - Nutrition & Water (CottonInfo and *my*BMP)	DAN1807	Smith, John	NSW DPI	Jul-17	Jun-19
	4.1.3 Partnerships are strengthened to engage multi-disciplinary and multi-institutional resources	AgVet Collaborative Forum - Plant Industries (Phase 3)	RIRDC1701	Medway, Jennifer	AgriFutures	Jul-16	Dec-19
		Climate Change Research Strategy for Primary Industries 2017-2020	CCR1801		CCRSPI	Jul-17	Jun-20
		WeedSmart (Phase 4)	UWA1801	Mayer, Lisa	UWA	Jul-17	Jun-20
4.2 Best practice (*my*BMP)	4.2.1 Best practice is based on science and measured impact	Boyce Cotton Comparative Analysis	COMM	Alchin, Phil	BCA	Jul-18	Jun-19

Key focus area	Outcome	Project title	Project code	Researcher	Organisation	Commenced in:	To be completed in:
GOAL 5 (ENABLING STRATEGY 2): DRIVING RD&E IMPACT							
5.1 Impact and effectiveness	5.1.2 CRDC monitors and evaluates RD&E impact	Annual consultant qualitative and quantitative surveys	1819FRP082	Todd, Liz	CCA	Jul-18	Jun-21
		Communications support projects	CRDC1744	Pilling, Bernadette	House of Communications	Jun-17	Dec-18
		CRDC Grower Practice Survey	CRDC1733	Sparks, Michael	Intuitive Solutions	Mar-17	Dec-19
		Longitudinal assessment of the cotton industry's people investments	CRDC1710	Moffatt, Jennifer	Jennifer Moffatt	Jul-16	Dec-18
		Measuring and reporting the value of capacity building on farms and in research	CRDC1701	Stone, Gordon	QualDATA	Jul-16	Jun-19
		Reinventing Australian agricultural statistics	AFI1802	Keogh, Mick	AFI	Apr-18	Nov-18
		Risk management in Australian agriculture	AFI1803	Keogh, Mick	AFI	Apr-18	Nov-18
	5.1.3 CRDC funded projects demonstrate value and return on investment	Impact assessment of selected clusters of projects	COMM	Chudleigh, Peter	AgTrans	Jul-18	Jun-19
		More Profit from Nitrogen - mid-term evaluation	RRDP1736	Coutts, Jeff	Coutts J&R	Jun-18	Sep-18

Attachment B: CRDC expenditure across the Government priorities

Note: These tables exclude budgeted employee and supplier expenditure, and corporate research activities which support RD&E planning and adoption.

TABLE A: RESEARCH AND DEVELOPMENT EXPENDITURE ESTIMATES 2018-19 ACROSS THE SCIENCE AND RESEARCH PRIORITIES

Food ($'000)						Soil and Water ($'000)			Transport ($'000)			Cybersecurity ($'000)			
1.1	**1.2**	**1.3.1**	**1.3.2**	**1.3.3**	**1.3.4**	**2.1**	**2.2**	**2.3**	**3.1**	**3.2**	**3.3**	**4.1**	**4.2**	**4.3**	**4.4**
$226	$1,538	$4,076	$617	$4,674	$186	$737	$3,439	$2,835	$0	$0	$0	$19	$0	$0	$0

Energy ($'000)			Resources ($'000)				Advanced Manufacturing ($'000)			Environmental Change ($'000)			Health ($'000)				Total ($'000)
5.1	**5.2**	**5.3**	**6.1**	**6.2**	**6.3**	**6.4**	**7.1**	**7.2**	**7.3**	**8.1**	**8.2**	**8.3**	**9.1**	**9.2**	**9.3**	**9.4**	
$22	$14	$0	$0	$0	$0	$0	$165	$0	$0	$368	$98	$661	$0	$0	$0	$25	$19,700

Science and Research Priorities

Priority 1: Food

1.1 Knowledge of global and domestic demand, supply chains and the identification of country specific preferences for food (and fibre)

1.2 Knowledge of the social, economic and other barriers to achieving access to healthy Australian food (and fibre).

1.3 Enhanced food production through:

- 1.3.1 novel technologies, such as sensors, robotics, real-time data systems and traceability, all integrated into the production chain.
- 1.3.2 enhanced food production through better management and use of waste and water; increased food (and fibre) quality, safety, stability and shelf life.
- 1.3.3 enhanced food production through protection of food (and fibre) sources through enhanced biosecurity
- 1.3.4 enhanced food production through genetic composition of food (and fibre) sources appropriate for present and emerging Australian conditions.

Priority 2: Soil and Water

2.1 New and integrated national observing systems, technologies and modelling frameworks across the soil-atmosphere-water-marine systems.

2.2 Better understanding of sustainable limits for productive use of soil, freshwater, river flows and water rights, terrestrial and marine ecosystems.

2.3 Minimising damage to, and developing solutions for restoration and remediation of, soil, fresh and potable water, urban catchments and marine systems.

