

# **Cross-RDC Impact Assessment 2019**

A Cross-RDC Impact Assessment for the Five-Year Period  
1 July 2013 to 30 September 2018

**FINAL REPORT**

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Prepared For

**The Council of Rural Research and  
Development Corporations**

Submitted By

**Agtrans Research**

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## Glossary of Economic Terms

Cost-benefit analysis:	A conceptual framework for the economic evaluation of projects and programs in the public sector. It differs from a financial appraisal or evaluation in that it considers all gains (benefits) and losses (costs), regardless of to whom they accrue.
Benefit-cost ratio:	The ratio of the present value of investment benefits to the present value of investment costs.
Discounting:	The process of relating the costs and benefits of an investment to a base year using a stated discount rate.
Internal rate of return:	The discount rate at which an investment has a net present value of zero, i.e. where present value of benefits = present value of costs.
Investment criteria:	Measures of the economic worth of an investment such as Net Present Value, Benefit-Cost Ratio, and Internal Rate of Return.
Modified internal rate of return:	The internal rate of return of an investment that is modified so that the cash inflows from an investment are re-invested at the rate of the cost of capital (the re-investment rate).
Net present value:	The discounted value of the benefits of an investment less the discounted value of the costs, i.e. present value of benefits - present value of costs.
Present value of benefits:	The discounted value of benefits.
Present value of costs:	The discounted value of RD&E investment costs.

## Acronyms and Abbreviations

AECL	Australian Egg Corporation Limited
AMPC	Australian Meat Processor Corporation
APL	Australian Pork Limited
AWI	Australian Wool Innovation
AWRI	Australian Wine Research Institute
BCR	Benefit-Cost Ratio
CBA	Cost-Benefit Analysis
CRDC	Cotton Research and Development Corporation
CRRDC	Council of Rural Research and Development Corporations
DAWR	Department of Agriculture and Water Resources (Commonwealth)
FRDC	Fisheries Research and Development Corporation
FWPA	Forest and Wood Products Australia Limited
GRDC	Grains Research and Development Corporation
GWRDC	Grape and Wine Research and Development Corporation
Hort. Innovation	Horticulture Innovation Australia
IRR	Internal Rate of Return
MIRR	Modified Internal Rate of Return
MLA	Meat and Livestock Australia
NPV	Net Present Value
PIRD Act	Primary Industries Research and Development Act (1989)
PVB	Present Value of Benefits
PVC	Present Value of Investment Costs
R&D	Research and Development
RD&E	Research, Development and Extension
RDC	Research and Development Corporation
RIRDC	Rural Industries Research and Development Corporation (now AgriFutures Australia)
RnD4P	Research and Development for Profit
SRA	Sugar Research Australia Limited
WG	Working Group

# Contents

Acknowledgments .....	2
Glossary of Economic Terms .....	3
Acronyms and Abbreviations .....	4
List of Tables .....	6
Executive Summary .....	7
1. Introduction .....	9
2. Context and Background .....	10
2.1 The Rural Research and Development Corporations .....	10
2.2 The Council of Rural Research and Development Corporations .....	11
2.3 The Cross-RDC Impact Assessment Program .....	11
3. The Current Assessment .....	14
3.1 Engaging Individual RDCs in the Cross-RDC Evaluation Process .....	14
3.2 Description of the Cross-RDC Aggregate Analysis Template .....	14
4. List of Evaluations .....	16
4.1 The Population .....	16
4.2 Primary Subset of Evaluations .....	17
5. Impact Assessment Results (2013-2018) .....	19
5.1 Economic Evaluation: Primary Results .....	19
5.2 Economic Evaluation: Other Results .....	20
RDC RD&E Expenditure over the Assessment Period .....	20
Total and RDC Investment in the Evaluations Aggregated .....	20
RD&E Investment Leverage .....	20
5.3 Qualitative Description of Environmental and Social Impacts .....	25
6. Public benefits .....	26
7. Collaboration .....	27
8. Alignment with CRRDC Communication Themes .....	28
9. Issues Identified and Recommendations for Future Cross-RDC Impact Assessments .....	33
8.1 Issues Identified for the Aggregate Assessment .....	33
8.2 Other Issues .....	34
8.3 Recommendations .....	35
10. Conclusion .....	37
References .....	38
Appendices .....	40
Appendix 1: List of all 15 Current RDCs with Web Page Links .....	40
Appendix 2: Complete List of the 219 RDC RD&E Investment Evaluations Submitted for the 2019 Cross-RDC Impact Assessment (total population) .....	41
Appendix 3: Subjective Assessment of Alignment of Each Project Cluster to the Six CRRDC Communication Themes (Total 219 Project Clusters) .....	52
Appendix 4: Record of the 288 RDC RD&E Evaluations Submitted as part of the 2016 Cross-RDC Impact Assessment Process (cross-RDC analysis for the six-year period 1 July 2009 to 30 June 2015) .....	63

## List of Tables

<b>Table 1:</b> Total Number of Project Cluster Evaluations Submitted .....	16
<b>Table 2:</b> Number of Project Clusters Excluded from the Subset by Assessment Criterion .....	18
<b>Table 3:</b> Number of Project Cluster Evaluations Included in the Primary Subset by Year .....	18
<b>Table 4:</b> 2019 Aggregate Results by Year – Primary Subset (1 July 2013 to 30 September 2018)....	19
<b>Table 5:</b> 2016 Aggregate Results by Year – Final Population (1 July 2009 to 30 June 2015) .....	20
<b>Table 6:</b> Total RDC RD&E Expenditure 2013/14 to 2017/18 <sup>(a)</sup> .....	21
<b>Table 7:</b> Aggregate Investment Criteria Over Time.....	22
<b>Table 8:</b> 2019 Aggregate Results by Year – Selected Evaluation Subset (1 July 2013 to 30 September 2018) .....	23
<b>Table 9:</b> 2019 Aggregate Results by Year – Complete Data Subset (1 July 2013 to 30 September 2018) .....	24
<b>Table 10:</b> Frequency of Reporting of Key Environmental Impact Categories .....	25
<b>Table 11:</b> Frequency of Reporting of Key Social Impact Categories .....	25
<b>Table 12:</b> RDC led RnD4P Projects Funded Under Round One of the RnD4P Program (2015/16 to 2017/18) .....	27
<b>Table 13:</b> Project Clusters Assessed as having a High Degree of Alignment with Communication Theme 1 - Farmgate Returns.....	28
<b>Table 14:</b> Project Clusters Assessed as having a High Degree of Alignment with Communication Theme 2 – Innovation .....	30
<b>Table 15:</b> Project Clusters Assessed as having a High Degree of Alignment with Communication Theme 3 – Leverage Investment <sup>(a)</sup> .....	30
<b>Table 16:</b> Project Clusters Assessed as having a High Degree of Alignment with Communication Theme 4 – Market Access, International Competitiveness.....	31
<b>Table 17:</b> Project Clusters Assessed as having a High Degree of Alignment with Communication Theme 5 – Value for Money <sup>(a)</sup> .....	31
<b>Table 18:</b> Project Clusters Assessed as having a High Degree of Alignment with Communication Theme 6 – Vibrant Communities .....	32

## Executive Summary

The Council of Rural Research and Development Corporations (CRRDC) commissioned the evaluation team (Agtrans Research and Consulting) to conduct a Cross-Research and Development Corporation (RDC) Impact Assessment for the period 1 July 2013 to 30 September 2018.

The project was undertaken to review and report on existing impact assessment and performance information (both quantitative and qualitative) across a five-year time window. Results of the current cross-RDC assessment then would provide input into the CRRDC's performance story and stakeholder communication and engagement strategy.

Cross-RDC impact assessment reports were published in 2008, 2010 and 2016. Part of the 2016 cross-RDC initiative was the development of a revised framework for the Rural Research and Development Corporations' (RDCs) collective impact assessment and reporting. As a result of the revision, the RDCs, through the mechanism of the CRRDC, agreed to conduct an updated, aggregate cross-RDC impact assessment every two years. The aggregate assessments were to cover a rolling five-year period to enable the RDCs to assess collective performance over time.

The CRRDC initiated the current, 2019 cross-RDC evaluation as the first of the formal, biennial aggregate RDC evaluations. The purpose of the current evaluation was to assess the collective impact of the combined RDC investment in research, development and extension (RD&E) over the five-year period from 1 July 2013 to 30 September 2018.

The evaluation team collected, and assembled data from economic evaluation reports containing a total of 219 individual evaluations of various RDC RD&E investments carried out during the five-year period. The individual 219 economic evaluations were conducted by at least 13 independent consultancies and represented all 15 RDCs. The investments evaluated in the submitted reports included single projects, project clusters (two or more projects grouped together for evaluation), and whole RDC programs or sub-programs. For the purpose of this analysis, all investments that were evaluated and recorded for the assessment are referred to hereafter as project clusters as per CRRDC impact assessment terminology.

For the purpose of the current Cross-RDC Impact Assessment, a subset of the population of 219 evaluations was assembled for quantitative assessment (hereafter referred to as the primary subset). Evaluations were selected for the primary subset according to the following criteria:

- the evaluation must have been submitted during the assessment period, 1 July 2013 to 30 September 2018 (as per the Agtrans project brief).
- the evaluation must have been completed by a suitably qualified, independent consultant/organisation (CRRDC methodology requirement).
- the investment being evaluated must have been randomly chosen (CRRDC methodology requirement).
- the evaluation report had to include data for the total investment, as well as the RDC contribution to the total investment, for the project cluster (CRRDC methodology requirement).
- the individual evaluation report needed to include investment criteria results for NPV and BCR at 30-years after the last year of investment as per the CRRDC Impact Assessment Guidelines (CRRDC methodology requirement).

Based on the above criteria, a primary subset of 111 evaluations were assembled from the population (219 evaluations) for initial quantitative assessment. The subset of evaluations represented 11 of the 15 RDCs.

The total present value of benefits for the 111 project clusters evaluated and recorded across the 1 July 2013 to 30 September 2018 period was estimated at \$8.44 billion (in 2018/19 dollar terms) with an aggregate present value of costs of \$1.52 billion, and a net present value of approximately \$6.92 billion over a 30-year period.

The total nominal investment recorded for all 111 project clusters evaluated was estimated at \$1.06 billion, with the RDCs' contributions to the total investment estimated at \$677.6 million (across the 11 RDCs represented in the primary subset). The RDC contribution to the investment represents approximately 31.0% of the total RD&E expenditure of the 11 RDCs (\$2.18 billion) over the five-year period. However, it should be noted that actual RDC RD&E expenditures over the period 2013/14 to 2017/18 do not align with the RD&E investment made in the project clusters evaluated. For the project clusters evaluated and submitted during the five-year aggregate assessment period, investment periods ranged from 1995/96 to 2017/18.

A comparison of the estimated RDC RD&E expenditure in the 111 project clusters (\$677.6 million) against the total estimated investment in the clusters (\$1.06 billion) indicates an average leverage ratio of approximately 1.57 to 1, meaning that for every \$1 contributed by the RDCs, co-investment partners contributed, on average, \$0.57 to the RD&E investment.

Several additional analyses were carried out on further subsets of evaluations, drawn from the population, based on different criteria to the primary subset in order to test the robustness of the above results. In general, the additional results generated were informative and were consistent with the results of the general aggregate analysis of the 111 project cluster evaluations.

Information on environmental and social impacts for each project cluster evaluated was also recorded in the data collection template. Qualitative data were summarised and assessed, and the impacts were then grouped into eight key environmental impact categories and six key social impact categories based on the frequency of the type of specific impacts identified. Of the 219 project cluster evaluations included in the population, 161 reported one or more environmental or social impacts.

The 2019 cross-RDC impact assessment process identified some issues to be considered for future assessments. These include inconsistency of reporting between RDCs and across consultants/organisations undertaking impact assessments, missing and/or incomplete data, and poor reporting of environment and social impacts of RD&E funded through the RDCs.

Overall, the results of the 2019 Cross-RDC Impact Assessment are highly positive. The results demonstrate that the investment by the RDCs as a whole has continued to deliver significant benefits to Australian primary producers, Government and the broader Australian economy.



# 1. Introduction

The Council of Rural Research and Development Corporations (CRRDC) commissioned the evaluation team (Agtrans Research and Consulting, hereafter referred to as Agtrans) to conduct a Cross-Research and Development Corporation (RDC) Impact Assessment for the period 1 July 2013 to 30 September 2018.

The project was undertaken to review and report on existing impact assessment and performance information (both quantitative and qualitative) across a five-year time window. The review included:

- An update of existing RDC impact assessments for the years ending 30 June 2014 and 2015, expressed in 2018/19 dollar terms (based on evaluations included in the previous, 2016 CRRDC Cross-RDC Impact Assessment).
- Collation and aggregation of data from any new ex-post evaluations carried out in the period 1 July 2015 to 30 September 2018, including those that were submitted for the previous 2016 CRRDC Cross-RDC Impact Assessment but were excluded from the final population.

Results of the current cross-RDC assessment may be used to provide input to the RDCs' performance story and to the Council's Stakeholder Engagement and Communication Strategy.

This report presents the findings of the evaluation team for the Cross-RDC Impact Assessment 2019. The analysis of the data collected has allowed a generalised assessment of the performance of the RDCs regarding their past investment.

## 2. Context and Background

### 2.1 The Rural Research and Development Corporations

The Rural Research and Development (R&D) Corporations are a network of organisations that were formed under a partnership between different agriculture, fisheries and forestry industries and the Australian Government to drive innovation and improvement in, and for, rural industries.

Historically all of the RDCs were established as agencies of the government under Commonwealth legislation, the Primary Industries and Energy Research and Development Act 1989 (now the Primary Industries Research and Development (PIRD) Act)<sup>1</sup>. The Act outlines the expectations, functions, roles and responsibilities for the RDCs, including delivery of economic, environmental and social benefits to rural industries, rural and regional communities, and the nation, through strategic investments in research, development and technology transfer or adoption.

There are 15 Rural RDCs across agriculture, fisheries and forestry industries in Australia. Each one is tasked with delivering tangible and practical improvements for their industry/commodity sector in terms of productivity and profitability, sustainability, and the community. This is achieved through strategic and targeted research, development and extension (RD&E) investments funded through a mix of Australian Government and industry contributions.

The RDCs are service providers to industry and government, and their role is to prioritise, invest in and evaluate RD&E, and in some cases market access, market development and commodity promotion (CRRDC, 2017). Given the RDCs' role as investment managers, custodians of public and private funds, and service providers to industry and Government, there is a strong focus on:

- Governance and accountability for funds being managed,
- Efficiency and effectiveness of processes employed, and
- Delivering value and impact from activities.

Of the 15 RDCs, five are statutory corporations or authorities, owned by the Commonwealth and established under legislation. The remaining 10 organisations are industry-owned, not-for-profit companies established in accordance with Australia's corporations law and declared through regulation as the service providers to industry for specific activities (CRRDC, 2018a). The 15 RDCs include<sup>2</sup>:

#### **Statutory bodies (alphabetical order):**

- AgriFutures Australia<sup>3</sup>
- Cotton Research and Development Corporation (CRDC)
- Fisheries Research and Development Corporation (FRDC)
- Grains Research and Development Corporation (GRDC)
- Wine Australia

#### **Industry owned companies (alphabetical order by trading name):**

- Australian Eggs
- Australian Meat Processor Corporation (AMPC)
- Australian Pork Limited (APL)
- Australian Wool Innovation (AWI)
- Dairy Australia
- Forest and Wood Products Australia Limited (FWPA)
- Hort Innovation
- LiveCorp
- Meat and Livestock Australia (MLA)
- Sugar Research Australia Limited (SRA)

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<sup>1</sup> For more information see: <https://www.legislation.gov.au/Details/C2014C00033>

<sup>2</sup> See Appendix 1: List of all 15 Current RDCs with Web Page Links for the complete list of RDCs with links to each of their associated web pages.

<sup>3</sup> Formerly known as the Rural Industries Research and Development Corporation (RIRDC)

## 2.2 The Council of Rural Research and Development Corporations

The Council of Rural RDCs provides a structure through which the 15 RDCs can work together on matters of common interest and importance. The overarching aim of the Council is to enable the RDCs to generate additional value, above what can be achieved through individual action alone (CRRDC, 2017).

The Council is formed by the RDCs, who are its organisational members. Members are represented at council meetings, and for the purposes of decision making, by the Chairs and Chief Executives (or their delegates) of each RDC. The Council operates on behalf of the RDCs and enables them to develop, share and communicate common positions, platforms and messages.

Two spheres of influence have been identified as being of strategic importance for the joint RDCs through the Council. These spheres are known as *Policy* (the space in which government sets and delivers on its agenda, where it establishes rules and regulations, and where it conducts its business), and *Portfolio* (collectively, the RDCs invest around \$700 million per year into RD&E, the aim under the Portfolio sphere is to increase opportunities for the RDCs to optimise and leverage their resources for greatest impact and benefits).

Within these two spheres of influence the Council has three priorities for action (CRRDC, 2017):

1. Collaboration and co-investment.
2. Impact assessment and evaluation.
3. Stakeholder engagement and communication.

**1. Collaboration and Co-investment** delivers against the Portfolio goal. It deals with the resources that are available to the RDCs, how they are deployed, and the opportunities available to the RDCs to get better results by working collaboratively. This area also works to address a key risk in the Policy space regarding perceptions of the RDCs not working together, not coordinating investment, and potentially duplicating effort.

**2. Impact Assessment and Evaluation** is about understanding and communicating the performance of the RDCs and the investments being made. This area also provides an evidence base that may help to inform future investment decisions as well as underpin the communication and stakeholder engagement program.

**3. Stakeholder Engagement and Communication** allows the RDCs to develop common messages, improve internal capabilities and promote the benefits of co-investment in rural innovation.

## 2.3 The Cross-RDC Impact Assessment Program

### Background

The RDCs operate in an area of high visibility and consistently strong demand for accountability of expenditures, operations and results. RDCs undertake project, program and operational assessments and performance reviews in line with CRRDC Impact Assessment Guidelines and the requirements of various contractual and regulatory arrangements with the Australian government.

In 2007 the CRRDC established a program to assess the impact of RD&E funded by the RDCs. The program was developed to estimate the overall return to the portfolio of RDC RD&E investment from the results of a sample of ex-post cost-benefit analyses (CBAs) across the individual RDCs.

The Cross-RDC Impact Assessment Program is governed by a set of formal procedures<sup>4</sup> that set out the purpose of the program, the basis on which the RDCs participate, the selection of

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<sup>4</sup> For the current CRRDC impact assessment program procedures, see: [http://www.ruralrdc.com.au/wp-content/uploads/2018/08/201804\\_RDC-IA-Procedures-V.2-1.pdf](http://www.ruralrdc.com.au/wp-content/uploads/2018/08/201804_RDC-IA-Procedures-V.2-1.pdf)

RD&E investments for evaluation, guidelines for methodology<sup>5</sup> to be used in conducting the evaluations and the process for analysis and reporting of results.

During the first several years of the program (2007 to 2011), 36 'highly successful Projects' (known as 'hero' Projects) and up to 160 randomly selected Projects or clusters of Projects were evaluated in two published reports (CRRDC, 2008 & CRRDC, 2010) and one unpublished report (completed in 2011).

The existing Impact Assessment Program was reviewed in 2011 after which the Council determined that the program should be continued, but with some refinement of the administrative procedures and the assessment methodology. In 2016, following the revision of the Guidelines and Procedures, the Council commissioned an independent evaluation team to conduct a Cross-RDC Impact Assessment and Performance Reporting Update.

This aggregate evaluation was undertaken in two stages carried out concurrently. Stage 1 reviewed and reported on existing impact assessment and performance information to fill in the gap since the last published cross-RDC impact assessment report with information covering the period 1 July 2009 to 30 June 2015. Stage 2 set out to identify and develop a future framework for the collection and reporting of data and evidence of impact across the RDCs, building on the existing Cross-RDC Guidelines and Procedures.

In light of the findings of the 2016 Cross-RDC Impact Assessment and Performance Update reporting process, the Cross-RDC Impact Assessment Working Group (WG) sought to again update the Guidelines and to also have the procedures rewritten and simplified. The purpose of these revisions was to provide an improved framework for conducting impact assessments of RD&E by all RDCs, to improve consistency and comparability of evaluation reporting, and to improve and simplify the future aggregation and analysis of individual RDC RD&E evaluations for cross-RDC impact assessment by the Council.

