



# Project Evaluation

## Carbon Farming in the Australian Cotton Industry

March 2017

Coutts J&R



**Australian Government**  
**Cotton Research and  
Development Corporation**

# ACKNOWLEDGEMENTS

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This review was made possible because of the excellent monitoring and evaluation data captured by the project team over the life of the project and the willingness of industry informants to share of their experiences and insights into the project and its activities. Jon Welsh, the project leader, provided excellent information support and contacts for industry consultation.

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**March 2017**

# SUMMARY STATEMENT

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## About the project

The Carbon Farming in the Australian Cotton Industry project was primarily focused on integrating the latest information on carbon, climate change and greenhouse gas (GHG) emissions management into the cotton industry's extension efforts. It approached this primarily through a collaborative strategy of upskilling project staff who in-turn engaged in developing the capacity of industry advisers.

Underpinning this was an industry communication and engagement strategy to build awareness amongst growers of issues, opportunities and options. The change logic of this approach is shown in Chart 1 on the following page.

**This review demonstrates that the *Carbon Farming in the Australian Cotton Industry* project has been effective in achieving its primary objectives. It shows the value of an integrated and collaborative approach and the importance of upskilling professionals servicing the industry.**

There is now an opportunity to build on the positive gains that have been made and grow the Cotton Industry's position in carbon, climate and related management areas.

There is strong evidence that **the project has increased adviser understanding** (particularly in the areas of seasonal forecasting, nitrogen efficiency and energy use) **which has translated to increased grower understanding** as a result of the communication and engagement activities.

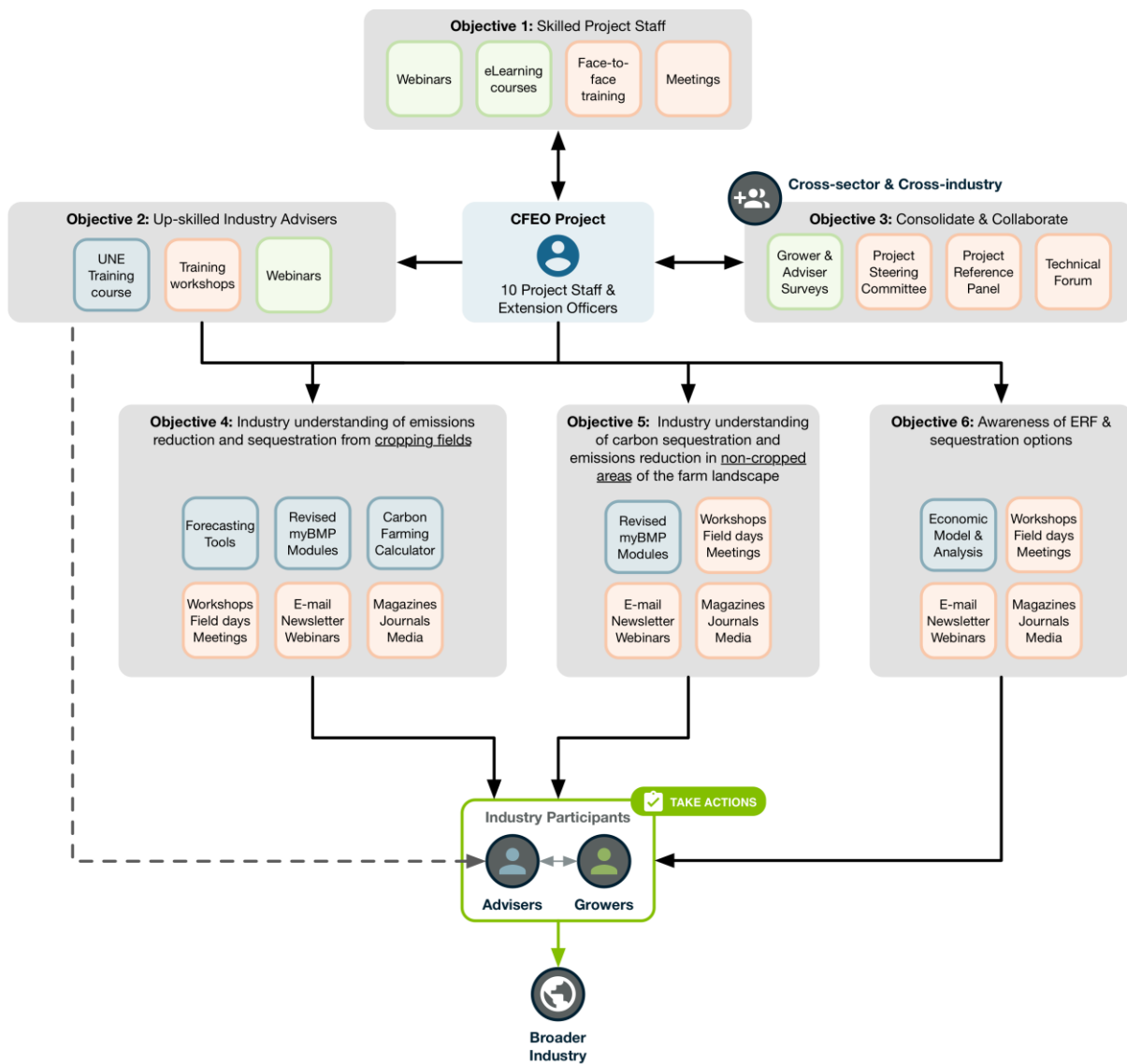
There is also evidence that **the project has influenced and supported grower decision making and on-farm targeted practice changes**. It was clear that some of the original targets were very (overly) optimistic, however there were significant gains made towards these in most targeted areas.