Priority 3: Transport

3.1 Low emission fuels and technologies for domestic and global markets.

3.2 Improved logistics, modelling and regulation: urban design, autonomous vehicles, electrified transport, sensor technologies, real time data and spatial analysis.

3.3 Effective pricing, operation, and resource allocation.

Priority 4: Cybersecurity

4.1 Highly-secure and resilient communications and data acquisition, storage, retention and analysis for government, defence, business, transport systems, emergency and health services.

4.2 Secure, trustworthy and fault-tolerant technologies for software applications, mobile devices, cloud computing and critical infrastructure.

4.3 New technologies and approaches to support the nation's cybersecurity: discovery and understanding of vulnerabilities, threats and their impacts, enabling improved risk-based decision making, resilience and effective responses to cyber intrusions and attacks.

4.4 Understanding the scale of the cyber security challenge for Australia, including the social factors informing individual, organisational, and national attitudes towards cyber security.

Priority 5: Energy

5.1 Low emission energy production from fossil fuels and other sources.

5.2 New clean energy sources and storage technologies that are efficient, cost-effective and reliable.

5.3 Australian electricity grids that can readily integrate and more efficiently transmit energy from all sources including low- and zero-carbon sources.

Priority 6: Resources

6.1 A fundamental understanding of the physical state of the Australian crust, its resource endowment and recovery.

6.2 Knowledge of environmental issues associated with resource extraction.

6.3 Lowering the risk to sedimentary basins and marine environments due to resource extraction.

6.4 Technologies to optimise yield through effective and efficient resource extraction, processing and waste management.

Priority 7: Advanced Manufacturing

7.1 Knowledge of Australia's comparative advantages, constraints and capacity to meet current and emerging global and domestic demand.

7.2 Cross-cutting technologies that will de-risk, scale up, and add value to Australian manufactured products.

7.3 Specialised, high value-add areas such as high-performance materials, composites, alloys and polymers.

Priority 8: Environmental Change

8.1 Improved accuracy and precision in predicting and measuring the impact of environmental changes caused by climate and local factors.

8.2 Resilient urban, rural and regional infrastructure.

8.3 Options for responding and adapting to the impacts of environmental change on biological systems, urban and rural communities and industry.

Priority 9: Health

9.1 Better models of health care and services that improve outcomes, reduce disparities for disadvantaged and vulnerable groups, increase efficiency and provide greater value for a given expenditure.

9.2 Improved prediction, identification, tracking, prevention and management of emerging local and regional health threats.

9.3 Better health outcomes for Indigenous people, with strategies for both urban and regional communities.

9.4 Effective technologies for individuals to manage their own health care, for example, using mobile apps, remote monitoring and online access to therapies.

TABLE B: RESEARCH AND DEVELOPMENT EXPENDITURE ESTIMATES 2018-19 ACROSS THE RURAL RD&E PRIORITIES.

	Advanced Technology ($'000)	Biosecurity ($'000)	Soil, water and managing natural resources ($'000)	Adoption of R&D ($'000)	Total ($'000)
Expenditure	$2,854	$8,824	$5,458	$2,564	$19,700
Percentage of total	14%	45%	28%	13%	100%

Attachment C: Research partner acronyms

AFI	Australian Farm Institute
AgriFutures	AgriFutures Australia (formerly the Rural Industries Research & Development Corporation)
AGWA	Australian Grape and Wine Authority
ANSTO	Australian Nuclear Science & Technology Organisation
ANU	Australian National University
ARLF	Australian Rural Leadership Foundation
BCA	Boyce Chartered Accountants
CA	Cotton Australia
CCA	Crop Consultants Australia
CCRSPI	Climate Change Research Strategy for Primary Industries
CRDC	Cotton Research and Development Corporation
CRRDP	Council of Rural Research and Development Corporations
CSIRO	Commonwealth Scientific and Industrial Research Organisation
D2D CRC	Data to Decisions Cooperative Research Centre
DA	Dairy Australia
DSITI	Queensland Department of Science, Information Technology and Innovation
GRDC	Grains Research and Development Corporation
GVIA	Gwydir Valley Irrigators Association
HIA	Horticulture Innovation Australia Limited
ICD	Initiated Coordinated Delivered (ICD) Project Services
IREC	Irrigation Research and Extension Committee
MLA	Meat and Livestock Australia
MRES	Micro Meteorology Research & Education Services
NCEA	National Centre for Engineering in Agriculture
NCSU	North Carolina State University
NSW DPI	NSW Department of Primary Industries
NTDPIR	Northern Territory Department of Primary Industries and Resources
PHA	Plant Health Australia
PYIA	Picture You in Agriculture
QDAF	Queensland Department of Agriculture and Fisheries
QUT	Queensland University of Technology
RMIT	Royal Melbourne Institute of Technology
SAC	Sustainable Apparel Coalition
SRA	Sugar Research Australia
UMELB	University of Melbourne
UNE	University of New England
UNSW	University of New South Wales
UQ	University of Queensland
USQ	University of Southern Queensland
USYD	University of Sydney
UTAS	University of Tasmania
UTS	University of Technology Sydney
UWA	University of Western Australia
UWS	University of Western Sydney

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