## **Purpose**

The purpose of the Cross-RDC Impact Assessment Program is to (CRRDC, 2018b):

- assess and report on the overall returns to rural industries from the portfolio of investments in RD&E by RDCs;
- assess and report on the non-market benefits (including public and spill-over benefits) arising from the portfolio of investments in RD&E by RDCs; and
- inform government and the public about the nature of those non-market (i.e. public and spill-over) benefits from rural RD&E that are conditional on public contributions to the RDCs.

## **Structure**

The Cross-RDC Impact Assessment Program provides for consistency in the evaluation of investments in rural RD&E made by the Rural RDCs in their respective industries. The Program involves aggregating the results of regular and rigorous assessment of completed RD&E investments by each RDC. These assessments provide accountability to RDC stakeholders, including government, levy payers, researchers and the community. The aggregation is designed to generate estimates of the performance of the RDC portfolio as a whole and over time.

The scope of the Program includes evaluation of:

- RD&E in which the RDC is the sole investor;
- RD&E in which the RDC has invested in collaboration with a research agency or other research funding organisations; and
- RD&E investments made through collaboration among RDCs.

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<sup>5</sup> For the current CRRDC impact assessment program Guidelines, see: [http://www.ruralrdc.com.au/wp-content/uploads/2018/08/201804\\_RDC-IA-Guidelines-V.2.pdf](http://www.ruralrdc.com.au/wp-content/uploads/2018/08/201804_RDC-IA-Guidelines-V.2.pdf)

## Process

Impact assessments are to be completed according to methodology described in the Council's Guidelines. The use of a common methodology by RDCs for all their impact assessments facilitates aggregation and analysis among their assessments.

The Cross-RDC Impact Assessment Program does not currently include results of ex-ante RD&E assessments<sup>6</sup> or re-assessment of previously evaluated investments in its estimates of the net benefits produced by the RDC portfolio. The Program also does not include evaluation of industry marketing activities or other functions of industry-owned corporations not directly related to industry RD&E and its administration. Marketing investments are to be evaluated separately at the discretion of each individual RDC.

The RDCs collectively have agreed to set a benchmark figure of evaluating the equivalent of at least 10 per cent of their total RD&E expenditure for a given project population each year. The number of investments assessed each year will vary between the RDCs depending on the size of each organisation and their own monitoring and evaluation programs. In the interests of efficiency and flexibility, the unit of analysis for the Cross-RDC Impact Assessment Program is a 'Project' (defined as a single RD&E investment) or 'Project Cluster' (two or more related Projects).

Individual RDCs have responsibility for determining what RD&E investments within their respective portfolios will be evaluated and how they will be evaluated. However, as a matter of policy it is expected that all cross-RDC collaborative RD&E investments (such as those funded under the Australian government's Rural R&D for Profit Program<sup>7</sup>) will be subject to evaluation and the results captured as part of the aggregated analysis.

The Council assumes in all cases that RDC evaluations are credible and rigorous. This is assured through the use of appropriately qualified and skilled independent analysts who have experience and training in performing social CBA. RDCs may cooperate in retaining external consulting services as appropriate to reduce costs. The cost of engaging an independent analyst to complete assessments is borne by each RDC as a cost of administering its RD&E portfolio.

The results of the assessment of each investment are submitted to the Council. The Council then is responsible for pooling, aggregating, and analysing the results of the assessments and preparing a Cross-RDC Impact Assessment Program Summary Report.

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<sup>6</sup> In the CRRDC Impact Assessment Guidelines, ex-post impact assessment of R&D projects is defined as evaluation of impact after the initial research phase has been completed (i.e. at the end of the RD&E investment) but before the benefits have been fully realised. Ex-ante impact assessment of R&D projects occurs prior to the RD&E investment being made.

<sup>7</sup> For more information see; <http://www.agriculture.gov.au/ag-farm-food/innovation/rural-research-development-for-profit>

## 3. The Current Assessment

### 3.1 Engaging Individual RDCs in the Cross-RDC Evaluation Process

A letter from the CRRDC was sent to each of the 15 RDCs on 18 February 2019 by the CRRDC Executive Officer (Tim Lester). The letter requested cooperation from the RDCs for the 2019 Cross-RDC impact assessment process and specifically requested the following:

- Approval for the evaluation team to utilise any existing ex-post evaluations completed for an RDC between 1 July 2013 and 30 September 2018, as well as those evaluations submitted previously as part of the 2016 CRRDC Cross-RDC Impact Assessment.
- Digital copies of any new ex-post impact assessments of RD&E investments (i.e. word/pdf files and/or spreadsheets) where the evaluation was completed between 1 July 2013 and 30 September 2018 (that is, the evaluation was submitted and accepted by the RDC during this period).
- Digital copies of any final reports (including, where applicable, quantitative impact information) where the RDC was the lead organisation for investments funded under the Australian government's Rural R&D for Profit Program.
- Information about how each RD&E investment was selected for evaluation (i.e. random selection method, non-random process, other).

Data was received by Agtrans from the RDCs between 25 February and 12 April 2019 via DropBox, email, USB and WeTransfer.

### 3.2 Description of the Cross-RDC Aggregate Analysis Template

The evaluation team utilised a standard template for data entry that was used to assemble data for the economic evaluation reports that were received, including those already held by Agtrans. The template, used to conduct the cross-RDC aggregate analysis, was created in Microsoft Excel® and was based on the data entry template used in the 2016 Cross-RDC Impact Assessment approved by the CRRDC.

The template included columns for reporting quantitative data for each RD&E investment evaluated. These columns included investment criteria for each investment, as required by the CRRDC Impact Assessment Guidelines, covering the present value of benefits (PVB), present value of investment costs (PVC), net present value (NPV), benefit-cost ratio (BCR), Internal Rate of Return (IRR), and modified IRR (MIRR). This set of investment criteria was included for both the total RD&E investment (including co-investors) and the investment by the RDC only. The total benefits were attributed to the RDC in proportion to the contribution of investment costs by the RDC. In each case, the investment criteria were reported in five-year step periods up to year 30, with the last year of investment as year 0 as per the CRRDC Impact Assessment Guidelines.

Other information recorded in the aggregate analysis template included:

- The name of the investment evaluated (e.g. project, project cluster or program title).
- The RDC contact responsible for the evaluation.
- The consultant/organisation that conducted the evaluation.
- The period of the investment (start year and final year).
- The discount rate used.
- The dollar terms.
- Whether the investment was selected using a random or non-random selection process.

The evaluation reports were the key source of information from which data on the qualitative environmental and social benefits were assembled. Where some of these benefits may have been valued, this was identified from the evaluation reports.

Other information components of the template for the 2019 cross-RDC data assembly include:

- The total RD&E investment made by each RDC in each financial year.
- The strength of the association of each investment analysed with the six CRRDC Communication Themes - score of 0 (none), 1 (low), 2 (medium) and 3 (high).
- A description of the various environmental and social impacts identified and/or valued across the investments evaluated.
- Information on collaborative investments with other RDCs that were available in the evaluation descriptions assembled, particularly those funded through the Australian government's Rural R&D for Profit Program.

Some derived parameters from the input data were automatically generated from the new template. These included:

- Average leverage ratios achieved by the RDC for co-investment.
- Total and RDC PVB, PVC and NPV by year and across the five years combined.
- The annual expenditure evaluated for each RDC as a percentage of the total RD&E expenditure for that year (by year and RDC).

## 4. List of Evaluations

### 4.1 The Population

The evaluation team collected economic evaluation reports containing a total of 219 individual evaluations of various RDC RD&E investments. The investments evaluated in the submitted reports included single projects, project clusters (two or more projects grouped together for evaluation), and whole RDC programs or sub-programs. For the purpose of this analysis, hereafter in this report all investments that were evaluated and recorded for the 2019 cross-RDC assessment are referred to as project clusters as per the CRRDC methodology. Data for each cluster was entered into the data collection template by the evaluation team for the 2019 Cross-RDC Impact Assessment.

The individual 219 economic evaluations were conducted by at least 13 independent consultancies (plus some conducted internally by the RDCs) and represented evaluations across all 15 RDCs.

Table 1 illustrates the total number of RD&E project cluster evaluations submitted for the 2019 Cross-RDC Impact Assessment by year and by RDC.

**Table 1: Total Number of Project Cluster Evaluations Submitted**

RDC Name	Year Ended 30 June						Totals
	2014	2015	2016	2017	2018	2019 <sup>(a)</sup>	
Australian Eggs	0	2	2	2	3	3	12
AgriFutures <sup>(b)</sup>	3	1	0	2	0	1	7
AMPC	0	0	0	0	0	3	3
APL	0	12	15	0	0	4	31
AWI	1	2	13	0	0	0	16
CRDC	0	0	0	0	5	0	5
Dairy Australia	0	0	3	1	2	0	6
FRDC	0	0	9	0	20	20	49
FWPA	3	0	1	4	0	0	8
GRDC	4	5	2	0	10	1	22
Hort Innovation	0	0	0	9	0	0	9
LiveCorp	0	0	1	0	0	0	1
MLA	0	1	13	0	0	0	14
SRA	0	4	6	0	5	5	20
Wine Australia <sup>(c)</sup>	2	0	4	5	5	0	16
<b>Totals</b>	<b>13</b>	<b>27</b>	<b>69</b>	<b>23</b>	<b>50</b>	<b>37</b>	<b>219</b>

(a) Figures for the 2019 financial year include evaluations submitted between 1 July 2018 and 30 September 2018.

(b) Formerly RIRDC (includes evaluations submitted under the name RIRDC during the 2019 cross-RDC assessment period).

(c) Includes project clusters evaluated under the Australian Wine Research Institute (AWRI) and the former Grape and Wine Research and Development Corporation (GWRDC).

Appendix 2 provides a complete list and summary details of all 219 evaluation reports including the RDC name, project cluster title, evaluation year, whether the project was randomly chosen or selected by the RDC, and the name of the consultancy/organisation that carried out the evaluation.



## 4.2 Primary Subset of Evaluations

For the purpose of the current Cross-RDC Impact Assessment, a subset of the 219 evaluations that formed the total population (hereafter referred to as the primary subset) was assembled for quantitative assessment. Evaluations were selected for the primary subset according to the following criteria:

- the evaluation must have been submitted during the assessment period, 1 July 2013 to 30 September 2018 (as per the Agtrans project brief).
- the evaluation must have been completed by a suitably qualified, independent consultant/organisation (CRRDC methodology requirement<sup>8</sup>).
- the investment being evaluated must have been randomly chosen (CRRDC methodology requirement).
- the evaluation report had to include data for the total investment, as well as RDC contribution to the total investment, for the project cluster (CRRDC methodology requirement).
- the individual evaluation report needed to include investment criteria results for NPV and BCR at 30-years after the last year of investment as per the CRRDC Impact Assessment Guidelines (CRRDC methodology requirement).

Based on the above criteria, 111 evaluations were selected from the population (219 evaluations) for the primary subset and initial quantitative assessment. The evaluations selected represented 11 of the 15 RDCs.

Of the 108 clusters not included in the primary subset, 5 (4.6%) were excluded on the basis of the relevant assessment period (5 of the evaluations submitted were dated in the period after 30 September 2018, these evaluations will be captured in the next, biennial instalment of the cross-RDC impact assessment process). Twenty-three (21.3%) evaluations were excluded on the basis that they were not conducted by an independent consultant/organisation (23 evaluations were conducted internally by the RDCs), 90 evaluations (83.3%) were excluded because they were not randomly selected (or the selection method was unknown), 23 evaluations (21.3%) were excluded on the basis that there were no results reported (no data) for the total investment and RDC contribution to investment in the cluster. Finally, 45 (41.7%) were excluded due to there being no results (data) for the 30-year BCR and/or NPV.

Note that it was possible for a single RD&E evaluation to be excluded because of failure to meet multiple subset criteria, the numbers and proportions above indicate that the most prevalent reason for exclusion from the primary subset was a non-random selection method, followed by no results reported for the 30-year BCR and/or NPV as required by the CRRDC Impact Assessment Guidelines.

Table 2 shows the number of projects excluded sequentially based on the four criteria listed above and Table 3 describes the final number of project cluster evaluations included in the primary subset for the 2019 Cross-RDC Impact Assessment by year and by RDC.

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<sup>8</sup> The independent evaluation criterion was a requirement under the prevailing 2014 CRRDC Impact Assessment Program Management Procedures CRRDC, May 2014). The procedures were amended in April of 2018. Though independent evaluation remains 'best practice' for ex-post assessment of R&D projects, it no longer is a requirement under the CRRDC Impact Assessment program. This change likely will be reflected in the next biennial instalment of the Cross-RDC Impact Assessment process.

**Table 2: Number of Project Clusters Excluded from the Subset by Assessment Criterion**

RDC Name	Exclusion Reason <sup>(a)</sup>					Total Number of Individual Evaluations Excluded (by RDC) <sup>(a)</sup>
	1. Evaluation not within assessment period	2. Non-independent consultant	3. Non-random selection/ unspecified selection	4. No data for total, nominal investment and/or RDC, nominal investment	5. No result reported for NPV and/or BCR at 30-years post-investment	
Australian Eggs	1	0	4	0	0	5
AgriFutures	0	0	0	0	0	0
AMPC	0	0	0	0	0	0
APL	4	0	31	4	13	31
AWI	0	13	14	14	16	16
CRDC	0	0	5	0	0	5
Dairy Australia	0	0	6	2	0	6
FRDC	0	0	0	0	13	13
FWPA	0	0	1	2	1	2
GRDC	0	10	18	0	0	18
Hort Innovation	0	0	1	1	1	1
LiveCorp	0	0	0	0	0	0
MLA	0	0	0	0	1	1
SRA	0	0	0	0	0	0
Wine Australia	0	0	10	0	0	10
<b>Totals</b>	<b>5</b>	<b>23</b>	<b>90</b>	<b>23</b>	<b>45</b>	<b>108</b>

(a) An individual RD&E evaluation may have been excluded for multiple reasons. Thus, the total number of projects excluded for each RDC (column 7) will not reflect the sum of the other columns (columns 2 to 6).

**Table 3: Number of Project Cluster Evaluations Included in the Primary Subset by Year**

RDC Name	Year Ended 30 June						Totals
	2014	2015	2016	2017	2018	2019	
AECL	0	2	0	0	3	2	7
AgriFutures	3	1	0	2	0	1	7
AMPC	0	0	0	0	0	3	3
APL	0	0	0	0	0	0	0
AWI	0	0	0	0	0	0	0
CRDC	0	0	0	0	0	0	0
Dairy Australia	0	0	0	0	0	0	0
FRDC	0	0	9	0	13	14	36
FWPA	3	0	0	3	0	0	6
GRDC	4	0	0	0	0	0	4
Hort Innovation	0	0	0	8	0	0	8
LiveCorp	0	0	1	0	0	0	1
MLA	0	0	13	0	0	0	13
SRA	0	4	6	0	5	5	20
Wine Australia	1	0	0	0	5	0	6
<b>Totals</b>	<b>11</b>	<b>7</b>	<b>29</b>	<b>13</b>	<b>26</b>	<b>25</b>	<b>111</b>

## 5. Impact Assessment Results (2013-2018)

### 5.1 Economic Evaluation: Primary Results

#### *Aggregate Results: Primary Subset (111 project clusters)*

Investment criteria recorded for each project cluster were generally reported in the dollar terms of the year in which the evaluated was completed (for example, investment criteria included in an economic evaluation report submitted in 2017/18 were generally reported in 2017/18 dollar terms). The PVBs, PVCs and NPVs for each project cluster recorded were standardised to 2018/19 dollar terms using the Gross Domestic Product (GDP) Implicit Price Deflator (ABS, 2018) and updated BCRs were derived.

Some of the investment analyses recorded include valuation of social and/or environmental impacts. This was noted in the data collection template. Most environmental and social impacts, however, were not valued due to the difficulties in valuing non-market goods (discussed further in Section 6 below).

The total PVB for the 111 project clusters evaluated and recorded across the 2013 to 2018 period was estimated at \$8.44 billion with an aggregate PVC of \$1.52 billion, and an NPV for the total primary subset of approximately \$6.92 billion over a 30-year period.

To allow comparison with previous CRRDC impact assessments, the simple average BCR for the primary subset (calculated as the average of the individual 111 project cluster BCRs) was estimated at 5.1 to 1 after 30-years. However, a simple average is often a flawed measure as it is sensitive to any extreme values within the data set, therefore, a weighted average was also estimated. The weighted average was estimated by taking the total PVB across all 111 project clusters (\$8.44 billion) and dividing by the total PVC (\$1.52 billion) resulting in an estimated average BCR of 5.5 to 1. That is, the total estimated value of benefits from the collective RDC investment over 30-years is approximately \$5.50 for every \$1.00 invested in RD&E.

The investment criteria from the aggregate quantitative analysis for the 2019 Cross-RDC Impact Assessment are all highly positive and demonstrate that the investment by the RDCs as a whole has been delivering significant benefits to Australia. Further, the 2016 Cross-RDC for the 2010-2015 period reported an estimated weighted average BCR of 4.5 to 1. Thus, the 2019 results are consistent with the previous aggregate cross-RDC analysis and, as the CRRDC impact assessment program continues, the biennial results will enable the CRRDC and the RDCs to assess and communicate their collective performance trend over time.

#### *Aggregate Results: Primary Subset by Year (111 project clusters)*

Table 4 presents the estimated results for the primary subset by financial year in which the analyses were carried out.

**Table 4:** 2019 Aggregate Results by Year – Primary Subset (1 July 2013 to 30 September 2018)

Aggregate Investment Criteria <sup>(a)</sup>	Year (ended 30 June)						Totals
	2014	2015	2016	2017	2018	2019	
PVB (\$m)	1,097.08	70.43	5,831.17	1,102.27	143.99	195.77	8,440.71
PVC (\$m)	335.43	21.22	972.53	121.09	37.85	35.24	1,523.36
NPV (\$m)	761.65	49.21	4,858.63	981.19	106.14	160.53	6,917.35
Simple Average BCR	9.0	6.5	5.2	5.9	3.7	4.0	5.1
Weighted Average BCR (PVB/PVC)	3.3	3.3	6.0	9.1	3.8	5.6	5.5
Number of Project Clusters Recorded	11	7	29	13	26	25	111

(a) Over a 30-year period

Table 4 shows that, over the course of the assessment period, the number of randomly selected, ex-post economic evaluations being carried out by the RDCs has varied considerably and this has

impacted the year by year results. Low numbers of evaluations in a given year mean that the results (e.g. 2013/14, 2014/15 and 2016/17) are less likely to be representative of the entire RDC portfolio.

Table 5 reproduces the estimated results by year from the previous 2016 Cross-RDC Impact Assessment (2010-2015). A comparison of the results shown in Tables 4 and 5 indicates that the estimated, annual investment criteria for the RDCs collectively have been relatively consistent over the period 2009/10 to 2018/19.

**Table 5: 2016 Aggregate Results by Year – Final Population (1 July 2009 to 30 June 2015)**

Aggregate Investment Criteria <sup>(a)</sup>	Year (ended 30 June)						
	2010	2011	2012	2013	2014	2015	Total
PVB (\$m)	2,506.7	936.3	442.4	1,892.9	462.1	84.6	6,325.0
PVC (\$m)	450.6	202.7	93.5	404.4	240.3	26.4	1,417.9
NPV (\$m)	2,056.2	733.4	348.0	1,488.4	221.8	58.2	4,906.0
Simple Average BCR	6.4	7.4	5.4	3.7	9.2	5.8	6.0
Weighted Average BCR (PVB/PVC)	5.6	4.6	4.7	4.7	1.9	3.2	4.5
Number of Project Clusters Recorded	38	41	38	31	10	9	167

(a) Over a 30-year period

Source: (Agtrans Research, AgEconPlus & EconSearch, 2016)

The total number of evaluations included in the aggregate assessment in 2014 and 2015 differed between the 2016 and current, 2019 cross-RDC impact assessment. This is because a data entry error was discovered in the 2016 data where an evaluation was incorrectly classified as submitted in 2012/13 when it was, in fact, submitted in 2013/14. Further, two evaluations that were originally submitted in 2014/15 were revised and resubmitted in 2015/16 with new results, thus they were removed from the 2014/15 count and recorded as 2015/16 to prevent double counting.