**The project met the challenge of policy changes** with respect to the ERF and carbon sequestration (which resulted in limited impact on adviser and grower understanding of these topics) by reframing the focus and objectives. Impacts were therefore mainly captured in the related areas of *reducing energy use and improving emissions management, improving nitrogen management and use of seasonal forecasting*.

Informed industry persons were very positive about the project's impact on increased industry awareness and the provision of carbon, energy and climate information and tools. This positivity was echoed by consultants engaged in training and other project activities.

*Dr Jeff Coutts*

Chart 1: Project change logic



# SUMMARY OF FINDINGS

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## Informed Persons

**Informed Persons believed the Carbon Farming Project to be timely and important given the wider issues associated with climate change and increasing economic pressures. Its role was seen as ensuring the Cotton industry is *responsive, proactive, and a good environmental citizen.***

Key factors in the project's success were given as the project manager's technical expertise and ability to engage with the whole of the industry combined with opportunities available to access funding.

It was felt that the project contributed to improved industry understanding of carbon emissions and climate issues and demonstrated that both financial and environmental gains can be achieved.

Impacts including improved energy efficiency and reduced nitrogen usage highlighted the project's direct influence on grower decision making.

It was noted that the project had been impacted by the change in government and resulting shift in carbon policy. This created challenges and implications in terms of the project's key messages and available opportunities.

*"...Jon Welsh and the following he has created is tremendous from the agronomist point of view and the growers point of view." (Consultant, NSW - Namoi)*

*"I think the farmers are time poor but it is important for them to participate in this program..." (Grower/manager, Qld - Theodore)*

## Objective 1: Skilled Project Extension Officers

**Project extension officers were reported to have attended all planned meetings and training. The understanding is that through the training and project experience, they have gained extra knowledge and skills to equip them to effectively support the industry in this topic area.**

## Objective 2: Up-skill Industry Advisers

**An increased understanding in the areas of seasonal forecasting, nitrogen management, and energy use means that advisors are able to provide better advice and have a greater capacity to assist client decision making and on-farm practice change.**

Industry advisers were successfully targeted through a combination of training and extension activities delivering information on seasonal forecasting, nitrogen efficiency, energy use, natural resource management, and the Emissions Reduction Fund (ERF).

The CottonInfo team, information resources and myBMP assisted:

- 98% of consultants improve **water & moisture management** practices on client's farms;
- 95% improve **nutrition & soils** practices;
- 88% improve **seasonal forecasting & climate** practices;
- 79% improve **natural resource management** practices; and
- 57% improve **energy use** practices.

*(2015/16 CRDC Cotton Consultants Survey)*

*“A better understanding of our farming systems and better able to make decisions and hopefully improve the sustainability for the farmers in our region.” (Consultant, NSW - Murrumbidgee)*

*“I found the whole project highly valuable particularly in relation to the pieces of information that I was most interested in and that was to do with growing cotton efficiently and productively and economically.” (Consultant, NSW - Gywdir)*

## Objective 3: Collaboration

**A number of meetings and presentations were held with relevant industry organisations to exchange ideas, gather information, and explore collaborative opportunities. Feedback from Project Reference Panel meetings suggested presenters and participants were well engaged and there was a free flow of information throughout a balanced group of specialised researchers, R&D Managers and technical specialists.**

All planned Objective 3 activities were successfully undertaken including the CRDC Grower and Consultant Surveys incorporating specific CFI questions, the establishment the Project Steering Committee and Project Reference Panels and subsequent annual meetings, and the convening of a well-attended Carbon Farming Technical Forum.