## 5.2 Economic Evaluation: Other Results

### *RDC RD&E Expenditure over the Assessment Period*

The total RD&E expenditure by all 15 RDCs for the period 1 July 2013 to 30 June 2018 was estimated at \$2.91 billion (nominal), averaging approximately \$593.24 million per year over the five-year period. For the 11 RDCs represented in the primary subset for the Cross-RDC Impact Assessment analysis, the total RD&E expenditure was estimated at \$2.64 billion or approximately 90.7% of the overall total RD&E expenditure for all 15 RDCs. Table 6 outlines the total RD&E expenditure of each of the RDCs for the 2019 reporting period.

### *Total and RDC Investment in the Evaluations Aggregated*

The total nominal investment recorded for all 111 project clusters evaluated was estimated at \$1.06 billion, with the RDCs' contributions to the total investment estimated at \$677.6 million (across the 11 RDCs represented in the primary subset). The RDC contribution to the investment represents approximately 31.0% of the total RD&E expenditure of the 11 RDCs (\$2.18 billion) over the five-year period. However, it should be noted that actual RDC RD&E expenditures over the period 2013/14 to 2017/18 do not align with the RD&E investment made in the project clusters evaluated. For the project clusters evaluated and submitted during the five-year aggregate assessment period, investment periods ranged from 1995/96 to 2017/18.

### *RD&E Investment Leverage*

A comparison of the estimated RDC RD&E expenditure for the 111 project clusters (\$677.6 million) against the total estimated investment in the clusters (\$1.06 billion) indicates an average leverage ratio of approximately 1.57 to 1, meaning that for every \$1 contributed by the RDCs, co-investment partners contributed, on average, \$0.57 to the RD&E investment. This result should be interpreted with some caution. The total and RDC investment in the 111 project clusters included in the primary subset occurred over a period from 1995/96 to 2017/18 and varies significantly between project clusters, RDCs and over time.

**Table 6: Total RDC RD&E Expenditure 2013/14 to 2017/18<sup>(a)</sup>**

RDC Name	Year ended 30 June					Totals	RDC Total as a % of Overall Total R&D Expenditure	5-year average
	2014	2015	2016	2017	2018			
AECL	3,000,785	3,082,390	3,377,875	3,862,520	5,187,497	18,511,067	0.6%	3,702,213
AgriFutures	15,785,000	15,208,000	16,014,000	20,920,000	22,996,000	90,923,000	3.1%	18,184,600
AMPC	14,451,711	14,721,172	17,085,035	20,177,027	16,015,619	82,450,564	2.8%	16,490,113
APL	9,660,944	9,767,513	10,088,936	10,242,622	10,523,100	50,283,115	1.7%	10,056,623
AWI	54,012,000	39,226,000	44,269,000	39,819,000	37,547,000	214,873,000	7.4%	42,974,600
CRDC	18,203,000	19,244,000	17,051,610	20,317,963	20,908,257	95,724,830	3.3%	19,144,966
Dairy Australia	NR	26,174,000	28,596,000	33,931,000	32,160,000	120,861,000	4.1%	30,215,250
FRDC	22,870,000	24,850,000	24,580,000	24,410,000	26,000,000	122,710,000	4.2%	24,542,000
FWPA	5,829,315	6,629,939	7,603,742	9,041,097	8,789,636	37,893,729	1.3%	7,578,746
GRDC	165,369,000	194,107,000	192,796,000	198,129,000	192,081,555	942,482,555	32.3%	188,496,511
Hort Innovation	74,908,671	70,995,837	78,172,778	84,548,665	92,238,553	400,864,504	13.8%	80,172,901
LiveCorp	600,000	635,000	895,000	490,723	470,542	3,091,265	0.1%	618,253
MLA	95,800,000	92,981,000	88,000,000	104,200,000	171,800,000	552,781,000	19.0%	110,556,200
SRA	13,536,000	16,189,000	17,930,000	22,061,000	24,091,000	93,807,000	3.2%	18,761,400
Wine Australia	NR	22,087,241	20,044,987	20,876,867	23,963,641	86,972,736	3.0%	21,743,184
<b>Totals</b>	494,026,426	555,898,092	566,504,963	613,027,484	684,772,400	2,914,229,365	100.0%	593,237,560

(a) Evaluations for the 2019 Cross-RDC Impact Assessment were submitted for the period 1 July 2013 to 30 September 2018, representing data across the financial years 2013/14 to 2018/19. However, total RD&E investment by RDC was not available for the 2019 financial year at the time of assessment.

NR: Not Reported

## Aggregate Results: Investment Criteria Over Time

To give some indication of returns over time, an analysis was carried out to show the aggregate results across the time intervals reported, up to 30-years. This analysis required a further tightening of the primary subset of RD&E evaluations to include only those project cluster evaluations that had reported results for all the 5-year time intervals after the last year of investment in the cluster (i.e. 0, 5, 10, 15, 20, 25, and 30 years) as required in the CRRDC Impact Assessment Guidelines.

This additional criterion reduced the primary subset from 111 to 96 project clusters across nine RDCs. Table 7 shows the results of the time interval analysis.

**Table 7:** Aggregate Investment Criteria Over Time

Investment Criteria	Years after last year of investment						
	0	5	10	15	20	25	30
PVB (\$m)	750.46	1,620.76	2,121.51	2,514.68	2,844.83	3,115.66	3,338.47
PVC (\$m)	846.28	846.28	846.28	846.28	846.28	846.28	846.28
NPV (\$m)	-95.82	774.48	1,275.22	1,668.40	1,998.55	2,269.37	2,492.19
Simple Average BCR	0.4	1.6	2.6	3.2	3.6	4.0	4.4
Weighted Average BCR (PVB/PVC)	0.9	1.9	2.5	3.0	3.4	3.7	3.9

A major weakness of the individual RDC evaluation processes was the consistency of reporting against requirements under the CRRDC Impact Assessment Guidelines. A number of evaluations failed to report key results for incremental time periods between the last year of an RD&E investment and the 30-year time horizon.

Therefore, the results shown in Table 7 may not be useful for informing a discussion about the impact of the RDCs collectively into the future. However, the aggregate results do indicate that, across the nine RDCs represented in the reduced subset, investment criteria become positive quickly, from just 5 years after the last year of investment.

## Aggregate Results: Additional Analyses

Two additional analyses were carried out on additional subsets of project clusters, drawn from the population, based on different criteria to the primary subset. The first was an assessment of aggregate results for a subset that included project clusters selected (rather than selected randomly) for evaluation, the second was a broader subset that included selected and random evaluations as well as those evaluations completed by non-independent consultants/organisations.

### Comparison of random subset (primary subset) with results of selected subset

Some RDCs conducted selected ex-post economic evaluations for other purposes (e.g. internal planning and accountability, stakeholder communication, state government reporting requirements, etc.). These evaluations were not included in the primary subset for aggregation in the current Cross-RDC Impact Assessment due to the potential for response bias<sup>9</sup> in the results.

An additional analysis was conducted of only those project cluster evaluations that were specifically selected for evaluation by the individual RDC, fell into the relevant assessment period (1 July 2013 to 30 September 2018), included data for total investment in the project cluster and the RDC contribution to investment in the cluster, and included data for the NPV and BCR at 30-years after the last year of investment. A subset of 41 selected RD&E evaluations, across six RDCs, met the above criteria, aggregate results (in real 2018/19 dollar terms) are shown in Table 8.

<sup>9</sup> Response bias: occurs when the method of collecting data/sample selection produces values that systematically differ from the true population value.

**Table 8: 2019 Aggregate Results by Year – Selected Evaluation Subset (1 July 2013 to 30 September 2018)**

Aggregate Investment Criteria <sup>(a)</sup>	Year (ended 30 June)						
	2014	2015	2016	2017	2018	2019	Totals
PVB (\$m)	1,190.02	391.74	2,267.48	38.14	304.55	968.61	5,160.53
PVC (\$m)	135.33	86.12	169.81	25.43	48.74	59.40	524.84
NPV (\$m)	1,054.69	305.62	2,097.67	12.71	255.80	909.21	4,635.70
Simple Average BCR	8.8	4.5	2.3	4.0	5.5	16.3	4.0
Weighted Average BCR (PVB/PVC)	8.8	4.5	13.4	1.5	6.2	16.3	9.8
Number of Project Clusters Recorded	1	5	19	8	7	1	41

(a) Over a 30-year period

The results for the subset of selected RD&E evaluations (41 individual evaluations across six RDCs) were compared to the results from the primary subset of random evaluations (111 evaluations across 11 RDCs) in Table 4.

The analysis found that there was considerably more variation in the investment criteria for the selected subset compared to the primary subset. For example, the weighted average BCR in the selected subset varied from a low of 1.5 (2016/17) to 16.3 (2018/19), a range of 14.8. On the other hand, the weighted average BCR for the primary subset varied from 3.3 to 9.1, a range of 5.8.

Other investment criteria for the selected subset were also found to be higher than those in the primary subset of random RD&E evaluations. The NPV for the selected subset (\$4.64 billion over 30-years from 41 evaluations) was 67% of the NPV for the primary subset (\$6.92 billion, 30-years, 111 evaluations) and the total weighted average BCR for the selected subset was estimated at 9.8 to 1 as opposed to the weighted average BCR of 5.5 to one for the primary subset.

The higher results of the selected subset, relative to the primary subset of randomly selected evaluations, was expected as some of the selected project clusters evaluated may have been chosen as examples of highly successful investments by the RDCs.

#### **Aggregate Results for Evaluations with Complete Quantitative Data**

To investigate the robustness of the primary subset results, an additional analysis was conducted on all RD&E evaluations submitted that met the following subset criteria:

- the evaluation must have been submitted during the assessment period, 1 July 2013 to 30 September 2018 (as per the Agtrans project brief).
- the evaluation report had to include data for the total investment, as well as RDC contribution to the total investment, for the project cluster (CRRDC methodology requirement).
- the individual evaluation report needed to include investment criteria results for NPV and BCR at 30-years after the last year of investment as per the CRRDC Impact Assessment Guidelines (CRRDC methodology requirement).

Thus, this analysis included evaluations that were chosen both randomly or non-randomly (or where the selection method was unspecified) and that were not conducted by an independent consultant/organisation (that is, the evaluations were conducted internally).

The revised criteria above resulted in a subset of 162 selected RD&E evaluations across 14 of the 15 RDCs. Aggregate results (in real 2018/19 dollar terms) are shown in Table 9.

**Table 9: 2019 Aggregate Results by Year – Complete Data Subset (1 July 2013 to 30 September 2018)**

Aggregate Investment Criteria <sup>(a)</sup>	Year (ended 30 June)						
	2014	2015	2016	2017	2018	2019	Totals
PVB (\$m)	2,287.10	462.17	8,098.64	1,140.42	4,557.29	1,164.38	17,710.00
PVC (\$m)	470.75	107.34	1,142.35	146.52	292.10	94.64	2,253.70
NPV (\$m)	1,816.34	354.83	6,956.30	993.90	4,265.19	1,069.74	15,456.30
Simple Average BCR	9.0	5.7	4.1	5.2	6.4	4.5	5.4
Weighted Average BCR (PVB/PVC)	4.9	4.3	7.1	7.8	15.6	12.3	7.9
Number of Project Clusters Recorded	12	12	48	21	43	26	162

(a) Over a 30-year period

The analysis found that the investment criteria for the subset of evaluations with complete quantitative data (162 evaluations) were moderately higher than those for the primary subset. The weighted average BCR (30-years) for the complete data subset was estimated at 7.9 to 1 compared to a weighted average BCR (30-years) of 5.5 for the primary subset. This was expected given the inclusion of the 41 evaluations from the selected subset that, in general, had higher investment criteria.



## 5.3 Qualitative Description of Environmental and Social Impacts

### *Method of aggregation*

Qualitative data on environmental and social impacts, where available for each of the 219 individual economic evaluations in the total population, were compiled and entered into the 2019 Cross-RDC Impact Assessment data collection template described in Section 3.2. The data entered were analysed and then grouped into eight environmental impact categories and six social impact categories based on the frequency of the type of specific impacts identified.

### *Categories and Findings*

Of the 219 project cluster evaluations assessed, 155 reported one or more environmental or social impacts. It should be noted that, where no environmental or social impacts were recorded for a project cluster, it may be due to reporting inconsistencies rather than an absence of any impact. For example, it could be that a triple bottom line reporting framework was not used. This aspect of reporting was beyond the scope of this assessment to investigate further.

Environmental impacts identified were categorised into eight broad impact categories. Table 10 shows the eight key environmental impact categories and the number of project clusters that reported each type of impact for the 219 clusters in the population.

**Table 10:** Frequency of Reporting of Key Environmental Impact Categories

<b>Environmental Impact Category</b>	<b>Number of Clusters that Reported Impacts for each Environmental Impact Category</b>
Improved water use efficiency and/or water quality	23
Improved climate outcomes	4
Changes to greenhouse gas emissions	19
Changes to chemical usage – reduced or increased export off-farm	33
Improved soil outcomes (e.g. reduced erosion, improved soil health)	14
Maintained or enhanced biodiversity	11
Improved sustainability	23
Other/miscellaneous	34

A similar categorisation process was implemented for social impacts identified. Table 11 shows the six social impact categories and the number of project clusters that reported each type of impact for the 219 clusters in the population.

**Table 11:** Frequency of Reporting of Key Social Impact Categories

<b>Social Impact Category</b>	<b>Number of Clusters that Reported Impacts for each Social Impact Category</b>
Human health and/or well-being	33
Scientific and/or industry capacity	68
Community spill-overs (e.g. regional well-being)	76
Animal welfare	22
Maintained or enhanced social licence to operate	18
Other/miscellaneous	31

## 6. Public benefits

Public benefits are usually considered synonymous with environmental and social benefits but can also include the spillovers of productivity gains to other sectors of the Australian economy and increased efficiency/effectiveness of public RD&E investment. The environmental and social benefits that have been reported in Table 10 and Table 11 cover the major public benefits from the RDC investment.

The Australian Government investment in the RDCs is not solely to address the delivery of public benefits as there are also elements of market failure used to justify Government funding of RD&E.

With regard to public benefits, of interest to Government is the concept of additionality. How does the Government funding increase the delivery of public benefits, given that some environmental and social benefits would have been delivered anyway as spillovers from productivity-oriented research? Ex-post evaluations cannot address this issue meaningfully, so it is beyond the scope of this report, and is not further discussed here.

### *Valuing Public Benefits: Context*

While identification of the public (social and environmental) benefits presents some challenges, quantification is even more difficult as measurement of the benefit can be problematic.

In the absence of market prices, methods to elicit willingness to pay (WTP) values for social and environmental benefits are available. These methods fall into two principal groups: revealed and stated preference methods.

Revealed preference methods use observed behaviour of individuals to estimate values for a benefit. Two common approaches are hedonic pricing and the travel cost method. An example of hedonic pricing may be an observed retail market premium of, for example, ethical foods as a measure of society's value for such foods. Travel cost methods rely on analyses of the travel costs incurred by people in pursuing a particular interest, such as visiting a place of natural beauty or other characteristics.

Stated preference methods elicit WTP estimates directly from consumers and are based on what people say rather than on observed behaviour. Variations include contingent valuation and choice modelling.

Contingent valuation involves asking respondents direct questions on what they would be willing to pay for a good or service. Choice modelling involves a series of questions, each which asks respondents to choose their preferred option from several alternatives. Each option contains a standard set of attributes and is differentiated from other options by allowing levels of attributes to vary systematically.

Revealed preference methods should be preferred to stated preference methods due to their greater proximity to actual behaviour; however, revealed preference methods usually rely on market information or observed costs and these are not always available or relevant for some valuations. Stated preference methods can have greater relevance in rural RD&E valuations than revealed preference methods.

Benefit transfer is the process of transferring a willingness to pay value derived from an existing study or studies to another like situation. This can be a hazardous process due to significant differences in the original and new situations, unclear reporting of the original study, and incorrect interpretation in transfer. Despite its shortcomings, benefit transfer is commonly practiced. This is because there may not be any highly relevant studies carried out or available to the analyst when needed (some are embedded in the grey literature), the high cost of carrying out a new WTP study, or a judgement that an approximate value will be sufficient.

## 7. Collaboration

In May of 2014, the Commonwealth Government formally announced the establishment of the Rural R&D for Profit Program (RnD4P) (Sekulovska, n.d.). The Program aims to boost funding to the RDCs for nationally coordinated, strategic research with a total of \$157 million available over eight years, ending on 30 June 2022. To be eligible for RnD4P grant funding, RDCs must partner with one or more researchers, research agencies, RDCs, funding bodies, or businesses (Commonwealth of Australia, 2019).

On 6 May 2015, the Minister for Agriculture announced funding of \$26.7 million from 2014/15 to 2017/18 for twelve projects for 'round one' of the RnD4P Program. RnD4P contracts between a lead organisation (e.g. an RDC) and the Department of Agriculture and Water Resources (DAWR) generally stipulate that the project team (the Grantee), in collaboration with partner organisations, will undertake particular activities, including an end-of-project evaluation.

Specifically, Activity 1: Project initiation and management - Output 1(e) of the contract states: *“undertake end-of-project evaluation in accordance with Output 1(d)<sup>10</sup> and provide a report to the Department. The evaluation must report on the Project’s outcomes against the Programme objective, including quantitative information on the outcomes achieved and independent expert analysis of expected and/or demonstrated quantifiable returns on investment”*.

However, there is no requirement that the independent, quantitative analysis be conducted according to a particular set of guidelines and so RnD4P evaluations were not included in the cross-RDC aggregate impact assessment for 2019.

Table 12 describes the 12 RnD4P projects funded under round one of the RnD4P Program. Each collaborative RnD4P investment was led by one of the 15 RDCs.

**Table 12:** RDC led RnD4P Projects Funded Under Round One of the RnD4P Program (2015/16 to 2017/18)

RnD4P Project Title	Lead Organisation
Smarter irrigation for profit	CRDC
Stimulating private sector extension in Australian agriculture to increase returns from R&D	Dairy Australia
Improved use of seasonal forecasting to increase farmer profitability	AgriFutures
Adaptive area-wide management of QFly using SIT: Guidelines for efficient and effective pest suppression and stakeholder adoption	HIA
A profitable future for Australian agriculture: Biorefineries for higher-value animal feeds, chemicals, and fuels	SRA
Multi-scale monitoring tools for managing Australian tree crops – Industry meets innovation	HIA
Fast-tracking and maximising the long-lasting benefits of weed biological control for farm productivity	MLA
Growing a profitable, innovative and collaborative Australian Yellowtail Kingfish aquaculture industry: bringing 'white' fish to the market	FRDC
Waste to revenue: novel fertilisers and feeds	APL
Market and consumer insights to drive food value chain innovation and growth	MLA
MIR for profit: integrating very large genomic and milk mid-infrared data to improve profitability of dairy cows	Dairy Australia
Consolidating targeted and practical extension services for Australian Farmers and Fishers (The foundation to address Priority 4a)	AgriFutures

<sup>10</sup> Output 1(d): create a monitoring and evaluation plan for the Project.

## 8. Alignment with CRRDC Communication Themes

### *Introduction*

As an additional component of the CRRDC Cross-RDC Impact Assessment and Performance Reporting Update, the evaluation team was asked to engage with the CRRDC communications team in order to provide some potentially useful input into the CRRDC's Stakeholder Engagement and Communications Strategy.

The Strategy includes communication around six central themes:

1. Farmgate returns: smarter farming drives improved productivity and profitability, on and off-farm
2. Innovation: Innovation and practice improvement drive cross-sector gains and public good
3. Leverage investment: co-investment and collaboration bring scale, capability and greater impact
4. Market access, international competitiveness: market intelligence and market access power demand for Australian food and fibre
5. Value for money: return on funds invested underpins research and development programs
6. Vibrant communities: There are about 134,000 primary production businesses in Australia, 99% of which are Australian owned

### *Approach*

The 2019 cross-RDC impact assessment, in alignment with the previous 2016 assessment, aimed to provide some sources of potential case studies for each of the six themes using a subjective assessment (supported, in some cases, with quantitative results) of the alignment of the outcomes and impacts of each individual project cluster with the themes.

The subjective scoring system assigned each project cluster a 0 (no alignment with theme), 1 (low alignment), 2 (medium alignment), or 3 (high degree of alignment) against each of the six communications themes. It was envisaged that clusters with a rating of 3 may be further investigated by the communications team as a source of case studies for that theme.

### *Findings*

Table 13 to Table 18 list the project clusters (from the full population of 219) that were subjectively assessed as having a high degree of alignment (score of 3) with each of the six communications themes described previously. Some project clusters had non-zero ratings for more than one communication theme.

The full list of clusters with scores for each theme can be found in Appendix 3: Subjective Assessment of Alignment of Each Project Cluster to the Six CRRDC Communication Themes (Total 219 Project Clusters).

**Table 13:** Project Clusters Assessed as having a High Degree of Alignment with Communication Theme 1 - Farmgate Returns

RDC name	Name of Project Cluster	Report Submitted (Year ended 30 June)
AECL	Energy Usage and Efficiency	2014/15
AgriFutures	Fodder Crops	2013/14
	Pasture Seeds R&D Program 2013-2018	2018/19
APL	Group Demonstration Award (GDA) - Lactation Pens	2014/15
	Lysine requirements	2014/15
	Physi-Trace	2014/15

	Physi-Trace	2018/19
AWI	2013-2016 Strategic Plan - Strategy 1: Program 2 (Wild Dogs)	2015/16
CRDC	BT Technologies Investments: 2010 to 2018	2017/18
	myBMP Investments: 2012 to 2016	2017/18
Dairy Australia	Countdown Downunder program	2015/16
FRDC	Abalone, YTK, oysters	2015/16
	Genetics	2015/16
	Management	2015/16
	Project 2009-723.30 & 2013-714: An Analysis of Product Differentiation Opportunities and Establishing Improved Trade Access and Market Development for Australian Wild Caught Abalone in China	2017/18
	Project 2010-200: The Innovative Development of the <i>Octopus tetricus</i> Fishery in Western Australia	2017/18
	Project 2013-753: A New Refrigeration System Reference Design and Demonstration Prototype	2017/18
	Project 2013-051: The Australian Aquatic Animal Health and Vaccine Centre: First Phase to Establish Atlantic Salmon Biosecure Fish Facility Capabilities and Develop Strategy for an Australian Centre of Excellence	2018/19
FWPA	construction practices	2013/14
GRDC	MCVP ph. 2,3 & 4	2014/15
	National Mungbean improvement Program 2004-2016	2014/15
	Australian Cereal Rust Control Program	2015/16
	Improved management of slugs and snails	2017/18
	PBA New Chemistry options for wild radish control summary	2017/18
	Soils under an irrigated environment (2)	2017/18
	Chickpea Breeding (2001 - 2018)	2018/19
Hort Innovation	VG Levy: Assist Growers to Capture more Value	2016/17
	VG Levy: New Products, New Uses, New Markets	2016/17
	VG Levy: Plant Health and Crop Protection	2016/17
MLA	Eating Quality	2015/16
	Feedlots	2015/16
	Goat Industry	2015/16
	Market Access Program (updated from Sep-2014)	2015/16
	Market Information	2015/16
	On-farm Productivity	2015/16
	Product Integrity	2015/16
SRA	Harvesting Best Practice	2014/15
Wine Australia	Grapes & Wine – Yeasts	2013/14
	Wine – Microbiology	2013/14

**Table 14:** Project Clusters Assessed as having a High Degree of Alignment with Communication Theme 2 – Innovation

<b>RDC name</b>	<b>Name of Project Cluster</b>	<b>Report Submitted (Year ended 30 June)</b>
AECL	Energy Usage and Efficiency	2014/15
CRDC	myBMP Investments: 2012 to 2016	2017/18
Dairy Australia	Countdown Downunder program	2015/16
	Taking Stock Program	2017/18
FRDC	Project 2013-753: A New Refrigeration System Reference Design and Demonstration Prototype	2017/18
	Project 2013-051: The Australian Aquatic Animal Health and Vaccine Centre: First Phase to Establish Atlantic Salmon Biosecure Fish Facility Capabilities and Develop Strategy for an Australian Centre of Excellence	2018/19
FWPA	LiDAR	2016/17
GRDC	ACPFPG	2013/14
	Soil Biology Initiative II	2014/15
	Measuring and managing soil water in Australian Agriculture	2017/18
	Northern region high yielding cereal agronomy - NSW	2017/18
Hort Innovation	VG Levy: Transformational R&D	2016/17
MLA	Market Information	2015/16
	New Products	2015/16
SRA	New germplasm to develop more productive varieties with enhanced resistance to nematodes, Pachymetra root rot and smut	2017/18
	Advancing yield, disease resistance and ratooning by exploiting new sources of genetic variability from wild relatives of sugarcane	2018/19
Wine Australia	Grapes & Wine - Yeasts	2013/14

**Table 15:** Project Clusters Assessed as having a High Degree of Alignment with Communication Theme 3 – Leverage Investment<sup>(a)</sup>

<b>RDC name</b>	<b>Name of Project Cluster</b>	<b>Report Submitted (Year ended 30 June)</b>
AgriFutures	Fodder Crops	2013/14
APL	Group Demonstration Award (GDA) - Lactation Pens	2014/15
	Lysine requirements	2014/15
	Finisher performance	2015/16
	Postgrad scholarship	2015/16
Dairy Australia	Smarter Energy Use Program	2017/18
FRDC	Project 2012-032: Pacific Oyster Mortality Syndrome (POMS) - Risk Mitigation, Epidemiology and OsHV-1 Biology	2017/18
	Project 2011-042: TSGA IPA: clarifying the relationship between salmon farm nutrient loads and changes in macroalgal community structure/distribution (Existing Student Support)	2018/19

	Project 2014-001: Aquatic Animal Health Subprogram: Strategic approaches to identifying pathogens of quarantine concern associated with the importation of ornamental fish	2018/19
	Project 2016-228: Phase 1: Traceability Systems for Wild Caught Lobster, Via Sense-T and Pathways to Market	2018/19
FWPA	LiDAR	2016/17
GRDC	ACPFPG	2013/14
	Peanut Breeding	2014/15
MLA	Off-farm Productivity	2015/16
Wine Australia	Phylloxera Sampling Strategies	2017/18

(a) Project clusters were scored according to their individual estimated leverage ratios. Ratios equal to 0 received a 0, ratios greater than 0 but less than or equal to 1.5 received a 1, ratios greater than 1.5 but less than 3 received a 2, and ratios greater than 3 received a score of 3.

**Table 16:** Project Clusters Assessed as having a High Degree of Alignment with Communication Theme 4 – Market Access, International Competitiveness

RDC name	Name of Project Cluster	Report Submitted (Year ended 30 June)
AgriFutures	Fodder Crops	2013/14
APL	Physi-Trace	2018/19
FRDC	Project 2009-723.30 & 2013-714: An Analysis of Product Differentiation Opportunities and Establishing Improved Trade Access and Market Development for Australian Wild Caught Abalone in China	2017/18
Hort Innovation	Vegetable industry export development program	2016/17
	VG Levy: Assist Growers to Capture more Value	2016/17
	VG Levy: Commercial Marketing Training for Growers	2016/17
	VG Levy: New Products, New Uses, New Markets	2016/17
LiveCorp	Livestock Exports	2015/16
MLA	Market Access Program (updated from Sep-2014)	2015/16
	Product Integrity	2015/16

**Table 17:** Project Clusters Assessed as having a High Degree of Alignment with Communication Theme 5 – Value for Money<sup>(a)</sup>

RDC name	Name of Project Cluster	Report Submitted (Year ended 30 June)
AgriFutures	Fodder Crops	2013/14
APL	Physi-Trace	2018/19
CRDC	myBMP Investments: 2012 to 2016	2017/18
FRDC	Project 2009-723.30 & 2013-714: An Analysis of Product Differentiation Opportunities and Establishing Improved Trade Access and Market Development for Australian Wild Caught Abalone in China	2017/18
	Project 2013-008: Movement, habitat utilisation and population status of the endangered Maugean skate	2017/18
	Project 2013-051: The Australian Aquatic Animal Health and Vaccine Centre: First Phase to Establish Atlantic	2018/19

	Salmon Biosecure Fish Facility Capabilities and Develop Strategy for an Australian Centre of Excellence	
	Project 2015-232: Australian Seafood Industries Pacific Oyster Mortality Syndrome (POMS) investigation into the 2016 disease outbreak in Tasmania - ASI emergency response	2018/19
FWPA	construction practices	2013/14
	recycled products	2013/14
	Cant-Opti	2016/17
	LiDAR	2016/17
GRDC	National Mungbean improvement Program 2004-2016	2014/15
	Australian Cereal Rust Control Program	2015/16
	Canola Investments Completed between 2013/14 and 2017/18	2017/18
	Improved management of slugs and snails	2017/18
	Measuring and managing soil water in Australian Agriculture	2017/18
	Northern region high yielding cereal agronomy - NSW	2017/18
	PBA New Chemistry options for wild radish control summary	2017/18
	Soils under an irrigated environment (1)	2017/18
	Chickpea Breeding (2001 - 2018)	2018/19
Hort Innovation	VG Levy: Assist Growers to Capture more Value	2016/17
	VG Levy: Plant Health and Crop Protection	2016/17
LiveCorp	Livestock Exports	2015/16
MLA	Eating Quality	2015/16
	Market Access Program (updated from Sep-2014)	2015/16
SRA	Harvesting Best Practice	2014/15

(a) Project clusters were scored according to their individual BCRs. BCRs less than or equal to 1 received a 0, BCRs greater than 1 but less than or equal to 3 received a 1, BCRs greater than 3 but less than 9 received a 2, and BCRs greater than or equal to 9 received a score of 3.

**Table 18:** Project Clusters Assessed as having a High Degree of Alignment with Communication Theme 6 – Vibrant Communities

RDC name	Name of Project Cluster	Report Submitted (Year ended 30 June)
AWI	2013-2016 Strategic Plan - Strategy 2: Wool Harvesting and Quality Preparation	2015/16
FRDC	Project 2008-306: Building Economic Capability to Improve the Management of Marine Resources in Australia	2017/18
	Project 2008-327: FRDC Agribusiness Scholarship	2017/18
Wine Australia	Leadership Development in the Wine Industry (Future Leaders)	2016/17



## 9. Issues Identified and Recommendations for Future Cross-RDC Impact Assessments

### 8.1 Issues Identified for the Aggregate Assessment

A major difficulty encountered during the data entry and aggregate assessment for the 219 individual project cluster evaluations submitted for the 2019 Cross-RDC Impact Assessment was the inconsistency of reporting between RDCs and between consultancies engaged to carry out the evaluations.

#### **Neglect of adhering to a standardised reporting process**

Some economic evaluation reports did not report the NPV and/or BCR investment criteria. The BCR (benefit-cost ratio) and NPV (net present value) were considered critical quantitative measures of the impact of the RDCs. These criteria have been a key focus of previous cross-RDC impact assessments.

As shown in Table 2, at least 45 project clusters were excluded from the primary subset for the current assessment as a result of missing data for the BCR and/or NPV at 30-years from the last year of investment. If all data had been supplied this would have increased the number of evaluations included in the primary subset for the aggregate RDC assessment.

Similarly, many evaluation reports failed to report against rolling time frames (i.e. did not include cumulative results for investment criteria at intervals between the last year of investment and some final point in the future). This limited the subset of available project cluster evaluations that could be utilised for an analysis of cross-RDC impact over time (see Section 5.1, Table 7).

The minimum expectations for the reporting are covered in the CRRDC Impact Assessment Guidelines. The Guidelines state that summary measures of total project cluster results should be presented, expressed as PVB, PVC, NPV, BCR, modified internal rate of return (MIRR) and IRR. The 2014 CRRDC Guidelines also assert that, at a minimum, timeframes including current, 5, 10, 20 and 30 year NPV horizons will be adopted. In 2018, the Guidelines were revised such that timeframe (cumulative results after the last year of investment) should be reported for 0, 5, 10, 15, 20, 25, and 30 year time horizons (CRRDC, 2018d).

#### **Inconsistent estimation of investment costs**

The CRRDC Impact Assessment Guidelines that prevailed during the majority of the evaluation period assessed (CRRDC, 2014) state:

*“The costs of adopting or implementing a new technology or other innovation may be incorporated into the assessment either as an additional element in the estimation of costs of the R&D project, or by deducting them from the net returns realised by industry from adoption of the innovation.”*

These alternative treatments of adoption and implementation costs in the Guidelines mean that there is some inconsistency between the project cluster evaluations in terms of how the PVC has been calculated. While not affecting the NPVs, this choice may have had an impact on the results for the BCRs in the aggregate analyses.

The April 2018 revision of the CRRDC Procedures and Guidelines has addressed the two issues above to some extent. The revised Guidelines now states (Agrans Research, 2018):

*“For CRRDC impact assessments, it is preferred that the costs of adopting or implementing a new technology or other innovation are incorporated into the assessment by deducting them from estimated gross benefits (e.g. gross benefits – additional adoption/implementation costs = net benefits) to ensure that the investment criteria reported (e.g. present value of costs, benefit-cost ratio, and internal rate of return) relate directly to the costs of the R&D project(s) being evaluated (e.g. benefit-cost ratio = PV of net benefits / PV of RD&E costs).”*

Thus, where project cluster evaluations are completed according to the revised CRRDC Impact Assessment Guidelines (2018), the Council can expect consistency of results across RDCs to improve for reports submitted from 2018/19 onward.

### **Inconsistent estimation of benefits**

The 2019 cross-RDC impact assessment process revealed that, despite the existence of the CRRDC Impact Assessment Guidelines and Procedures, the process for estimation of benefits between RDCs may not have been applied consistently in all cases. For example, some RDCs utilise partial equilibrium models and report first round and/or second round benefits. Such benefit estimation inconsistencies are likely due to individual RDC reporting requirements independent of the CRRDC cross-RDC impact assessment program requirements.

### **Data on co-investment**

The vast majority of project cluster evaluation reports included data for the total, nominal investment by all partners in the project cluster and the particular RDC's contribution to the investment in the cluster (195 of the 219 evaluations included in the population).

The co-investment component of the total investment was generally either not reported (derived as total nominal investment less the RDC specific contribution) or only reported as 'investment by others/other investment', lacking detail about the individual co-investment partners and their specific investment contributions.

Sources of co-investment (e.g. industry, state Government departments, other research partners such as CSIRO) and specific leverage ratios are of some interest to the Australian Government (and to the CRRDC) and may be useful in decisions regarding allocation of future funding given the role of Government.

The CRRDC Impact Assessment Guidelines (Appendix 2 of the Guidelines) presents the CRRDC Impact Assessment Reporting Template. The template specifically mentions that, for financial and in-kind investments in R&D projects, the report should identify participating institutions, collaborators, and other investors, and detail the year-on-year, cash and in-kind, contributions by each participant.

### **Missing Information/Incomplete Data**

A large proportion of the project cluster evaluation reports stated that the impact assessment had been conducted according to the CRRDC Impact Assessment Guidelines. However, there were many reports where the prevailing methodology was not explicitly stated. Further, many of the evaluation reports did not report key information and data necessary for accurate and robust aggregation of results across RDCs.

Examples of missing information include the dollar terms of the evaluation, the discount rate and year that cash flows were discounted to, whether management, administration and/or extension costs had been taken into account (as required by the CRRDC Guidelines), and the method of selection/purpose of the evaluation (e.g. random, selected for internal reporting requirements, etc.).

## **8.2 Other Issues**

### **Reporting and valuation of environmental and social impacts**

As managers and custodians of both public and private funds, and operating in a space where industry, the environment and communities often have competing priorities, the ability to demonstrate the environmental and social impacts of RD&E is becoming increasingly important.

However, environmental and social impacts are difficult to value as there often are no market mechanisms readily available. However, it would improve the credibility and performance story of the RDCs collectively if some additional valuations of non-market impacts were attempted.

### **Further investigation of data**

The scope of the 2019 Cross-RDC Impact Assessment was necessarily narrow and constrained by available time and resources. However, as the quantity and quality of RDC data increases over time

through the CRRDC biennial aggregate reporting process, it may be possible to further explore and analyse the data to produce other useful or interesting information about the collective performance of the RDCs and the range and types of impacts reported.

### **Future reporting of results by research theme/type**

The CRRDC held a workshop for the CRRDC Impact Assessment Program working group in Sydney on 6 May 2019. Participants at the workshop expressed some desire to look at the aggregate performance of the RDCs against some overarching research/investment themes. For example, assessment of results by investment risk category (e.g. high, medium, low), research type (e.g. applied, strategic, tactical), or other cross-sectoral classification. However, the data available for the current and past cross-RDC impact assessments does not allow for such aggregate reporting.

## **8.3 Recommendations**

Based on the issues identified in Sections 8.1 and 8.2 above, a number of recommendations/suggestions have been proposed to improve future RDC RD&E impact assessments and future cross-RDC aggregate impact assessments.

### **1. Standard minimum reporting requirements for RD&E impact assessments**

The CRRDC Impact Assessment Guidelines (2018) set out the recommended process and reporting of results for RDC Impact Assessments. However, as 'guidelines' only, the cross-RDC aggregation found that, though the CRRDC process for impact assessment is typically followed, reporting of results according to the Guidelines has been inconsistent across RDCs and consultants/organisations undertaking the impact assessments.

It is recommended that the RDCs include a set of minimum reporting requirements for RD&E impact assessments in their project/consultancy agreements (e.g. in the terms of reference) to build consistency and familiarity with CRRDC reporting requirements.

In particular, for the purpose of the cross-RDC impact assessment process, it is recommended that the RDCs include explicit reporting of the following items in their agreements:

- i) Year of assessment (financial year, ending 30 June)
- ii) Discount year and discount rate
- iii) Dollar terms for results
- iv) Total investment and specific RDC investment in nominal terms by financial year,
- v) Results/investment criteria, including the PVB, PVC, NPC and BCR, at 5-year increments up to 30-years after the last year of investment

Further, it is recommended that the RDCs request that the consultant/organisation undertaking the impact assessment report the how the investment was selected for evaluation (e.g. random, selected for internal decision making, etc.), the method used to calculate the PVC, and the treatment of administration, management and extension costs.

All such information is required to be provided when an impact assessment is completed according to the CRRDC Impact Assessment Guidelines. Thus, explicit reporting of such information should be a minor undertaking for any consultant/organisation completing the impact assessment process for an RDC. An example of a reporting template and results spreadsheet are available in the current CRRDC Impact Assessment Guidelines (2018) (Appendix 2 and 3).

### **2. Create a joint catalogue of available non-market valuation studies**

Many environmental and social impacts of RD&E are cross-sectoral. For example, RDC RD&E often results in impacts associated with water quality, soil health, community wellbeing, animal welfare, biodiversity, and industries' social licence to operate.

To improve the estimation of impact from RDC RD&E and contribute to the performance story of the RDCs collectively, it is recommended that the CRRDC and RDCs undertake a body of work to develop and maintain a digital catalogue/library of existing, credible studies focused on the valuation of cross-sectoral environmental and social impacts (i.e. non-market economic analyses). This

catalogue should be made available as a resource to all 15 RDCs and the community of consultants/organisations involved in evaluation of the RDCs RD&E investments.

An audit and assessment of available studies then could be utilised to:

- i) Identify and describe a set of credible approaches to non-market valuation,
- ii) Identify key data gaps in the existing literature, and
- iii) Inform future collaborative work aimed at addressing gaps in the available data to improve the measurement and reporting of impact for the RDCs individually and collectively.

### **3. Develop a set of cross-RDC RD&E categories/classifications**

The CRRDC Impact Assessment Program working group identified that aggregate RDC performance reporting could be made more accurate and informative through the use of common language. For example, common definitions of RD&E outputs, outcomes, and impacts are essential for communicating pathways to impacts for the RDCs individually and collectively. Further, the working group noted that breaking down cross-RDC results by research type/theme could be useful particularly with respect to reporting the aggregate performance of the RDCs over time.