Knowledge gained through these meetings was seen to be aiding the development of future extension messages for the remainder of the project and strengthening peer-to-peer networks in the industry.

## Cotton Industry Nitrogen Forum

91% agreed/strongly agreed it lived up to their expectations

97% agreed/strongly agreed it was well designed and the presenter and discussion groups stimulated their learning

94% agreed/strongly agreed they will be able to use what they learned

## Objective 4 & 5: Increased Industry Understanding

**There is strong evidence that the project has increased grower and adviser understanding, particularly in the areas of seasonal forecasting, nitrogen efficiency and energy use. It is also credited with influencing and supporting grower decision making and on-farm practice changes – particularly in the areas of reducing energy use and improving emissions management (e.g. implementing solar irrigation and carbon footprint benchmarking), improving nitrogen management (e.g. soil testing), and seasonal forecasting (e.g. installing weather stations and improved irrigation timing).**

Extension campaigns to increase industry awareness and understanding of seasonal forecasting, nitrogen efficiency, energy use, natural resource management, and the ERF were successfully delivered and engaged large numbers of growers and advisers across all cotton growing regions.

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A total of **~138 extension activities** were held between 2013/14 and 2015/16 attended by ~6,228 participants representing at least 156,700 hectares of cotton – 60% of the total 263,339ha 2015/16 cotton crop.

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The planned target of 25% of industry implementing plant tissue analysis to monitor crop nutrition balances to meet crop nutrient demand appears to have been achieved. Industry surveys and activity evaluations found that between 40-50% of growers had used leaf/petiole testing when deciding on fertiliser rates.

*“I feel a good outcome in the future economic and emission wise from these actions will be huge. Keep up the good work.” (Grower/manager, NSW - Murrumbidgee)*

*“This project is a way that money will reach grass roots where it is actually needed to increase profitability at the farmer level. The more we can prove that this is economic point of view the more the farmer will see it.” (Grower/manager, NSW - Macquarie)*

- **100% of Cotton Nutrition workshop respondents indicated**

There did however appear to be less impact on grower and adviser understanding of the ERF and carbon sequestration. This was most likely due to the shift in project focus following carbon policy changes. There was also limited data available on myBMP awareness and participation.

the workshop would help them in the management of soils, crop nutrition and nitrogen use efficiency for cotton production.

- **85%-90%** of IrriSAT workshop respondents likely to adopt the IrriSAT technology.
- **75%** of Energy Efficiency field day respondents likely to adopt Renewable energy technology.
- **40-70%** of Cotton Nutrition & NUE Workshop respondents likely to adopt presented nutrition concepts.

## Objective 6: ERF Awareness

**Despite carbon policy changes and the resultant limited incentives for cotton industry participation, there was still some evidence of positive gains in awareness, with 40% of consultants (CRDC Cotton Consultants Survey) confident they could access information about the opportunities, benefits and trade-offs of participating in the ERF and/or implementing potential mitigation/sequestration options.**

Overall however, industry awareness of ERF issues remained well below anticipated percentages, with Progress Report 6 reporting awareness at 15%.

Delivery of Objective 6 activities – focused primarily on creating awareness of the ERF and carbon sequestration – included a number of extension activities delivered through face-to-face interaction (e.g. workshops and meetings), personalised e-communication (e.g. webinars), and industry publications (e.g. fact sheets and journal articles)

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# EVALUATION DETAILS

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## Project Background

The Carbon Farming Futures program was about *ensuring that advances in land management technologies and techniques for emissions reduction and adaptation will lead to enhanced productivity and sustainable land use under a changing climate*. These advances were seen to be able to *allow farmers and land managers to benefit from the economic opportunities of the Carbon Farming Initiative (CFI) while assisting Australia in achieving its long term emission reduction targets*<sup>1</sup>.

The *Carbon Farming Initiative* was a *voluntary carbon abatement scheme that ran between September 2011 and December 2014 when it was integrated with the Emissions Reduction Fund – projects automatically became Emissions Reduction Fund projects*.