It is recommended that the RDCs, through the mechanisms of the CRRDC and Impact Assessment Program working group, develop a set of common RD&E investment categories/classifications such as risk level (e.g. high, medium, low), research type (e.g. applied, strategic, tactical etc.) or research themes (e.g. natural resource management, productivity, environmental sustainability, etc.).

It is important that such classifications, if developed, be clearly defined, consistently recorded and reported, and remain relatively constant over time to enable robust, aggregate assessment of RDC results in the future.

## 10. Conclusion

The total nominal investment recorded for all 111 project clusters assessed (the primary subset) was estimated at \$1.06 billion, with the RDCs' contributions to the total investment estimated at \$677.6 million (across the 11 RDCs represented in the primary subset). The RDC contribution to the investment represents approximately 25.4% of the total RD&E expenditure of the nine RDCs (\$2.66 billion) over the five-year period.

A comparison of the estimated RDC RD&E expenditure in the 111 project clusters (\$677.6 million) against the total estimated investment in the clusters (\$1.06 billion) indicates an average leverage ratio of approximately 1.57 to 1, meaning that for every \$1 contributed by the RDCs, co-investment partners contributed, on average, \$0.57 to the RD&E investment.

The total PVB for the 111 project clusters evaluated and recorded across the 1 July 2013 to 30 September 2018 period was estimated at \$8.44 billion (in 2018/19 dollar terms) with an aggregate PVC of \$1.52 billion, and an NPV for the total primary subset of approximately \$6.92 billion over a 30-year period.

To allow comparison with previous CRRDC impact assessments, the simple average BCR for the primary subset of evaluations was estimated at 5.1 to 1 after 30-years. However, a simple average is often a flawed measure as it is sensitive to any extreme values within the data set, therefore, a weighted average was also estimated. The weighted average was estimated using the aggregate PVB (\$8.44 billion) and PVC (\$1.52 billion) resulting in an estimated BCR of 5.5 to 1. That is, the total estimated value of benefits from the collective RDC investment over 30-years is approximately \$5.50 for every \$1.00 invested in RD&E.

Several additional analyses were carried out on other subsets, assembled from the base population, based on different criteria to the primary subset in order to explore and test the robustness of the results reported for the primary subset. In general, the additional results generated were informative and were consistent with the results and expectations produced by the initial aggregate assessment of the 111 project cluster evaluations.

Information on environmental and social impacts for each project cluster evaluated was also recorded in the data collection template. Qualitative data were summarised and assessed, and the impacts were then grouped into eight key environmental impact categories and six key social impact categories based on the frequency of the type of specific impacts identified. Of the 219 project cluster evaluations included in the population, 161 reported one or more environmental or social impacts.

The 2019 cross-RDC impact assessment process identified some issues to be considered for future assessments. These included inconsistency of reporting between RDCs and across consultants/organisations undertaking impact assessments, missing and/or incomplete data, and poor reporting of environment and social impacts of RD&E funded through the RDCs.

Overall, the results of the 2019 Cross-RDC Impact Assessment are highly positive. The results demonstrate that the investment by the RDCs as a whole has continued to deliver significant benefits to Australian primary producers, Government and the broader Australian economy.

## References

- Agtrans Research. (2018). *CRRDC Impact Assessment Guidelines Revision - April 2018: Companion Document*. Canberra: Council of Rural Research and Development Corporations. Retrieved from <http://www.ruralrdc.com.au/wp-content/uploads/2018/08/180420-Revised-CRRDC-Impact-Assessment-Guidelines-Companion-Document.pdf>
- Agtrans Research, AgEconPlus & EconSearch. (2016). *Cross-RDC Impact Assessment and Performance Reporting Update - Stage 1: Cross-RDC Impact Assessment for the Period 1 July 2009 to 30 June 2015*. Canberra: Council of Rural Research and Development Corporations. Retrieved from <http://www.ruralrdc.com.au/wp-content/uploads/2018/08/161021-CRRDC-Cross-RDC-Impact-Assessment-2010-2015-FINAL-REPORT.pdf>
- Australian Bureau of Statistics. (2018, October 26). *5204.0 - Australian System of National Accounts, 2017-18*. Retrieved from Australian Bureau of Statistics: <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/5204.02017-18?OpenDocument>
- Commonwealth of Australia. (2019, April 29). *Rural Research and Development for Profit*. Retrieved from Australian Government - Department of Agriculture: <http://www.agriculture.gov.au/ag-farm-food/innovation/rural-research-development-for-profit#round-1-rural-research-and-development-for-profit>
- Council of Rural Research and Development Corporations. (2008). *Measuring Economic, Environmental and Social Returns from Rural Research and Development Corporations' Investment*. Canberra: Council of Rural Research and Development Corporations. Retrieved from <http://www.ruralrdc.com.au/wp-content/uploads/2018/08/Rural-RDC-Eval-Report-low-res.pdf>
- Council of Rural Research and Development Corporations. (2010). *Impact of Investment in Research and Development by the Rural Research and Development Corporations*. Canberra: Council of Rural Research and Development Corporations. Retrieved from <http://www.ruralrdc.com.au/wp-content/uploads/2018/08/CRRDCC-evaluation-report-2009-final-1.pdf>
- Council of Rural Research and Development Corporations. (2014). *Impact Assessment Guidelines*. Canberra: Council of Rural Research and Development Corporations. Retrieved from <http://www.ruralrdc.com.au/wp-content/uploads/2018/08/CRRDC-Impact-Assessment-Guidelines-V.1-070514.pdf>
- Council of Rural Research and Development Corporations. (2017, March 6). *Council of Rural RDCs - Background Information*. Retrieved from Rural R&D Corporations: <http://www.ruralrdc.com.au/wp-content/uploads/2018/08/COUNCIL-OF-RURAL-RDCs-Background-information.pdf>
- Council of Rural Research and Development Corporations. (2018a). *About*. Retrieved from Rural R&D Corporations: <http://www.ruralrdc.com.au/about/>
- Council of Rural Research and Development Corporations. (2018b). *Cross-RDC Impact Assessment Program: Management Procedures*. Canberra: Council of Rural Research and Development Corporations. Retrieved from [http://www.ruralrdc.com.au/wp-content/uploads/2018/08/201804\\_RDC-IA-Procedures-V.2-1.pdf](http://www.ruralrdc.com.au/wp-content/uploads/2018/08/201804_RDC-IA-Procedures-V.2-1.pdf)
- Council of Rural Research and Development Corporations. (2018c). *Cross-RDC Impact Assessment Program: Guidelines*. Canberra: Council of Rural Research and Development Corporations. Retrieved from [http://www.ruralrdc.com.au/wp-content/uploads/2018/08/201804\\_RDC-IA-Guidelines-V.2.pdf](http://www.ruralrdc.com.au/wp-content/uploads/2018/08/201804_RDC-IA-Guidelines-V.2.pdf)

Council of Rural Research and Development Corporations. (May 2014). *Impact Assessment Program Management Procedures*. Canberra: Council of Rural Research and Development Corporations.

Rural R&D Corporations. (2016). *About the Rural R&D Corporations*. Retrieved August 8, 2016, from Rural R&D Corporations: <http://www.ruralrdc.com.au/about-the-rrdcs/#top>

Sekulovska, D. (n.d.). *Perspectives*. Retrieved from Deloitte: <https://www2.deloitte.com/au/en/pages/consumer-business/articles/rural-rd-profit-program.html>

## Appendices

### Appendix 1: List of all 15 Current RDCs with Web Page Links

- Grains Research and Development Corporation - <https://grdc.com.au/>
- Horticulture Innovation Australia Limited - <https://www.horticulture.com.au/>
- Meat and Livestock Australia - <https://www.mla.com.au/>
- Dairy Australia - <https://www.dairyaustralia.com.au/>
- Australian Wool Innovation - <https://www.wool.com/>
- Fisheries Research and Development Corporation - <http://frdc.com.au/>
- AgriFutures Australia (formerly the Rural Industries Research and Development Corporation) - <https://www.agrifutures.com.au/>
- Wine Australia - <https://www.wineaustralia.com/>
- Sugar Research Australia - <https://sugarresearch.com.au/>
- Cotton Research and Development Corporation - <https://www.crdc.com.au/>
- Australian Pork Limited (APL) - <https://australianpork.com.au/>
- Australian Meat Processor Corporation (AMPC) - <https://www.ampc.com.au/>
- Forest and Wood Products Australia (FWPA) - <https://www.fwpa.com.au/>
- Australian Egg Corporation Limited (AECL) - <https://www.australianeggs.org.au/>
- LiveCorp - <http://www.livecorp.com.au/>



## Appendix 2: Complete List of the 219 RDC RD&E Investment Evaluations Submitted for the 2019 Cross-RDC Impact Assessment (total population)

Evaluations in the 2019 Cross-RDC Impact Assessment population that also were included as part of the previous, evaluations that were originally submitted during the 2016 Cross-RDC Impact Assessment process are highlighted in green. Note that the 219 evaluations listed excludes any Rural R&D for Profit Program reports and evaluations, these were considered separately and did not form part of the cross-RDC aggregate analysis.

RDC Name	Name/Title of RD&E Investment (Project Cluster)	Financial Year Submitted	Selection Method (R, S, NS)	Analyst(s)	Total Nominal Investment (\$m)	RDC Nominal Investment (\$m)
AECL	Energy Usage and Efficiency	2014/15	R	AgEconPlus	0.07	0.07
	Human Health and Nutrition	2014/15	R	AgEconPlus	2.03	0.91
	Feed Quality and Nutrition	2015/16	S	AgEconPlus	1.57	0.90
	Product Quality	2015/16	S	AgEconPlus	0.42	0.36
	Hen Welfare	2016/17	S	AgEconPlus	1.84	1.09
	Salmonella	2016/17	S	AgEconPlus	0.61	0.45
	A Review of Animal Welfare Policy and Assessment Frameworks	2017/18	R	AgEconPlus	0.01	0.01
	Odour Review of Layer Farms and Development of an S-Factor Formula	2017/18	R	AgEconPlus	0.06	0.06
	Update of Environmental Guidelines for the Egg Industry	2017/18	R	AgEconPlus	0.08	0.08
	Best Practice Lighting Management for Australian Layers	2018/19	R	AgEconPlus	0.05	0.05
	Further Analysis of Aviaries Data	2018/19	R	AgEconPlus	0.06	0.06
	The Effect of Feed Additives of Spotty Liver Disease	2018/19	R	AgEconPlus	0.01	0.01
AgriFutures	Fodder Crops	2013/14	R	Agtrans Research	4.30	0.94
	Global Challenges	2013/14	R	Agtrans Research	2.60	1.97
	Wildflowers & native plants	2013/14	R	Agtrans research	3.62	1.18
	Horses (2015)	2014/15	R	Agtrans Research	9.08	2.60
	Rice R&D Program 2012-2017	2016/17	R	Agtrans Research	35.25	14.29
	Ginger R&D Program	2016/17	R	Agtrans Research	2.58	1.26
	Pasture Seeds R&D Program 2013-2018	2018/19	R	Agtrans Research	6.95	1.93

AMPC	Container loading pilot installation	2018/19	R	AgEconPlus	0.96	0.96
	Feasibility of miniaturising snake robotics for spinal cord removal prior to splitting beef carcasses	2018/19	R	AgEconPlus	0.32	0.32
	Improvements to robotic bandsaw operations	2018/19	R	AgEconPlus	0.35	0.35
APL	Group Demonstration Award (GDA) - Lactation Pens	2014/15	NS	Unknown	0.12	0.02
	Animal Health Emergencies	2014/15	NS	Unknown	0.06	0.03
	benchmarking pig welfare	2014/15	NS	Unknown	0.05	0.02
	Concept plan audit frequency for meat	2014/15	NS	Unknown	0.01	0.01
	Lysine requirements	2014/15	NS	Unknown	0.13	0.01
	Physi-Trace	2014/15	NS	Unknown	0.25	0.15
	PigBal model - Stage 2	2014/15	NS	Unknown	0.39	0.14
	PRRS virus	2014/15	NS	Unknown	0.07	0.07
	Review of APIQ Free Range Standards	2014/15	NS	Unknown	0.07	0.07
	selection criteria	2014/15	NS	Unknown	0.66	0.25
	Spent Eco-shelter bedding	2014/15	NS	Unknown	0.14	0.13
	Stock Handling (not in summary)	2014/15	NS	Unknown	0.30	0.16
	data collection	2015/16	S	IDA economics	0.25	0.11
	Development of guidelines	2015/16	S	IDA economics	0.43	0.29
	Dietary requirements	2015/16	S	IDA economics	0.15	0.07
	education resources	2015/16	S	IDA economics	0.03	0.03
	Environmental BMP resources	2015/16	S	IDA economics	0.07	0.07
	Export benchmarks	2015/16	S	IDA economics	0.36	0.21
	Finisher performance	2015/16	S	IDA economics	0.20	0.05
	Nutrient mapping	2015/16	S	IDA economics	0.04	0.04
	Physi-trace implementation	2015/16	S	IDA economics	0.22	0.22
	Porcine epidemic	2015/16	S	IDA economics	0.04	0.04
Postgrad scholarship	2015/16	S	IDA economics	0.40	0.05	
Review of standards	2015/16	S	IDA economics	0.07	0.07	
Sludge Management	2015/16	S	IDA economics	0.09	0.09	

	Toxoplasmosis	2015/16	S	IDA economics	0.04	0.04
	Welfare indices	2015/16	S	IDA economics	0.22	0.11
	Biosecurity/ Exotic Diseases	2018/19	S	ACIL Allen Consulting	0.98	NR
	Gilt Enhancement	2018/19	S	ACIL Allen Consulting	1.85	NR
	Nutrition	2018/19	S	ACIL Allen Consulting	1.79	NR
	Physi-Trace	2018/19	S	ACIL Allen Consulting	3.17	NR
AWI	BESTWOOL/BESTLAMB network	2013/14	NS	Marsden Jacob Associates	14.08	NR
	On-farm - Genetics, Genomics	2014/15	R	BDA Group	3.62	3.62
	On-farm - Shearer Training	2014/15	R	BDA Group	2.10	2.10
	2013-2016 Strategic Plan - Strategy 1: Program 1 (Parasites & Diseases)	2015/16	NS	AWI (internal)	NR	5.50
	2013-2016 Strategic Plan - Strategy 1: Program 2 (Wild Dogs)	2015/16	NS	AWI (internal)	NR	6.80
	2013-2016 Strategic Plan - Strategy 1: Program 3 (Genetics & Genomics)	2015/16	NS	AWI (internal)	NR	5.50
	2013-2016 Strategic Plan - Strategy 1: Program 4 (Reproduction)	2015/16	NS	AWI (internal)	NR	2.50
	2013-2016 Strategic Plan - Strategy 13: Woolmark	2015/16	NS	AWI (internal)	NR	3.00
	2013-2016 Strategic Plan - Strategy 2: Wool Harvesting and Quality Preparation	2015/16	NS	AWI (internal)	NR	7.20
	2013-2016 Strategic Plan - Strategy 3: Program 1 (Managing the Resource Base)	2015/16	NS	AWI (internal)	NR	5.00
	2013-2016 Strategic Plan - Strategy 4: Program 1 (Grower Skills Capacity)	2015/16	NS	AWI (internal)	NR	5.90
	2013-2016 Strategic Plan - Strategy 5: Program 1 (Supply Chain Diversification)	2015/16	NS	AWI (internal)	NR	1.80
	2013-2016 Strategic Plan - Strategy 5: Program 2 (Technical Transfer)	2015/16	NS	AWI (internal)	NR	1.40
	2013-2016 Strategic Plan - Strategy 8: Program 3 (The Campaign for Wool)	2015/16	NS	AWI (internal)	NR	9.10
	2013-2016 Strategic Plan - Strategy 8: Program 4 (International Woolmark Prize)	2015/16	NS	AWI (internal)	NR	15.00

	2013-2016 Strategic Plan - Strategy 9: Product Promotion	2015/16	NS	AWI (internal)	NR	30.60
CRDC	BT Technologies Investments: 2010 to 2018	2017/18	S	Agtrans Research	9.68	4.94
	myBMP Investments: 2012 to 2016	2017/18	S	Agtrans Research	5.10	2.19
	Nutrition Investments 2008-2016	2017/18	S	Agtrans Research	8.90	3.16
	Sustainability Investments: 2012 to 2017	2017/18	S	Agtrans Research	3.98	2.13
	Water Use Efficiency Investments 2011-2015	2017/18	S	Agtrans Research	4.36	2.54
Dairy Australia	Countdown Downunder program	2015/16	S	Marsden Jacob Associates	10.64	NR
	Flexible Feeding Systems program	2015/16	S	Marsden Jacob Associates	NR	6.75
	Flexible Future Forage Systems research program	2015/16	S	Marsden Jacob Associates	6.15	NR
	Automatic Milking System component of the Future Dairy Program	2016/17	S	Marsden Jacob Associates	15.20	8.04
	Smarter Energy Use Program	2017/18	S	Marsden Jacob Associates	1.23	0.23
	Taking Stock Program	2017/18	S	Marsden Jacob Associates	1.66	0.59
FRDC	Abalone, YTK, oysters	2015/16	R	Agtrans Research	4.38	2.11
	Consumers, products and markets (part A)	2015/16	R	Agtrans Research	8.77	4.37
	Enhancement, nutrition and health	2015/16	R	Agtrans Research	12.61	4.99
	Genetics	2015/16	R	Agtrans Research	17.97	5.33
	Governance and Regulatory systems	2015/16	R	Agtrans Research	15.19	5.75
	Management	2015/16	R	Agtrans Research	26.63	12.96
	profitability	2015/16	R	Agtrans Research	3.97	2.48
	Resource access & allocation	2015/16	R	Agtrans Research	3.72	2.05
	systems & production	2015/16	R	Agtrans Research	44.18	14.42
	Project 2008-002: Targeting and CPUE definition in the SESSF trawl fishery	2017/18	R	Agtrans Research	0.45	0.20
	Project 2008-306: Building Economic Capability to Improve the Management of Marine Resources in Australia	2017/18	R	Agtrans Research	1.56	0.93
Project 2008-327: FRDC Agribusiness Scholarship	2017/18	R	Agtrans Research	0.13	0.09	

Project 2009-303: Australasian Aquaculture 2010 to 2014	2017/18	R	Agtrans Research	0.84	0.24
Project 2009-710: Bioeconomic Evaluation of Commercial Scale Stock Enhancement in Abalone	2017/18	R	Agtrans Research	0.51	0.15
Project 2009-723.30 & 2013-714: An Analysis of Product Differentiation Opportunities and Establishing Improved Trade Access and Market Development for Australian Wild Caught Abalone in China	2017/18	R	Agtrans Research	2.03	1.75
Project 2010-200: The Innovative Development of the <i>Octopus tetricus</i> Fishery in Western Australia	2017/18	R	Agtrans Research	0.63	0.37
Project 2010-777: Analysis of the core leadership group and network structure of East Coast Trawl	2017/18	R	Agtrans Research	0.23	0.16
Project 2011-030: Evaluating Candidate Monitoring Strategies, Assessment Procedures and Harvest Control Rules in the Spatially Complex Queensland Coral Reef Fin Fish Fishery	2017/18	R	Agtrans Research	1.07	0.39
Project 2012-032: Pacific Oyster Mortality Syndrome (POMS) - Risk Mitigation, Epidemiology and OsHV-1 Biology	2017/18	R	Agtrans Research	3.43	0.80
Project 2012-047: Characterising benthic pelagic interactions in Macquarie Harbour	2017/18	R	Agtrans Research	0.52	0.21
Project 2012-058: Limiting impacts of the spread of urchins by rebuilding abalone populations	2017/18	R	Agtrans Research	0.08	0.04
Project 2012-225: Technical Reviews of Formal Harvest Strategies	2017/18	R	Agtrans Research	0.39	0.15
Project 2012-500.20: Common Language Group	2017/18	R	Agtrans Research	0.45	0.45
Project 2013-008: Movement, habitat utilisation and population status of the endangered Maugean skate	2017/18	R	Agtrans Research	0.57	0.26
Project 2013-053: Summer spawning patterns and preliminary Daily Egg Production Method survey of Jack Mackerel and Sardine	2017/18	R	Agtrans Research	0.54	0.39
Project 2013-753: A New Refrigeration System Reference Design and Demonstration Prototype	2017/18	R	Agtrans Research	0.68	0.50
Project 2014-030: Status of key Australian fish stocks (SAFS) reports 2014 and beyond	2017/18	R	Agtrans Research	1.89	0.81
Project 2014-714: Writing our History - The people and achievements of the Australian Seafood CRC	2017/18	R	Agtrans Research	0.09	0.04
Project 2015-406: Development of a National Pacific Oyster Mortality Syndrome (POMS) Response Plan	2017/18	R	Agtrans Research	0.03	0.03

Project 2011-042: TSGA IPA: clarifying the relationship between salmon farm nutrient loads and changes in macroalgal community structure/distribution (Existing Student Support)	2018/19	R	Agtrans Research	0.55	0.04
Project 2011-070: Comparative susceptibility and host responses of endemic fishes and salmonids affected by amoebic gill disease in Tasmania	2018/19	R	Agtrans Research	0.47	0.23
Project 2012-015: Improving confidence in the management of the Blue Swimmer Crab ( <i>Portunus armatus</i> ) in Shark Bay	2018/19	R	Agtrans Research	1.65	0.68
Project 2012-024: INFORMD2	2018/19	R	Agtrans Research	1.62	0.75
Project 2012-403: Development of the East Arnhem Fisheries Network Training Framework	2018/19	R	Agtrans Research	0.11	0.11
Project 2013-051: The Australian Aquatic Animal Health and Vaccine Centre: First Phase to Establish Atlantic Salmon Biosecure Fish Facility Capabilities and Develop Strategy for an Australian Centre of Excellence	2018/19	R	Agtrans Research	3.34	1.69
Project 2013-056: Revision of the Australian Shellfish Quality Assurance Program Manual - in light of the FRDC funded PST review	2018/19	R	Agtrans Research	0.04	0.04
Project 2014-001: Aquatic Animal Health Subprogram: Strategic approaches to identifying pathogens of quarantine concern associated with the importation of ornamental fish	2018/19	R	Agtrans Research	1.20	0.25
Project 2014-012: Tasmania's coastal reefs: deep reef habitats and significance for finfish production and biodiversity	2018/19	R	Agtrans Research	0.51	0.23
Project 2014-036: First Implementation of an independent observer program for the Charter Boat Industry of NSW: data for industry-driven resource sustainability	2018/19	R	Agtrans Research	0.35	0.18
Project 2014-204: Implications of current spatial management measures for AFMA ERAs for habitats	2018/19	R	Agtrans Research	0.32	0.19
Project 2014-301: Social and economic evaluation of NSW Coastal Commercial Wild-Catch Fisheries	2018/19	R	Agtrans Research	0.71	0.44
Project 2014-729: Improving the palatability, bioavailability and efficacy of orally administered praziquantel for yellowtail kingfish with lipid nanoparticles and hybrid lipid carrier systems	2018/19	R	Agtrans Research	0.30	0.17
Project 2015-044: The development of a mobile application for the Aquatic animal diseases significant to Australia: Identification field guide	2018/19	R	Agtrans Research	0.04	0.04

	Project 2015-232: Australian Seafood Industries Pacific Oyster Mortality Syndrome (POMS) investigation into the 2016 disease outbreak in Tasmania - ASI emergency response	2018/19	R	Agtrans Research	0.05	0.05
	Project 2016-057: Workshop to identify research needs and a future project to reduce bycatch and improve fuel efficiency via Low Impact Fuel Efficient (LIFE) prawn trawls	2018/19	R	Agtrans Research	0.07	0.04
	Project 2016-228: Phase 1: Traceability Systems for Wild Caught Lobster, Via Sense-T and Pathways to Market	2018/19	R	Agtrans Research	0.82	0.14
	Project 2016-266: A Plan for the Australian Prawn Farming Industry's Initial Response to the White Spot Disease Incident in Summer 2016-17	2018/19	R	Agtrans Research	0.08	0.07
	Project 2016-411: Skills and Capability Building Priorities	2018/19	R	Agtrans Research	0.04	0.04
	Project 2016-501: Seafood with ET	2018/19	R	Agtrans Research	0.22	0.22
FWPA	construction practices	2013/14	R	Ross McLeod	0.50	0.35
	Molecular breeding	2013/14	R	Ross McLeod	0.10	0.03
	recycled products	2013/14	R	Ross McLeod	0.20	0.07
	Generic Marketing	2015/16	S	CIE	NR	NR
	Cant-Opti	2016/17	R	CIE	0.40	NR
	case studies	2016/17	R	CIE	0.27	0.16
	e-Cambium	2016/17	R	CIE	0.77	0.31
	LiDAR	2016/17	R	CIE	1.05	0.17
GRDC	ACPGF	2013/14	R	Agtrans Research & Tracy Henderson	119.76	22.37
	Dual Purpose Wheat Breeding	2013/14	R	Agtrans Research	3.04	1.95
	FACE	2013/14	R	Agtrans Research and Mary Ann Franco-Dixon	14.66	4.70
	Water Use Efficiency	2013/14	R	Agtrans Research	21.99	11.22
	Peanut Breeding	2014/15	S	Agtrans Research	12.37	2.64
	MCVP ph. 2,3 & 4	2014/15	S	Agtrans Research, Barry White	20.20	11.36
	National Mungbean improvement Program 2004-2016	2014/15	S	Agtrans Research	8.48	3.45

	Soil Biology Initiative II	2014/15	S	Agtrans Research	17.88	9.12
	Triticale Breeding	2014/15	S	Agtrans Research & AgEconPlus	8.64	2.95
	Australian Cereal Rust Control Program	2015/16	S	Agtrans Research	47.49	20.91
	Soybean Breeding	2015/16	S	Agtrans Research	6.78	2.50
	Canola Investments Completed between 2013/14 and 2017/18	2017/18	S	GRDC (internal)	75.72	37.86
	Chickpea Investments Completed between 2014/14 and 2017/18	2017/18	S	GRDC (internal)	50.11	25.02
	Improved management of slug and snails	2017/18	S	GRDC (internal)	1.57	1.57
	Lupin Breeding for Australia	2017/18	S	GRDC (internal)	5.78	2.72
	Measuring and managing soil water in Australian Agriculture	2017/18	S	GRDC (internal)	4.18	2.09
	Northern region high yielding cereal agronomy - NSW	2017/18	S	GRDC (internal)	0.45	0.45
	PBA Australian Faba Bean Breeding Program	2017/18	S	GRDC (internal)	11.00	5.65
	PBA New Chemistry options for wild radish control summary	2017/18	S	GRDC (internal)	1.17	0.79
	Soils under an irrigated environment (1)	2017/18	S	GRDC (internal)	0.30	0.30
	Soils under an irrigated environment (2)	2017/18	S	GRDC (internal)	0.69	0.69
	Chickpea Breeding (2001 - 2018)	2018/19	S	Agtrans Research	31.86	15.32
Hort Innovation	Vegetable industry export development program	2016/17	S	EY	3.40	NR
	VG Levy: Assist Growers to Capture more Value	2016/17	R	Consulting & Implementation Services & CIE	5.48	5.48
	VG Levy: Commercial Marketing Training for Growers	2016/17	R	Consulting & Implementation Services & CIE	0.96	0.96
	VG Levy: Cost Management	2016/17	R	Consulting & Implementation Services & CIE	1.76	1.76
	VG Levy: New Products, New Uses, New Markets	2016/17	R	Consulting & Implementation Services & CIE	3.27	3.27
	VG Levy: Plant Health and Crop Protection	2016/17	R	Consulting & Implementation Services & CIE	28.80	21.54



	VG Levy: Skills and Training	2016/17	R	Consulting & Implementation Services & CIE	5.72	5.13
	VG Levy: Transformational R&D	2016/17	R	Consulting & Implementation Services & CIE	16.52	14.38
	VG Levy: Understanding the consumer	2016/17	R	Consulting & Implementation Services & CIE	3.76	3.76
LiveCorp	Livestock Exports	2015/16	R	CIE	42.10	42.10
MLA	Genetics and Genomics	2014/15	R	IDA Economics	173.64	48.91
	Animal Health	2015/16	R	CIE	36.93	25.78
	Animal Welfare (I)	2015/16	R	CIE	14.44	11.90
	Eating Quality	2015/16	R	CIE	47.14	44.21
	Feedlots	2015/16	R	CIE	22.75	20.73
	Goat Industry	2015/16	R	CIE	2.59	2.59
	Market Access Program (updated from Sep-2014)	2015/16	R	CIE	36.26	36.26
	Market Information	2015/16	R	CIE	34.70	34.18
	New Products	2015/16	R	CIE	18.55	9.98
	Off-farm Environment	2015/16	R	CIE	13.74	7.67
	Off-farm Productivity	2015/16	R	CIE	59.60	9.40
	On-farm Environment	2015/16	R	CIE	56.97	56.92
	On-farm Productivity	2015/16	R	CIE	113.39	94.02
Product Integrity	2015/16	R	CIE	48.77	47.47	
SRA	Best Practice IWM	2014/15	R	Agtrans Research	0.78	0.73
	Biomass Accumulation	2014/15	R	Agtrans Research	0.29	0.28
	Harvesting Best Practice	2014/15	R	Agtrans Research	0.51	0.45
	NFS: appropriate nutrient management	2014/15	R	Agtrans Research	2.81	2.76
	Climate forecasting to improve nitrogen management	2015/16	R	Agtrans Research	0.37	0.37
	Exotic threats	2015/16	R	Agtrans Research	1.77	1.73
	Precision Agriculture	2015/16	R	Agtrans Research	3.08	2.65

	Remote sensing for canegrub management	2015/16	R	Agtrans Research	1.14	1.14
	Solving the Yellow Canopy Syndrome	2015/16	R	Agtrans Research	0.76	0.76
	Utilising Total Biomass	2015/16	R	Agtrans Research	3.23	2.75
	Development and testing of an SNP marker platform in sugarcane	2017/18	R	Agtrans Research	1.44	0.91
	Implementing a framework for farmers to engage in the use of Precision Technologies	2017/18	R	Agtrans Research	1.05	0.52
	Maximising the rate of parental improvement in the Australian sugarcane breeding program	2017/18	R	Agtrans Research	2.77	2.37
	New germplasm to develop more productive varieties with enhanced resistance to nematodes, Pachymetra root rot and smut	2017/18	R	Agtrans Research	2.29	1.89
	Rapid detection of Ratoon Stunting Disease	2017/18	R	Agtrans Research	1.13	0.59
	Advancing yield, disease resistance and ratooning by exploiting new sources of genetic variability from wild relatives of sugarcane	2018/19	R	Agtrans Research	2.30	1.40
	Developing cytogenetic and molecular tools to improve selection for soil borne pathogen resistance in wild hybrids	2018/19	R	Agtrans Research	2.25	1.65
	Innovative approaches to identifying the cause of chlorotic streak and new management strategies	2018/19	R	Agtrans Research	2.10	1.12
	Maximising genetic gain from family selection	2018/19	R	Agtrans Research	1.83	0.95
	Optimising productivity and variety recommendation through analysis of mill data	2018/19	R	Agtrans Research	0.68	0.39
Wine Australia	Grapes & Wine - Yeasts	2013/14	R	EconSearch	19.56	15.40
	Wine - Microbiology	2013/14	S	EconSearch	16.11	13.19
	Flavour	2015/16	S	IDA Economics Pty Ltd	24.88	11.30
	Nutrition	2015/16	S	IDA Economics Pty Ltd	4.30	4.23
	Refrigeration	2015/16	S	IDA Economics Pty Ltd	0.42	0.37
	Trunk disease	2015/16	S	IDA Economics Pty Ltd	4.24	2.13
	Enhanced Varieties and Clones for a more Variable Climate and the Production of Lower Alcohol Wines	2016/17	S	AgEconPlus & Gillespie Economics	1.45	0.89

Leadership Development in the Wine Industry (Future Leaders)	2016/17	S	AgEconPlus & Gillespie Economics	0.41	0.37
Lean	2016/17	S	AgEconPlus & Gillespie Economics	0.45	0.20
Powdery Mildew Assessment	2016/17	S	AgEconPlus & Gillespie Economics	1.55	0.58
The Wine Flavours Card	2016/17	S	AgEconPlus & Gillespie Economics	0.31	0.22
Market Access, Safety, Regulatory and Technical Trade Issues	2017/18	R	AgEconPlus	0.32	0.32
Phylloxera Sampling Strategies	2017/18	R	AgEconPlus	0.82	0.17
Root Zone Salinity and Sub-Surface Drive Irrigation Techniques	2017/18	R	AgEconPlus	0.94	0.47
The Removal of Lees from Underneath Wine	2017/18	R	AgEconPlus	0.61	0.46
The Staging and conduct of extension programs	2017/18	R	AgEconPlus	2.08	2.03

(a) Some project cluster titles are abbreviated for ease of data entry at the time of recording.

(b) NR: Not Reported.

### Appendix 3: Subjective Assessment of Alignment of Each Project Cluster to the Six CRRDC Communication Themes (Total 219 Project Clusters)

The table below gives a comprehensive list of the project cluster evaluations included in the 2019 Cross-RDC Impact Assessment. The information provided in the table also includes the subjective assessment of each project cluster’s alignment with each of the six CRRDC communication themes. Cells highlighted in green indicate where clusters have received the maximum subjective rating against one of the CRRDC communication themes.

RDC Name	Name/Title of RD&E Investment (Project Cluster)	Financial Year Submitted	Farmgate Returns	Innovation	Leverage Investment	Market Access, International Competitiveness	Value for Money	Vibrant Communities
AECL	Energy Usage and Efficiency	2014/15	3	3	0	0	2	0
	Human Health and Nutrition	2014/15	2	2	1	0	2	0
	Feed Quality and Nutrition	2015/16	2	1	1	0	1	0
	Product Quality	2015/16	1	1	1	0	1	2
	Hen Welfare	2016/17	1	1	1	0	2	1
	Salmonella	2016/17	0	2	1	0	2	0
	A Review of Animal Welfare Policy and Assessment Frameworks	2017/18	0	2	0	0	2	0
	Odour Review of Layer Farms and Development of an S-Factor Formula	2017/18	2	1	0	0	1	0
	Update of Environmental Guidelines for the Egg Industry	2017/18	1	0	0	0	2	0
	Best Practice Lighting Management for Australian Layers	2018/19	2	1	0	0	1	0
	Further Analysis of Aviaries Data	2018/19	1	0	0	0	1	0
	The Effect of Feed Additives of Spotty Liver Disease	2018/19	2	2	0	0	2	0
AgriFutures	Fodder Crops	2013/14	3	1	3	3	3	0
	Global Challenges	2013/14	1	1	1	2	1	1
	Wildflowers & native plants	2013/14	1	2	2	2	1	0
	Horses (2015)	2014/15	0	2	2	2	1	0
	Rice R&D Program 2012-2017	2016/17	2	2	1	1	2	2
	Ginger R&D Program	2016/17	2	2	1	0	2	1

	Pasture Seeds R&D Program 2013-2018	2018/19	3	2	2	1	2	0
AMPC	Container loading pilot installation	2018/19	0	2	0	0	2	0
	Feasibility of miniaturising snake robotics for spinal cord removal prior to splitting beef carcasses	2018/19	0	2	0	1	2	0
	Improvements to robotic bandsaw operations	2018/19	0	2	0	0	1	0
APL	Group Demonstration Award (GDA) - Lactation Pens	2014/15	3	2	3	0	0	0
	Animal Health Emergencies	2014/15	0	0	1	1	0	0
	benchmarking pig welfare	2014/15	0	0	2	1	0	0
	Concept plan audit frequency for meat	2014/15	1	2	0	2	0	0
	Lysine requirements	2014/15	3	2	3	0	0	0
	Physi-Trace	2014/15	3	1	1	1	0	0
	PigBal model - Stage 2	2014/15	2	0	2	1	0	0
	PRRS virus	2014/15	1	1	0	1	0	0
	Review of APIQ Free Range Standards	2014/15	2	0	0	2	0	0
	selection criteria	2014/15	2	1	2	1	0	0
	Spent Eco-shelter bedding	2014/15	1	1	1	0	0	0
	Stock Handling (not in summary)	2014/15	1	0	1	0	0	0
	data collection	2015/16	2	1	1	2	0	0
	Development of guidelines	2015/16	2	1	1	2	0	0
	Dietary requirements	2015/16	1	0	1	0	0	0
	education resources	2015/16	1	0	0	1	0	0
	Environmental BMP resources	2015/16	2	1	0	2	0	0
	Export benchmarks	2015/16	1	2	1	2	0	0
	Finisher performance	2015/16	1	0	3	0	0	0
	Nutrient mapping	2015/16	0	1	0	1	0	0
Physi-trace implementation	2015/16	1	1	0	2	0	0	
Porcine epidemic	2015/16	2	1	0	1	0	0	
Postgrad scholarship	2015/16	1	2	3	1	0	1	

	Review of standards	2015/16	2	1	0	2	0	0
	Sludge Management	2015/16	2	1	0	0	0	0
	Toxoplasmosis	2015/16	0	1	0	1	0	0
	Welfare indices	2015/16	0	0	1	0	0	1
	Biosecurity/ Exotic Diseases	2018/19	2	2	0	2	0	0
	Gilt Enhancement	2018/19	2	2	0	0	2	0
	Nutrition	2018/19	0	0	0	0	0	0
	Physi-Trace	2018/19	3	2	0	3	3	0
AWI	BESTWOOL/BESTLAMB network	2013/14	2	2	0	0	0	1
	On-farm - Genetics, Genomics	2014/15	0	1	0	0	0	0
	On-farm - Shearer Training	2014/15	2	1	0	0	0	0
	2013-2016 Strategic Plan - Strategy 1: Program 1 (Parasites & Diseases)	2015/16	2	2	0	0	0	0
	2013-2016 Strategic Plan - Strategy 1: Program 2 (Wild Dogs)	2015/16	3	1	0	0	0	0
	2013-2016 Strategic Plan - Strategy 1: Program 3 (Genetics & Genomics)	2015/16	1	2	0	0	0	0
	2013-2016 Strategic Plan - Strategy 1: Program 4 (Reproduction)	2015/16	2	2	0	0	0	0
	2013-2016 Strategic Plan - Strategy 13: Woolmark	2015/16	1	0	0	1	0	0
	2013-2016 Strategic Plan - Strategy 2: Wool Harvesting and Quality Preparation	2015/16	1	2	0	0	0	3
	2013-2016 Strategic Plan - Strategy 3: Program 1 (Managing the Resource Base)	2015/16	2	1	0	0	0	0
	2013-2016 Strategic Plan - Strategy 4: Program 1 (Grower Skills Capacity)	2015/16	1	2	0	0	0	2
	2013-2016 Strategic Plan - Strategy 5: Program 1 (Supply Chain Diversification)	2015/16	2	0	0	0	0	0
	2013-2016 Strategic Plan - Strategy 5: Program 2 (Technical Transfer)	2015/16	1	1	0	0	0	0
	2013-2016 Strategic Plan - Strategy 8: Program 3 (The Campaign for Wool)	2015/16	1	0	0	2	0	0

	2013-2016 Strategic Plan - Strategy 8: Program 4 (International Woolmark Prize)	2015/16	2	0	0	2	0	0
	2013-2016 Strategic Plan - Strategy 9: Product Promotion	2015/16	2	0	0	2	0	0
CRDC	BT Technologies Investments: 2010 to 2018	2017/18	3	2	1	0	2	1
	myBMP Investments: 2012 to 2016	2017/18	3	3	1	1	3	1
	Nutrition Investments 2008-2016	2017/18	2	2	2	0	2	1
	Sustainability Investments: 2012 to 2017	2017/18	2	2	1	2	1	1
	Water Use Efficiency Investments 2011-2015	2017/18	2	2	1	0	2	2
Dairy Australia	Countdown Downunder program	2015/16	3	3	0	0	1	0
	Flexible Feeding Systems program	2015/16	2	2	0	0	1	0
	Flexible Future Forage Systems research program	2015/16	2	2	0	0	2	0
	Automatic Milking System component of the Future Dairy Program	2016/17	0	1	1	0	0	0
	Smarter Energy Use Program	2017/18	1	2	3	0	1	0
	Taking Stock Program	2017/18	2	3	2	0	2	1
FRDC	Abalone, YTK, oysters	2015/16	3	1	1	1	2	0
	Consumers, products and markets (part A)	2015/16	2	1	1	2	1	0
	Enhancement, nutrition and health	2015/16	2	1	2	1	1	0
	Genetics	2015/16	3	2	2	0	1	0
	Governance and Regulatory systems	2015/16	2	2	2	0	2	1
	Management	2015/16	3	2	1	1	2	0
	profitability	2015/16	2	1	1	1	1	0
	Resource access & allocation	2015/16	2	1	1	0	1	1
	systems & production	2015/16	2	2	2	1	1	1
	Project 2008-002: Targeting and CPUE definition in the SESSF trawl fishery	2017/18	0	0	1	0	0	0
	Project 2008-306: Building Economic Capability to Improve the Management of Marine Resources in Australia	2017/18	1	1	1	0	2	3