The Australian Government repealed the Carbon Tax with effect from 1 July 2014. Through its *Direct Action Plan*, the government planned to introduce a mix of new policies, including the Emissions Reduction Fund which was intended to *build on the existing Carbon Farming Initiative (CFI) and provide ongoing opportunities for farmers and land managers to participate in emission reduction projects*. It was noted that Extension and Outreach projects already funded under the Carbon Farming Futures program would continue to support the communication of opportunities under the CFI, and the transition to the Emissions Reduction Fund.

The *Emissions Reduction Fund (ERF)* is a voluntary scheme that aimed to provide incentives for a range of organisations and individuals to adopt new practices and technologies to reduce their emissions. It is enacted through the *Carbon Credits (Carbon Farming Initiative) Act 2011*, the *Carbon Credits (Carbon Farming Initiative) Regulations 2011* and the *Carbon Credits (Carbon Farming Initiative) Rule 2015*<sup>2</sup>.

Through the *Extension and Outreach* component of the Carbon Farming Futures program the Australian Government invested funding from 2011–12 to 2016–17 to assist farmers and land managers to participate in land sector emissions reduction activities and the Carbon Farming Initiative (CFI). In April 2013, 24 projects valued at \$21.3 million were funded under the Extension and Outreach program to deliver information that is clear, consistent and current to farmers, land managers and their key influencers using a mix of traditional and new extension services.

The *Carbon farming in the Australian cotton industry project* aimed to *integrate the latest information on carbon, climate change and greenhouse gas (GHG) emissions management into the cotton industry's extension efforts*. This will be done by *up-skilling industry information providers, incorporating information into the myBMP web portal tool (an online farm management tool for cotton growers) and developing cotton specific carbon farming communication campaigns*<sup>3</sup>.

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<sup>1</sup> <http://www.agriculture.gov.au/ag-farm-food/climatechange/carbonfarmingfutures>

<sup>2</sup> <http://www.cleanenergyregulator.gov.au/ERF/About-the-Emissions-Reduction-Fund>

<sup>3</sup> <http://www.agriculture.gov.au/ag-farm-food/climatechange/carbonfarmingfutures/extensionandoutreach/project-list#plain-english-summary>

# Methodology

## Secondary Documents

A combination of documents were analysed to assess progress achievements and impacts against objectives, activities, and KPIs – as established in the amended *May 2015 Schedule of Project Objectives, Activities and Delivery Timeframes*. These documents included:

- Seven Project Progress Reports (July 2013 – December 2016):
  - Progress Report No.1 (July 2013 - December 2013)<sup>i</sup>
  - Progress Report No.2 (December 2013 - May 2014)<sup>ii</sup>
  - Progress Report No.3 (May 2014 - December 2014)<sup>iii</sup>
  - Progress Report No.4 (December 2014 - May 2015)<sup>iv</sup>
  - Progress Report No.5 (May 2015 - December 2015)<sup>v</sup>
  - Progress Report No.6 (December 2015 - May 2016)<sup>vi</sup>
  - Progress Report No.7 (May 2016 - December 2016)<sup>vii</sup>
- Activity records from the CottonInfo YourDATA M&E Database<sup>viii</sup> - including any attached evaluation data and reports
- CRDC Cotton Growing Practices Surveys (2013, 2014, 2016<sup>4</sup>)
- CRDC Cotton Consultants Survey (2013/14 and 2015/16)
- Other activity evaluations and relevant documents provided by the project manager

## Interviews & Survey

As part of the evaluation, interviews with informed persons and telephone surveys of previously engaged growers and consultants were undertaken.

### Informed Persons' Interviews

Structured phone interviews were undertaken with six informed persons who were asked to provide their insights and perspectives about the outcomes and effectiveness of the project:

- One respondent was an outsourced consultant involved in the research aspect of the program, maintaining contact with researchers and providing feedback on their findings and research papers – they were also responsible for the extension of research findings to growers in the cotton industry.
- Two respondents from Cotton Australia provided feedback from their perspectives as a policy officer and a program management role, which involved partnering with the carbon farming program during energy efficiency field days.
- Two respondents represented CottonInfo and were responsible for the extension and delivery of program outcomes – one involved in the overall management of the carbon farming program.

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<sup>4</sup> Note: The 2016 Cotton Growing Practices survey report has not yet been publically released.

- One respondent provided feedback as the communications RD&E manager working jointly with CRDC and CottonInfo on the extension of program outcomes.

## Survey of Cotton Growers and Consultants

Thirty-nine respondents – 28 grower/managers and 11 consultants – were surveyed over the phone to gain feedback on their participation in the project and any impacts it may have had on their understanding and decision making. Respondent contact details were provided by the project manager and consisted of growers and advisers who had participated in previous project activities.

- Respondent regions:
  - NSW (28 respondents) – Namoi (54%), Murrumbidgee (18%), Gywdir (14%), Bourke (7%), and Macquarie (7%)
  - Qld (11 respondents) – McIntyre (45%), Darling Downs (36%), St George (9%), Theodore (9%)
- Combined 51,930 hectares of cotton production represented at an average of 1,997 hectares per grower

## Report Structure

The report is structured into three sections:

- **Part A** provides a summary of stakeholder views provided through the Informed Persons' interviews and grower and consultant telephone surveys;
- **Part B** assesses the project's success against planned objectives, comparing what was planned versus what was achieved and any evidence of resulting benefits and impacts; and
- **Part C** provides a comprehensive tabular audit summarised against objectives, activities and KPIs – including data sources.

# PART A: STAKEHOLDER VIEWS

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As part of the evaluation process structured interviews of informed persons and phone surveys of engaged growers and advisers were undertaken to provide insights into the value and effectiveness of the project.

## Informed Persons

### Program Context

There was positive feedback from Informed persons that the carbon farming project had played a valuable role in ensuring the industry is *responsive, proactive, and a good environmental citizen*. They saw that this had been achieved by improving environmental awareness and responsibility and the understanding of how farming practices impact the quality and productivity of soils through nitrous oxide and nitrogen efficiencies. It was suggested that towards the end of the project, producers began to better understand the saving that could be achieved.

- The need for this type of project was identified as helping to raise awareness among producers about the opportunities available in this *era of carbon farming*. In particular, with the continuously increasing cost of electricity, the topic of natural resource management was noted as becoming *very important* and identified by one respondent as being *an opportunity for the program and its success*. Combined with the wider issues associated with climate change and the need to reduce costs and expenses, the program was felt to be *very timely*.
- The view was expressed by one Informed person that the importance of the project was not so much about *trading credits*, but more as an industry benchmark and a comparison between cotton and other agricultural industries in Australia and internationally, *as well as recognizing what the cotton industry already has in place in terms of carbon reductions*.
- An informed person involved in climate change advocacy work and policy change with the Australian Government suggested the project had been *vital* and helped to fulfil a need for *independent advice*, to guide the industry and demonstrate the costs and benefits involved in carbon farming.
- Project outputs were described as being *invaluable to industry and useful in filling in the gaps*, with outcomes noted to be providing a *whole of systems approach*. One Informed person believed the case studies and presentations delivered had been *first class* and that they were *definitely hitting the mark in terms of interest in the industry*.

### Contributions to Industry Knowledge and Understanding

The project was seen to have contributed to a better understanding of irrigation water and losses; the integration of alternative resources in irrigation; emissions off-setting; and *climate functions and forecasting systems*, specifically identifying the most appropriate *fit and function* of different models, for different times of year and different regions to determine the best outcomes.

It was acknowledged that the project had delivered good information about climate variability, which producers had been able to use to inform modelling and management decisions. One respondent commented that *producers are becoming more considerate about the products they are using and the*

*timing of application. They are looking at cotton as part of the whole system and the impacts of other crops in the system.*

## Examples of Project Impacts

The cotton industry was noted to be running integrated programs *putting the principles of carbon farming into practice*, ensuring a greater understanding of *carbon footprints* and *protocols on farms*.

Several discussed energy use efficiency gains being made as a direct result of the carbon farming project. A common case study cited was that of Jon Welsh working closely with a producer on the installation of new solar hybrid irrigation system. Following the successful installation, a field day was hosted on the property with 80-100 people subsequently enquiring about the process. As a result of this and other demonstrations of hybrid solar/diesel equipment – as well as other workshops and project materials – several producers were noted to have changed their practices. Further advice about the cost benefits of solar irrigation was also sought by a number of growers, while others were undertaking pump audits and taking further steps to improve on-farm efficiencies. These improvements to irrigation efficiencies were ultimately seen to result in a reduction of carbon emissions.

It was also noted that there is evidence of reduced nitrogen being placed by producers as well as changes to the application of nitrogen. One respondent suggested that the majority of producers are *moving from upfront application to a split application* during the season as well as using tools for testing and budgeting.

Overall, it was felt the program had been *valuable*, with data from CRDC's Consultants Survey 2015-16 and Cotton Growing Practices Survey 2016 suggesting that *despite industry challenges*, there is a *positive sense* that the project is useful, that is has helped to raise awareness of improved practices and that producers and consultants are *hungry for more information*.