Project 2008-327: FRDC Agribusiness Scholarship	2017/18	2	2	1	1	2	3
Project 2009-303: Australasian Aquaculture 2010 to 2014	2017/18	1	1	2	1	1	2
Project 2009-710: Bioeconomic Evaluation of Commercial Scale Stock Enhancement in Abalone	2017/18	2	1	2	0	1	1
Project 2009-723.30 & 2013-714: An Analysis of Product Differentiation Opportunities and Establishing Improved Trade Access and Market Development for Australian Wild Caught Abalone in China	2017/18	3	2	1	3	3	1
Project 2010-200: The Innovative Development of the <i>Octopus tetricus</i> Fishery in Western Australia	2017/18	3	1	1	0	2	1
Project 2010-777: Analysis of the core leadership group and network structure of East Coast Trawl	2017/18	0	0	1	0	0	0
Project 2011-030: Evaluating Candidate Monitoring Strategies, Assessment Procedures and Harvest Control Rules in the Spatially Complex Queensland Coral Reef Fin Fish Fishery	2017/18	0	1	2	0	0	0
Project 2012-032: Pacific Oyster Mortality Syndrome (POMS) - Risk Mitigation, Epidemiology and OsHV-1 Biology	2017/18	2	1	3	0	1	1
Project 2012-047: Characterising benthic pelagic interactions in Macquarie Harbour	2017/18	2	0	1	0	2	1
Project 2012-058: Limiting impacts of the spread of urchins by rebuilding abalone populations	2017/18	0	0	1	0	0	0
Project 2012-225: Technical Reviews of Formal Harvest Strategies	2017/18	0	1	2	0	0	0
Project 2012-500.20: Common Language Group	2017/18	0	0	0	0	0	1
Project 2013-008: Movement, habitat utilisation and population status of the endangered Maugean skate	2017/18	2	1	1	1	3	1



Project 2013-053: Summer spawning patterns and preliminary Daily Egg Production Method survey of Jack Mackerel and Sardine	2017/18	1	0	1	0	1	0
Project 2013-753: A New Refrigeration System Reference Design and Demonstration Prototype	2017/18	3	3	1	0	2	1
Project 2014-030: Status of key Australian fish stocks (SAFS) reports 2014 and beyond	2017/18	0	2	1	0	1	0
Project 2014-714: Writing our History - The people and achievements of the Australian Seafood CRC	2017/18	0	0	1	0	0	0
Project 2015-406: Development of a National Pacific Oyster Mortality Syndrome (POMS) Response Plan	2017/18	1	0	0	0	1	1
Project 2011-042: TSGA IPA: clarifying the relationship between salmon farm nutrient loads and changes in macroalgal community structure/distribution (Existing Student Support)	2018/19	0	1	3	0	2	2
Project 2011-070: Comparative susceptibility and host responses of endemic fishes and salmonids affected by amoebic gill disease in Tasmania	2018/19	0	1	1	0	0	0
Project 2012-015: Improving confidence in the management of the Blue Swimmer Crab ( <i>Portunus armatus</i> ) in Shark Bay	2018/19	2	1	1	2	2	1
Project 2012-024: INFORMD2	2018/19	2	2	1	0	2	0
Project 2012-403: Development of the East Arnhem Fisheries Network Training Framework	2018/19	0	0	0	0	0	2
Project 2013-051: The Australian Aquatic Animal Health and Vaccine Centre: First Phase to Establish Atlantic Salmon Biosecure Fish Facility Capabilities and Develop Strategy for an Australian Centre of Excellence	2018/19	3	3	1	1	3	2
Project 2013-056: Revision of the Australian Shellfish Quality Assurance Program Manual - in light of the FRDC funded PST review	2018/19	1	1	0	1	2	1
Project 2014-001: Aquatic Animal Health Subprogram: Strategic approaches to identifying	2018/19	0	1	3	0	0	0

	pathogens of quarantine concern associated with the importation of ornamental fish							
	Project 2014-012: Tasmania's coastal reefs: deep reef habitats and significance for finfish production and biodiversity	2018/19	0	0	1	0	0	1
	Project 2014-036: First Implementation of an independent observer program for the Charter Boat Industry of NSW: data for industry-driven resource sustainability	2018/19	0	2	1	0	2	1
	Project 2014-204: Implications of current spatial management measures for AFMA ERAs for habitats	2018/19	1	2	1	0	1	0
	Project 2014-301: Social and economic evaluation of NSW Coastal Commercial Wild-Catch Fisheries	2018/19	1	1	1	0	1	2
	Project 2014-729: Improving the palatability, bioavailability and efficacy of orally administered praziquantel for yellowtail kingfish with lipid nanoparticles and hybrid lipid carrier systems	2018/19	0	0	1	0	0	0
	Project 2015-044: The development of a mobile application for the Aquatic animal diseases significant to Australia: Identification field guide	2018/19	0	2	0	0	1	0
	Project 2015-232: Australian Seafood Industries Pacific Oyster Mortality Syndrome (POMS) investigation into the 2016 disease outbreak in Tasmania - ASI emergency response	2018/19	2	2	0	0	3	1
	Project 2016-057: Workshop to identify research needs and a future project to reduce bycatch and improve fuel efficiency via Low Impact Fuel Efficient (LIFE) prawn trawls	2018/19	2	2	1	0	1	1
	Project 2016-228: Phase 1: Traceability Systems for Wild Caught Lobster, Via Sense-T and Pathways to Market	2018/19	1	1	3	2	0	0
	Project 2016-266: A Plan for the Australian Prawn Farming Industry's Initial Response to the White Spot Disease Incident in Summer 2016-17	2018/19	1	1	1	0	1	0
	Project 2016-411: Skills and Capability Building Priorities	2018/19	0	1	0	0	2	2

	Project 2016-501: Seafood with ET	2018/19	2	0	0	0	1	0
FWPA	construction practices	2013/14	3	2	1	1	3	0
	Molecular breeding	2013/14	2	2	2	0	2	0
	recycled products	2013/14	1	1	2	1	3	1
	Generic Marketing	2015/16	0	0	0	0	0	0
	Cant-Opti	2016/17	1	2	0	1	3	0
	case studies	2016/17	1	0	1	1	1	0
	e-Cambium	2016/17	1	2	1	1	2	0
	LiDAR	2016/17	1	3	3	0	3	0
GRDC	ACPFQ	2013/14	2	3	3	1	1	1
	Dual Purpose Wheat Breeding	2013/14	1	1	1	0	1	0
	FACE	2013/14	1	2	2	0	1	0
	Water Use Efficiency	2013/14	2	1	1	0	2	0
	Peanut Breeding	2014/15	2	2	3	2	1	0
	MCVP ph. 2,3 & 4	2014/15	3	2	1	1	2	0
	National Mungbean improvement Program 2004-2016	2014/15	3	2	1	1	3	0
	Soil Biology Initiative II	2014/15	2	3	1	1	1	0
	Triticale Breeding	2014/15	1	1	2	1	1	0
	Australian Cereal Rust Control Program	2015/16	3	2	1	0	3	0
	Soybean Breeding	2015/16	2	2	2	0	1	0
	Canola Investments Completed between 2013/14 and 2017/18	2017/18	2	2	1	0	3	0
	Chickpea Investments Completed between 2014/14 and 2017/18	2017/18	2	2	1	0	2	0
	Improved management of slug and snails	2017/18	3	2	0	0	3	0
	Lupin Breeding for Australia	2017/18	2	2	1	0	2	0
	Measuring and managing soil water in Australian Agriculture	2017/18	2	3	1	0	3	0
Northern region high yielding cereal agronomy - NSW	2017/18	2	3	0	0	3	0	

	PBA Australian Faba Bean Breeding Program	2017/18	2	2	1	0	2	0
	PBA New Chemistry options for wild radish control summary	2017/18	3	2	1	0	3	0
	Soils under an irrigated environment (1)	2017/18	2	2	0	0	3	0
	Soils under an irrigated environment (2)	2017/18	3	1	0	0	2	0
	Chickpea Breeding (2001 - 2018)	2018/19	3	2	1	0	3	0
Hort Innovation	Vegetable industry export development program	2016/17	2	1	0	3	0	0
	VG Levy: Assist Growers to Capture more Value	2016/17	3	1	0	3	3	0
	VG Levy: Commercial Marketing Training for Growers	2016/17	2	1	0	3	2	0
	VG Levy: Cost Management	2016/17	1	1	0	0	1	0
	VG Levy: New Products, New Uses, New Markets	2016/17	3	2	0	3	2	0
	VG Levy: Plant Health and Crop Protection	2016/17	3	1	1	0	3	0
	VG Levy: Skills and Training	2016/17	1	2	1	0	2	2
	VG Levy: Transformational R&D	2016/17	2	3	1	1	2	0
	VG Levy: Understanding the consumer	2016/17	2	1	0	0	1	0
LiveCorp	Livestock Exports	2015/16	2	1	0	3	3	0
MLA	Genetics and Genomics	2014/15	1	2	2	0	0	0
	Animal Health	2015/16	2	2	1	0	2	0
	Animal Welfare (l)	2015/16	1	1	1	1	2	0
	Eating Quality	2015/16	3	1	1	0	3	0
	Feedlots	2015/16	3	2	1	0	2	0
	Goat Industry	2015/16	3	1	0	0	1	0
	Market Access Program (updated from Sep-2014)	2015/16	3	1	0	3	3	0
	Market Information	2015/16	3	3	1	0	2	0
	New Products	2015/16	2	3	1	0	1	0
	Off-farm Environment	2015/16	0	1	1	1	1	1
	Off-farm Productivity (k)	2015/16	1	2	3	0	2	0
	On-farm Environment	2015/16	1	1	0	0	2	0

	On-farm Productivity	2015/16	3	2	1	0	1	0
	Product Integrity	2015/16	3	2	1	3	2	0
SRA	Best Practice IWM	2014/15	2	1	1	1	2	0
	Biomass Accumulation	2014/15	0	1	1	0	0	0
	Harvesting Best Practice	2014/15	3	2	1	1	3	0
	NFS: appropriate nutrient management	2014/15	2	1	1	0	1	0
	Climate forecasting to improve nitrogen management	2015/16	1	1	0	0	2	0
	Exotic threats	2015/16	1	2	1	1	2	0
	Precision Agriculture	2015/16	2	1	1	1	2	1
	Remote sensing for canegrub management	2015/16	1	1	0	0	1	0
	Solving the Yellow Canopy Syndrome	2015/16	2	2	0	1	2	0
	Utilising Total Biomass	2015/16	0	1	1	0	0	0
	Development and testing of an SNP marker platform in sugarcane	2017/18	1	2	1	0	1	0
	Implementing a framework for farmers to engage in the use of Precision Technologies	2017/18	0	0	1	0	0	0
	Maximising the rate of parental improvement in the Australian sugarcane breeding program	2017/18	2	2	1	0	1	0
	New germplasm to develop more productive varieties with enhanced resistance to nematodes, Pachymetra root rot and smut	2017/18	2	3	1	0	2	1
	Rapid detection of Ratoon Stunting Disease	2017/18	0	1	1	0	0	0
	Advancing yield, disease resistance and ratooning by exploiting new sources of genetic variability from wild relatives of sugarcane	2018/19	2	3	1	0	1	0
	Developing cytogenetic and molecular tools to improve selection for soil borne pathogen resistance in wild hybrids	2018/19	2	1	1	0	1	0
	Innovative approaches to identifying the cause of chlorotic streak and new management strategies	2018/19	2	2	1	0	2	0
	Maximising genetic gain from family selection	2018/19	2	2	1	0	1	0

	Optimising productivity and variety recommendation through analysis of mill data	2018/19	2	2	1	0	2	0
Wine Australia	Grapes & Wine - Yeasts	2013/14	3	3	1	1	2	0
	Wine - Microbiology	2013/14	3	2	1	1	1	0
	Flavour	2015/16	2	2	1	0	0	0
	Nutrition	2015/16	2	2	1	0	0	0
	Refrigeration	2015/16	2	2	1	0	0	0
	Trunk disease	2015/16	2	2	1	0	0	0
	Enhanced Varieties and Clones for a more Variable Climate and the Production of Lower Alcohol Wines	2016/17	1	1	1	0	1	0
	Leadership Development in the Wine Industry (Future Leaders)	2016/17	1	1	1	0	1	3
	Lean	2016/17	2	2	1	0	2	0
	Powdery Mildew Assessment	2016/17	2	2	2	0	1	0
	The Wine Flavours Card	2016/17	1	1	1	2	2	0
	Market Access, Safety, Regulatory and Technical Trade Issues	2017/18	1	0	0	2	0	0
	Phylloxera Sampling Strategies	2017/18	2	2	3	0	2	1
	Root Zone Salinity and Sub-Surface Drive Irrigation Techniques	2017/18	1	1	1	0	1	0
	The Removal of Lees from Underneath Wine	2017/18	1	0	1	0	0	0
The Staging and conduct of extension programs	2017/18	2	1	1	1	2	0	

## Appendix 4: Record of the 288 RDC RD&E Evaluations Submitted as part of the 2016 Cross-RDC Impact Assessment Process (cross-RDC analysis for the six-year period 1 July 2009 to 30 June 2015)

Records highlighted in green indicate where an evaluation from the 2016 Cross-RDC Impact Assessment population was considered for inclusion in the 2019 Cross-RDC Impact Assessment population (analysis for the period 1 July 2013 to 30 September 2018).

RDC Name	Name/Title of RD&E Investment (Project Cluster)	Financial Year Submitted	Selection Method (R, S, NS)	Analyst(s)	Total Nominal Investment (\$m)	RDC Nominal Investment (\$m)
AECL	Laying Hen Welfare	2010/11	R	AgEconPlus	4.13	1.77
AECL	Environment	2010/11	R	AgEconPlus	1.41	0.71
AECL	Flock Health	2011/12	R	AgEconPlus	0.13	0.13
AECL	Sex Determination	2012/13	R	AgEconPlus	4.82	2.48
AECL	Farm Euthanasia	2012/13	R	AgEconPlus	0.20	0.07
AECL	Egg Washing	2012/13	R	AgEconPlus	0.47	0.24
AECL	Energy Usage and Efficiency	2014/15	R	AgEconPlus	0.07	0.07
AECL	Human Health and Nutrition	2014/15	R	AgEconPlus	2.03	0.91
APL	PigBal model - Stage 2	2014/15	NS	Unknown	0.39	0.14
APL	Spent Eco-shelter bedding	2014/15	NS	Unknown	0.14	0.13
APL	Lysine requirements	2014/15	NS	Unknown	0.13	0.01
APL	Physi-Trace	2014/15	NS	Unknown	0.25	0.15
APL	Stock Handling (not in summary)	2014/15	NS	Unknown	0.30	0.16
APL	benchmarking pig welfare	2014/15	NS	Unknown	0.05	0.02
APL	Animal Health Emergencies	2014/15	NS	Unknown	0.06	0.03
APL	PRRS virus	2014/15	NS	Unknown	0.07	0.07
APL	Concept plan audit frequency for meat	2014/15	NS	Unknown	0.01	0.01
APL	selection criteria	2014/15	NS	Unknown	0.66	0.25
APL	Review of APIQ Free Range Standards	2014/15	NS	Unknown	0.07	0.07
APL	Group Demonstration Award (GDA) - Lactation Pens	2014/15	NS	Unknown	0.12	0.02
APL	Target 25	2010/11	R	IDA economics	0.61	0.50

APL	Chilling systems	2010/11	R	IDA economics	0.20	0.20
APL	ProHand	2010/11	R	IDA economics	0.31	0.14
APL	NCPITE	2010/11	R	IDA economics	0.40	0.21
APL	AUSPIG support	2010/11	R	IDA economics	0.11	0.11
APL	Physi-Trace III	2010/11	R	IDA economics	0.25	0.24
APL	Value chain mapping	2010/11	R	IDA economics	0.13	0.10
APL	Studying animal welfare	2010/11	R	IDA economics	0.41	0.18
APL	Group housing during gestation	2010/11	R	IDA economics	3.03	1.10
APL	PigPass NVD	2010/11	R	IDA economics	5.73	0.99
APL	NEGP	2010/11	R	IDA economics	0.11	0.11
APL	Compliance	2010/11	R	IDA economics	0.16	0.16
APL	Life cycle analyses	2010/11	R	IDA economics	0.07	0.01
APL	PCR tests for M. Hyponeumonia	2010/11	R	IDA economics	0.50	0.18
APL	Bungowannah virus	2010/11	R	IDA economics	0.58	0.06
APL	Project muscle: APL 2200	2009/10	S	IDA economics	0.11	0.11
APL	PigPass Physi-trace	2009/10	S	IDA economics	0.60	0.60
APL	Myocarditis	2009/10	S	IDA economics	1.38	0.53
APL	Food Safety	2009/10	S	IDA economics	0.21	0.16
APL	Postgrad scholarship	2015/16	S	IDA economics	0.40	0.05
APL	Welfare indices	2015/16	S	IDA economics	0.22	0.11
APL	Porcine epidemic	2015/16	S	IDA economics	0.04	0.04
APL	Dietary requirements	2015/16	S	IDA economics	0.15	0.07
APL	Finisher performance	2015/16	S	IDA economics	0.20	0.05
APL	education resources	2015/16	S	IDA economics	0.03	0.03
APL	Nutrient mapping	2015/16	S	IDA economics	0.04	0.04
APL	Environmental BMP resources	2015/16	S	IDA economics	0.07	0.07
APL	data collection	2015/16	S	IDA economics	0.25	0.11
APL	Review of standards	2015/16	S	IDA economics	0.07	0.07
APL	Development of guidelines	2015/16	S	IDA economics	0.43	0.29



APL	Sludge Management	2015/16	S	IDA economics	0.09	0.09
APL	Toxoplasmosis	2015/16	S	IDA economics	0.04	0.04
APL	Export benchmarks	2015/16	S	IDA economics	0.36	0.21
APL	Physi-trace implementation	2015/16	S	IDA economics	0.22	0.22
AWI	On-farm - Evergraze (m)	2012/13	R	BDA Group	5.03	1.35
AWI	On-farm - Wild Dog	2012/13	R	BDA Group	8.60	3.00
AWI	On-farm - Lifetime Ewe	2012/13	R	BDA Group	0.60	0.42
AWI	On-farm - Extension Networks	2012/13	R	BDA Group	11.10	3.53
AWI	Off-farm - Merino Touch	2012/13	R	BDA Group	2.00	2.00
AWI	On-farm - Shearer Training	2014/15	R	BDA Group	2.10	2.10
AWI	On-farm - Genetics, Genomics	2014/15	R	BDA Group	3.62	3.62
AWRI	Wine - Problem Solving Capability	2011/12	S	EconSearch	8.64	8.59
AWRI	Wine - Microbiology	2013/14	S	EconSearch	16.11	13.19
CRDC	Cotton Catchment Communities CRC	2011/12	NS	David Vere & Fiona Scott	n/a	n/a
CRDC	WINCOTT	2007/08	R	BDA group	0.08	0.08
CRDC	Soils research	2007/08	R	BDA group	4.50	4.50
CRDC	Fibre Classification	2007/08	R	BDA group	n/a	2.00
CRDC	Water Use	2009/10	R	BDA group	4.90	1.70
CRDC	Extension team	2009/10	R	BDA group	5.96	2.37
CRDC	Fibre Quality	2009/10	R	BDA group	1.92	0.77
Dairy Australia	Cowtime Extension	2009/10	R	BDA Group	0.67	0.43
Dairy Australia	Systems Management	2009/10	R	BDA Group	12.29	2.87
Dairy Australia	NCDEA	2009/10	R	BDA Group	6.48	1.58
Dairy Australia	Grains2Milk	2010/11	R	BDA Group	6.32	4.00
Dairy Australia	Dairy Innovation Australia	2010/11	R	BDA Group	32.40	9.30