## Benefit of the Project to the Cotton Industry

The consensus was that the carbon farming project had contributed to a greater awareness of *climate variability*, the options available to producers and the steps to take to reduce emissions. It was credited with showing both the financial implications and the important environmental gains that can be achieved, and was seen to be successful in communicating these messages as well as affording a *continued pressure on farmers to realise there are alternative pathways* to work towards reduced rates of nitrogen and to lower their footprint.

It was acknowledged by several Informed persons that *practice change takes time* and although it appeared only *small gains are being made*, on ground changes are occurring and the uptake of some practices had been quicker (for example irrigation efficiencies). It was noted that while simple improvements to energy and efficiencies can be made, the delay between trials and the extension of findings to producers, as well as the investment costs, meant it would be a long time before a *whole of farm approach can be established*.

## Project Barriers and Challenges

The major challenge seen to have impacted the project was the change in government and resulting shift in carbon policy, with one Informed person describing the difficulty with *the changes to carbon pricing and the impact on value propositions for implementing some of the opportunities to manage*

*carbon on cotton farms.* This was noted to have created challenges and implications in terms of the project's key messages and opportunities available, with the initial *clear mandate encouraging the uptake of certain opportunities* becoming untenable when *the whole premise and availability of these changed.*

In terms of industry challenges, seasonal conditions and grower interest (i.e. the number of growers at any given period interested in irrigation and energy use efficiencies) were seen to have had some impact. One Informed person discussed the limited water availability during the project and the impact this had on outcomes in being not just a barrier to practice change but a catalyst as well. Restricted by the availability of water and having to grow in smaller areas, producers were able to implement more, take their time, and detail the production changes. It was suggested that the benefits in fertility achieved on the smaller scale would soon upscale to larger production *where it might have been more difficult to experiment and implement change immediately.*

The challenges experienced by producers in terms of the Carbon Farming Initiative (CFI) applications were highlighted by one Informed person who suggested the administration and project costs can tend to *outstrip the benefits of participation* (note: this informed person was involved in *advocating for reduced administration costs as well as for the assessment of the whole farm process instead of a singular method of assessment*).

## Future Strategies

Several Informed persons took the opportunity to praise the project manager for doing an excellent *job of focusing project priorities to match the needs of the industry* and noted that his ability to *adapt and respond to the industry context* had been critical. The combination of the project manager's technical expertise and ability to engage with the whole of the industry and the availability of funding were seen as key factors in the project's success.

The project was seen to have great *potential for change in the industry because of the importance of energy costs and the impacts on production*, and given the challenges faced by shifting carbon policy and its impact on project messages, it was noted that *clear objectives* and a *more adaptive and responsive* approach was needed.

The need to extend research messages focused on *bringing nitrogen rates more in line with production* was highlighted, with farmers' tendency to be *over-insured and use higher rates of nitrogen* noted. One Informed person explained that *we need to be able to provide a higher level of confidence to reduce rates and loss of productivity.*

Opportunities for carbon storage were also discussed, with one Informed person suggesting the areas of carbon capturing, measurement and storage would benefit from further research across all industries – not just cotton. They also identified the opportunities for *carbon capture on remnant vegetation adjacent to cotton crops.*

Also highlighted was the project's role in upskilling extension staff in carbon farming, and while this process was seen to have been successful, it was still important to *respond to the needs of those in attendance.* One Informed person suggested that in order to ensure a willingness to learn and provide motivation to improve understanding, *there should be opportunity for input into the content.*

# Survey Respondents

Note: The majority of findings from the survey have been included under the relevant objectives, activities and KPIs in Part B.

## Awareness of the Project and its Objectives

Overall, respondents were **moderately aware of the Government's extension and outreach Australian Cotton Project and what it has been doing** – providing an average rating of 4.2 on a 0 to 10 scale where 0 is low awareness and 10 is high awareness (n=39). Consultants (4.5 avg. n=11) had a comparatively higher average awareness compared to growers (4.6 avg. n=28).

Respondents who had moderate or high awareness commented on their participation in certain activities (e.g. energy workshop, trials), their interaction with specific contacts (e.g. Jon Welsh), or the information they had received (e.g. e-newsletters).

Asked to describe what the project was trying to achieve, growers believed it was primarily related to reducing carbon emissions (e.g. through sequestration and optimising nitrogen use) and improving energy efficiency (e.g. solar energy and pumping efficiency). Most consultants also understood the project was related to carbon farming, with one noting it was also about profitable farming and another describing the link it was creating between research and production.

## Further Support Needed

Further support that growers felt the project could provide to assist them make changes included: more information and data on specific topics (5 mentions – e.g. soil sequestration, water logging, water use efficiency); either policy changes or more information on understanding policy (4 mentions); more funding for renewable energy (1 mention); improving public perception of the industry's responsible farming practices (1 mention); better communication from consultants (1 mention); and increased monitoring and assistance interpreting results (1 mention).

Suggestions on how the project could further support consultants included: increased exposure to information (2 mentions – e.g. examples and case studies); data demonstrating economic benefits (1 mention); improved promotion of the work down by Cotton Australia (1 mention); more financial incentives to increase the rate of adoption (1 mention); and extend the work to other industries such as rice (1 mention).

## General Comments

Given the opportunity to provide general comments about the project, the ERF, and future directions, a number of growers praised the project as being a good initiative and a worthwhile exercise (7 mentions). Positive comments included: *I think the farmers are time poor but it is important for them to participate in this program; weather component of it has been very worthwhile and working on the things we can control and not focus on the things we can't; it is on the right track and it is essential to continue with the project; I feel a good outcome in the future economic and emission wise from these actions will be huge; and this project is a way that money will reach grass roots where it is actually needed to increase profitability at the farmer level.*

The need to continue research and trials was reiterated by a couple of growers, with another highlighting the need for an evaluation on the capital costs of farm involvement in emissions reduction programs.

Consultants also praised the project and described it as being *terrific and very informative* (3 mentions), with the impact of the following created by the project manager Jon Welsh described as being *tremendous from the agronomist point of view and the growers point of view*. One consultant had *found the whole project highly valuable particularly in relation to the information on growing cotton efficiently, productively and economically*. It was suggested more farmers needed to be targeted and that more regular activities and updates could be beneficial.

The need to communicate the economic benefits was also noted, with one consultant worried that *we are going to have trouble and struggle to get growers on-board if there aren't economic benefits in our system*. Another consultant was concerned that the project's message had so far not been well sold or portrayed to growers.

# PART B: PROJECT OBJECTIVES

Project objectives are based on the amended *May 2015 Schedule of Project Objectives, Activities and Delivery Timeframes*, with analysis of project progress reports and records from the CottonInfo YourDATA M&E database used to assess achievements against planned activities and industry surveys and activity evaluations used to assess impact against KPI targets.

## Objective 1

Project extension officers skilled to provide high quality information and support about greenhouse gas emissions management and the Emissions Reduction Fund

### Summary

Project extension officers were reported to have attended all planned meetings and training though a lack of available evaluation data limited any insights into the extent of impact on knowledge and understanding gains. The understanding is that through the training and project experience, they have gained extra knowledge and skills to equip them to effectively support the industry in this topic area.

### Activities Delivered

Note: Full details of Objective 1 activities undertaken are available in the Part C Activity Audit.

#### ACTIVITY 1: Staff training

Project staff and extension officers (10) to complete carbon farming training for extension providers provided by the Commonwealth.	Delivered
	Yes

Objective 1 and its activities were fully delivered with progress reports indicating project staff and extension officers had attended all yearly training and meetings (KPI 1b) including completion of the Carbon Farming Initiative eLearning course in September 2013 (KPI 1a).

## Objective 2

Up-skill cotton & grains industry advisers, extension networks and key influencers

### Summary

Industry advisers were successfully targeted through a combination of training (e.g. new developed UNE training course and lectures) and extension activities (e.g. cotton nutrition and carbon workshops) delivering information on seasonal forecasting, nitrogen efficiency, energy use, natural resource management, and the ERF. Industry surveys and activity feedback showed increased adviser understanding in the areas of seasonal forecasting, nitrogen management, and energy use – resulting in better advice and an increased capacity to assist client decision making and on-farm practice change. There were however areas where the project had minimal impact on adviser knowledge including understanding the ERF and carbon sequestration – possibly reflecting the project's shift in focus following carbon policy changes.