Dairy Australia	Plant Breeding	2010/11	R	BDA Group	n/a	2.70
Dairy Australia	Future Decision Support	2010/11	R	BDA Group	n/a	1.40
Dairy Australia	MAADI	2011/12	R	BDA Group	8.65	3.41
FRDC	Diet Development	2009/10	R	Agtrans Research	7.95	2.04
FRDC	Abalone Aquaculture	2009/10	R	Agtrans Research	4.02	1.66
FRDC	SBT aquaculture	2009/10	R	Agtrans Research	19.41	6.70
FRDC	Salmon aquaculture	2009/10	R	Agtrans Research	10.11	4.26
FRDC	Environ. Impacts	2009/10	R	Agtrans Research	9.02	3.25
FRDC	Ecologically sustainable development	2009/10	R	Agtrans Research	5.86	2.71
FRDC	MPAs and spatial	2009/10	R	Agtrans Research	1.65	0.48
FRDC	animal health and pests	2009/10	R	Agtrans Research	5.78	1.82
FRDC	Enhancing wild catch fisheries	2009/10	R	Agtrans Research	9.81	3.84
FRDC	aquaculture technology - environmental	2009/10	R	Agtrans Research	3.05	1.02
FRDC	Food safety	2009/10	R	Agtrans Research	5.04	2.57
FRDC	Market development & trade access	2009/10	R	Agtrans Research	13.08	5.73
FRDC	Workplace Health and Safety	2009/10	R	Agtrans Research	0.45	0.27
FRDC	workshops and conferences	2009/10	R	Agtrans Research	1.98	0.45
FRDC	Strategic planning	2009/10	R	Agtrans Research	2.91	1.32
FRDC	Population dynamics - AFMA	2009/10	R	Agtrans Research	15.89	8.20
FRDC	Population dynamics - Tropical	2009/10	R	Agtrans Research	10.28	3.99
FRDC	Population dynamics - NSW	2009/10	R	Agtrans Research	3.30	1.28
FRDC	Biosecurity and health (Salmon and SBT)	2012/13	R	Agtrans Research	9.42	3.46
FRDC	Habitat and Ecosystem protection (A)	2012/13	R	Agtrans Research	27.75	10.11
FRDC	Habitat and Ecosystem protection (B)	2012/13	R	Agtrans Research	9.76	3.77
FRDC	Leadership development	2012/13	R	Agtrans Research	8.24	3.88
FRDC	Workforce development	2012/13	R	Agtrans Research	2.86	0.98
FRDC	Innovation skills (part A)	2012/13	R	Agtrans Research	3.05	0.89

FRDC	Innovation skills (part B)	2012/13	R	Agtrans Research	0.85	0.37
FRDC	Extension and Adoption	2012/13	R	Agtrans Research	2.86	1.38
FRDC	Abalone, YTK, oysters	2015/16	R	Agtrans Research	4.38	2.11
FRDC	Management	2015/16	R	Agtrans Research	26.63	12.96
FRDC	Governance and Regulatory systems	2015/16	R	Agtrans Research	15.19	5.75
FRDC	Resource access & allocation	2015/16	R	Agtrans Research	3.72	2.05
FRDC	Enhancement, nutrition and health	2015/16	R	Agtrans Research	12.61	4.99
FRDC	Genetics	2015/16	R	Agtrans Research	17.97	5.33
FRDC	systems & production	2015/16	R	Agtrans Research	44.18	14.42
FRDC	profitability	2015/16	R	Agtrans Research	3.97	2.48
FRDC	Consumers, products and markets (part A)	2015/16	R	Agtrans Research	8.77	4.37
FWPA	exotic pine plantations	2011/12	R	URS	0.73	0.34
FWPA	myrtle rust	2011/12	R	URS	0.04	0.02
FWPA	MOE & MOR assessments	2011/12	R	URS	0.45	0.24
FWPA	quality tests	2011/12	R	URS	0.04	0.03
FWPA	roof environments	2011/12	R	URS	1.68	0.60
FWPA	sound resistance	2011/12	R	URS	0.58	0.28
FWPA	On board computers	2012/13	R	Ross McLeod	0.72	0.35
FWPA	Preservative treatment	2012/13	R	Ross McLeod	0.05	0.02
FWPA	Formaldehyde	2012/13	R	Ross McLeod	0.37	0.18
FWPA	construction practices	2013/14	R	Ross McLeod	0.50	0.35
FWPA	recycled products	2013/14	R	Ross McLeod	0.20	0.07
FWPA	Molecular breeding	2013/14	R	Ross McLeod	0.10	0.03
FWPA	Generic Marketing	2015/16	S	CIE		
FWPA	LiDAR	2016/17	R	CIE	1.05	0.17
FWPA	e-Cambium	2016/17	R	CIE	0.77	0.31
FWPA	case studies	2016/17	R	CIE	0.27	0.16
FWPA	Cant-Opti	2016/17	R	CIE	0.40	
GRDC	Capacity building	2009/10	R	Agtrans Research	1.46	0.71

GRDC	Grain Storage	2009/10	R	Agtrans Research	12.51	4.58
GRDC	Managing Mycotoxins in Maize	2009/10	R	Agtrans Research	1.05	0.32
GRDC	Premium Grains	2009/10	R	Agtrans Research	17.82	8.49
GRDC	Molecular Markers	2009/10	R	Agtrans Research	27.31	11.97
GRDC	Oilseeds Breeding	2009/10	R	Agtrans Research	38.75	11.45
GRDC	Crop Nutrition	2009/10	R	Agtrans Research	22.88	9.56
GRDC	Weeds	2009/10	R	Agtrans Research	31.12	13.17
GRDC	National Invertebrate Pest Initiative	2010/11	R	Agtrans Research & Barry White	4.19	2.39
GRDC	Future Farm Industries	2010/11	R	Agtrans Research	22.81	6.58
GRDC	Harrington Seed Destructor	2010/11	R	Agtrans Research	2.71	2.54
GRDC	Grain Research Updates	2010/11	R	Agtrans Research	2.42	1.74
GRDC	Minor Use Chemicals	2010/11	R	Agtrans Research & Barry White	1.94	1.29
GRDC	National Variety Trials	2010/11	R	Agtrans Research & Barry White	17.30	17.30
GRDC	WVCS	2010/11	R	Agtrans Research	1.94	1.94
GRDC	Scholarships	2011/12	R	Agtrans Research	2.21	2.21
GRDC	MPCN II	2012/13	R	Agtrans Research	46.09	17.92
GRDC	Sorghum pre-breeding	2012/13	R	Agtrans Research	25.50	8.07
GRDC	ACPFG	2013/14	R	Agtrans Research & Tracy Henderson	119.76	22.37
GRDC	Dual Purpose Wheat Breeding	2013/14	R	Agtrans Research	3.04	1.95
GRDC	FACE	2013/14	R	Agtrans Research and Mary Ann Franco-Dixon	14.66	4.70
GRDC	Water Use Efficiency	2013/14	R	Agtrans Research	21.99	11.22
GRDC	Agronomy	2009/10	S	Agtrans Research	11.83	4.03
GRDC	Summer Coarse Grains Breeding	2009/10	S	Agtrans Research	9.25	3.65
GRDC	Wheat Breeding	2009/10	S	Agtrans Research	45.01	13.10
GRDC	Soil Biology (Themes 1-3)	2009/10	S	Agtrans Research	16.63	8.50

GRDC	National Mungbean improvement Program	2010/11	S	Agtrans Research	4.72	1.88
GRDC	Lupin Breeding	2011/12	S	Agtrans Research	15.96	6.13
GRDC	Partners in Grain	2011/12	S	Agtrans Research	2.37	0.99
GRDC	Barley Breeding Australia	2012/13	S	Agtrans Research	15.80	6.44
GRDC	National Chickpea Breeding Program	2012/13	S	Agtrans Research	35.59	21.65
GRDC	Climate Champion Program	2012/13	S	Agtrans Research	1.10	0.56
GRDC	Lentil Breeding program	2012/13	S	Agtrans Research	16.00	7.85
GRDC	MCVP ph. 2 & 3	2012/13	S	Agtrans Research, Barry White	14.43	8.17
GRDC	Soil Biology Initiative II	2014/15	S	Agtrans Research	17.88	9.12
GRDC	MCVP ph. 2,3 & 4	2014/15	S	Agtrans Research, Barry White	20.20	11.36
GRDC	National Mungbean improvement Program 2004-2016	2014/15	S	Agtrans Research	8.48	3.45
GRDC	Triticale Breeding	2014/15	S	Agtrans Research & AgEconPlus	8.64	2.95
GWRDC	Vine Physiology - Nutrient Management	2009/10	R	EconSearch	0.43	0.15
GWRDC	Vine Health - Powdery Mildew	2010/11	R	EconSearch	2.57	1.53
GWRDC	Vine Health - Other Disease	2010/11	R	EconSearch	1.41	0.73
GWRDC	Grapes & Wine - Yeasts	2012/13	R	EconSearch	19.56	15.40
GWRDC	Grapes & Wine - Wastewater Management	2012/13	R	EconSearch	2.35	2.35
HAL	Onion - Market and Supply chain	2009/10	R	AgEconPlus	0.74	0.56
HAL	Onion - Extension and Communication	2009/10	R	AgEconPlus	0.56	0.56
HAL	Citrus - Biosecurity and Market Access	2009/10	R	AgEconPlus	11.84	5.86
HAL	Citrus - Breeding and Biotechnology	2009/10	R	AgEconPlus	12.05	4.94
HAL	Citrus - Crop Production	2009/10	R	AgEconPlus	1.89	0.85
HAL	Citrus - Plant Health	2009/10	R	AgEconPlus	8.11	8.11
HAL	Citrus - Postharvest and Quality	2009/10	R	AgEconPlus	3.91	3.91
HAL	Macadamia - Varietal Improvement	2010/11	R	AgEconPlus	6.23	4.00
HAL	Macadamia - Technology	2010/11	R	AgEconPlus	1.16	1.07
HAL	Macadamia - Crop Protection	2010/11	R	AgEconPlus	3.39	2.16

HAL	Macadamia - Produce Handling and Quality	2010/11	R	AgEconPlus	4.23	1.53
HAL	Macadamia - Market Research	2010/11	R	AgEconPlus	0.59	0.59
HAL	Almond - Biosecurity and Market Access	2010/11	R	AgEconPlus	0.68	0.63
HAL	Almond - Environment	2010/11	R	AgEconPlus	2.00	2.00
HAL	Almond - Industry Development	2010/11	R	AgEconPlus	2.13	2.13
HAL	Table Grapes - Consumer Research and Market Analysis	2010/11	R	AgEconPlus	0.18	0.14
HAL	Table Grapes - Biosecurity and Market Access	2010/11	R	AgEconPlus	2.96	1.05
HAL	Table Grapes - Industry Development Services	2010/11	R	AgEconPlus	0.81	0.40
HAL	Table Grapes - Plant Health	2010/11	R	AgEconPlus	0.97	0.71
HAL	Dried Fruit - Crop Production (grape, prune, apricot)	2010/11	R	AgEconPlus	3.06	1.51
HAL	Dried Fruit - Breeding and Biotech (grape, prune, apricot)	2010/11	R	AgEconPlus	6.77	2.89
HAL	Dried Fruit - Industry Development (grape, prune, apricot)	2010/11	R	AgEconPlus	1.64	0.90
HAL	Mushroom - Human Health and Nutrition	2010/11	R	AgEconPlus	4.40	4.40
HAL	Mushroom - Communication and Extension	2010/11	R	AgEconPlus	2.22	2.22
HAL	Mushroom - Human Health	2010/11	R	AgEconPlus	2.53	2.53
HAL	Banana - Breeding and Biotechnology	2011/12	R	AgEconPlus	4.46	1.33
HAL	Banana - Crop Production and Environment	2011/12	R	AgEconPlus	4.70	1.97
HAL	Banana - Post harvest, QA and Food Safety	2011/12	R	AgEconPlus	0.55	0.37
HAL	Banana - Biosecurity and Market Access	2011/12	R	AgEconPlus	1.95	1.67
HAL	Custard Apple - New tree training system	2011/12	R	AgEconPlus	0.02	0.01
HAL	Chestnut - Nut rot biology and management	2011/12	R	AgEconPlus	0.10	0.05
HAL	Papaya - Genetic improvement	2011/12	R	AgEconPlus	0.15	0.09
HAL	Persimmon - irradiation for market access	2011/12	R	AgEconPlus	0.11	0.03
HAL	Pineapple - phytophthora management	2011/12	R	AgEconPlus	0.50	0.19
HAL	Passionfruit - genetic improvement for disease	2011/12	R	AgEconPlus	0.64	0.26
HAL	Summerfruit - Breeding and biotechnology	2011/12	R	AgEconPlus	3.63	1.65
HAL	Summerfruit - Plant Health	2011/12	R	AgEconPlus	6.24	3.42
HAL	Summerfruit - Post harvest and QA	2011/12	R	AgEconPlus	5.26	3.96
HAL	Summerfruit - Industry development	2011/12	R	AgEconPlus	1.16	0.85

HAL	Lychee - Plant Health	2011/12	R	AgEconPlus	1.46	0.43
HAL	Cherry - Quality, Market Development & Workplace Safety	2011/12	R	AgEconPlus	0.42	0.42
HAL	Apple - Biosecurity and Market Access	2012/13	R	AgEconPlus	31.30	23.83
HAL	Apple - Breeding and Biotechnology	2012/13	R	AgEconPlus	17.33	10.73
HAL	Apple - Plant Health	2012/13	R	AgEconPlus	5.70	2.34
HAL	Apple - Crop Production and Environment	2012/13	R	AgEconPlus	4.86	2.36
HAL	Apple - Market Development	2012/13	R	AgEconPlus	2.45	2.45
HAL	Mango - Industry Development	2012/13	R	AgEconPlus	1.18	1.18
HAL	Strawberry - Breeding and Biotechnology	2012/13	R	AgEconPlus	17.94	9.84
MLA	New Products	2011/12	R	GHD	18.74	18.74
MLA	Eating Quality	2012/13	R	CIE	463.80	108.70
MLA	Market Access	2014/15	R	CIE	29.74	29.74
MLA	Genetics and Genomics	2014/15	R	IDA Economics	173.64	48.91
MLA	Product Integrity	2015/16	R	CIE	48.77	47.47
MLA	Market Access	2015/16	R	CIE	36.26	36.26
MLA	Livestock Exports (j)	2015/16	R	CIE	42.10	42.10
MLA	Eating Quality	2015/16	R	CIE	47.14	44.21
MLA	New Products	2015/16	R	CIE	18.55	9.98
MLA	Export Beef Marketing	2015/16	R	CIE	117.86	116.56
MLA	Export Sheepmeat Marketing	2015/16	R	CIE	38.32	38.11
MLA	On-farm Productivity	2015/16	R	CIE	113.39	94.02
MLA	Off-farm Productivity (k)	2015/16	R	CIE	59.60	9.40
MLA	Market Information	2015/16	R	CIE	34.70	34.18
MLA	Animal Health	2015/16	R	CIE	36.93	25.78
MLA	Feedlots	2015/16	R	CIE	22.75	20.73
MLA	Goat Industry	2015/16	R	CIE	2.59	2.59
MLA	On-farm Environment	2015/16	R	CIE	56.97	56.97
MLA	Off-farm Environment	2015/16	R	CIE	13.74	7.67
MLA	Animal Welfare (l)	2015/16	R	CIE	14.44	11.90

RIRDC	Ethical Foods	2009/10	R	Agtrans Research	0.85	0.85
RIRDC	Transparency	2009/10	R	Agtrans Research	0.10	0.10
RIRDC	Transport/neutrality	2009/10	R	Agtrans Research	0.10	0.10
RIRDC	Tea Tree - SCCP	2010/11	R	Agtrans Research	0.29	0.23
RIRDC	Tea Tree - Breeding & Cloning	2010/11	R	Agtrans Research	1.11	0.64
RIRDC	Tea Tree - Biofilm	2010/11	R	Agtrans Research	0.13	0.12
RIRDC	Horse and Rider Health and Safety	2010/11	R	Agtrans Research	0.38	0.17
RIRDC	Rhodococcus equi	2010/11	R	Agtrans Research	0.23	0.17
RIRDC	Equine Amnionitis and Foetal Loss	2010/11	R	Agtrans Research	0.42	0.06
RIRDC	Agave	2011/12	R	Agtrans Research	0.75	0.22
RIRDC	Bioenergy	2011/12	R	Agtrans Research	0.56	0.56
RIRDC	SSF - Future Directions	2011/12	R	Agtrans Research	0.25	0.20
RIRDC	Child Safety	2011/12	R	Agtrans Research	0.09	0.09
RIRDC	Farm Safety Studies	2011/12	R	Agtrans Research	0.51	0.24
RIRDC	Chalkbrood control	2011/12	R	Agtrans Research	0.64	0.15
RIRDC	Tasmanian floral database	2011/12	R	Agtrans Research	0.04	0.04
RIRDC	Simulation Exercise	2011/12	R	Agtrans Research	0.11	0.03
RIRDC	Methane Recovery	2011/12	R	Agtrans Research	3.66	0.85
RIRDC	Essential Oils	2012/13	R	Agtrans Research	4.95	1.68
RIRDC	Pasture Seeds	2012/13	R	Agtrans Research	3.46	1.34
RIRDC	Fodder Crops	2013/14	R	Agtrans Research	4.30	0.94
RIRDC	Global Challenges	2013/14	R	Agtrans Research	2.60	1.97
RIRDC	Wildflowers & native plants	2013/14	R	Agtrans research	3.62	1.18
RIRDC	Horses (2015)	2014/15	R	Agtrans Research	9.08	2.60
RIRDC	Rice (Varietal Improvement)	2010/11	S	Agtrans Research	12.75	5.91
SRA	Precision Agriculture	2014/15	R	Agtrans Research	3.08	2.65
SRA	Exotic threats	2014/15	R	Agtrans Research	1.74	1.65
SRA	Biomass Accumulation	2014/15	R	Agtrans Research	0.29	0.28
SRA	Harvesting Best Practice	2014/15	R	Agtrans Research	0.51	0.45



SRA	NFS: appropriate nutrient management	2014/15	R	Agtrans Research	2.81	2.76
SRA	Best Practice IWM	2014/15	R	Agtrans Research	0.78	0.73
SRA	Climate forecasting to improve nitrogen management	2015/16	R	Agtrans Research	0.37	0.37
SRA	Remote sensing for canegrub management	2015/16	R	Agtrans Research	1.14	1.14
SRA	Solving the Yellow Canopy Syndrome	2015/16	R	Agtrans Research	0.76	0.76
SRA	Utilising Total Biomass	2015/16	R	Agtrans Research	3.23	2.75
SRDC	Value Chain	2010/11	R	Agtrans Research	9.22	3.87
SRDC	Value adding	2010/11	R	Agtrans Research	1.26	0.72
SRDC	Rotation crops	2010/11	R	Agtrans Research	0.59	0.39
SRDC	Disease management	2010/11	R	Agtrans Research	2.12	0.96
SRDC	Climate variability and climate change	2011/12	R	Agtrans Research	0.91	0.37
SRDC	Integrated farming systems to improve productivity	2011/12	R	Agtrans Research	19.65	5.13
SRDC	Soil Resources and Nutrients	2011/12	R	Agtrans Research	3.50	1.54
SRDC	Water sustainability	2011/12	R	Agtrans Research	2.87	1.08
SRDC	Improved capability for leadership	2012/13	R	Agtrans Research	0.79	0.52
SRDC	Enhancing cost-efficiency in milling systems: Juice extraction and whole of system	2012/13	R	Agtrans Research	1.17	0.55
SRDC	Enhancing cost-efficiency in milling systems: Juice processing	2012/13	R	Agtrans Research	1.97	1.12
SRDC	Diagnostic technologies for genetic screening	2012/13	R	Agtrans Research	2.81	1.28