### Activities Delivered

*Note: Full details of Objective 2 activities undertaken are available in the Part C Activity Audit.*

#### ACTIVITY 2: Up-skill industry advisers

Provide targeted training to up-skill industry advisers about emissions management and the ERF so that they are skilled to incorporate these issues in their advice and discussions with cotton clients: Delivery to be by workshops, webinars and to be incorporated as module of Cotton and the environment course of the Grad Cert Rural Science: Cotton Production Course (UNE).	Delivered  Yes
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A **training course on the fundamentals of carbon and nutrition** (KPI 2a) was developed and incorporated into the Cotton Production Course with content submitted to UNE January 2014 and presented to 30 tertiary students as per approved subject material in May 2014<sup>ii</sup>. The course was also delivered through a series of six webinars in 2015 and 2016 (KPI 2c).

At least **six training workshops were held** in 2015 and 2016 (KPI 2b), with a recent progress report indicating fifty workshops had been conducted since the project's commencement<sup>vii</sup>. The majority of these training activities were combined grower and adviser workshops and field days delivered as part of Objectives 4 & 5 (increase cotton industry understanding of emissions reduction and sequestration from cropping fields and non-cropped areas) and are detailed further in those report sections.

#### Other activities undertaken as part of Objective 2 activities included:

- Two UNE lectures on carbon and climate delivered to 45 students, advisers, and growers in May 2016;
- Sharing extension methods to 118 researchers and industry leaders at the CCRSPI Conference in May 2016;
- A presentation to a University of Melbourne class of 20 students and lectures on the findings of the Automated Irrigation Benefit Cost Analysis in February 2016; and

- A training presentation sharing extension methods to the Dept. of Ag. and 100 E&O project officers in February 2016.

## Objective 3

Consolidate the current, cross-sectoral science and provide clear direction for future extension and research activities.

### Summary

All planned Objective 3 activities were successfully undertaken including the CRDC Grower and Consultant Surveys incorporating specific CFI questions, the establishment the Project Steering Committee and Project Reference Panels and subsequent annual meetings, and the convening of a well-attended Carbon Farming Technical Forum. A number of meetings and presentations were also held with relevant industry organisations (e.g. R&D for Profit, MCV, NANORP) to exchange ideas, gather information, and explore collaborative opportunities – though difficulties were noted by one progress report in *aligning the Department of Agriculture objectives with other Industry Joint Venture partners with our grower audience in regards to seasonal forecasting extension and reducing emissions*.

While limited evaluation data made analysis of any impacts difficult, feedback from Project Reference Panel meetings suggested presenters and participants were well engaged and there was a free flow of information throughout a balanced group of specialised researchers, R&D Managers and technical specialists. Knowledge gained through these meetings was seen to be aiding the development of future extension messages for the remainder of the project and strengthening peer-to-peer networks in the industry.

### Activities Delivered

*Note: Full details of Objective 3 activities undertaken are available in the Part C Activity Audit.*

#### ACTIVITY 3a: Grower and Consultant Surveys

Collect data on project status using the CRDC funded Cotton Grower Practices and Cotton Consultants surveys conducted at the beginning and end of the project.	Delivered
	Yes

**Cotton Growing Practices and Cotton Consultants surveys** – which included specific CFI questions – were undertaken as planned in 2014, 2015, and 2016 (KPI 3aii).<sup>5</sup> These surveys were commissioned by CRDC and undertaken by Crop Consultants Australia (Cotton Consultants survey) and Roth Rural (Cotton Growing Practices survey) with the Carbon Farming in the Australian Cotton Industry project providing input into CFI related questions (KPI 3ai). Data collected from these surveys was intended to provide insights into industry knowledge gains relating to KPIs under Objectives 4,5 and 6 – analysis of this data is included throughout this report where relevant.

<sup>5</sup> Progress Reports 3,4,5,6, and 7, with survey reports available from the CRDC website (<http://www.crdc.com.au/publications/industry-publications>)

### ACTIVITY 3b: Project Steering Committee

Cross-sectoral and cross-industry collaboration on carbon farming - Establish steering committee and/or reference panel to manage the project.

Delivered

Yes

Both the **Project Steering Committee (PSC)** and **Project Reference Panel (PRP)** were established with annual meetings – both in-person and via webinar – held from 2013 onwards (KPI 3aiii). The PSC meetings were described as way to inform stakeholders of the project's progress and future activities<sup>vii</sup>, while the PRP meetings were noted to have *created a number of ideas and suggestions related to measuring emissions targets and ways to regulate industry emissions through industry targets*<sup>vi</sup>.

### ACTIVITY 3c: Carbon farming forum

Convene a Carbon Farming in Cotton and Grains Systems Technical Forum to encourage a collaborative, integrated, systematic focus for carbon farming research, development and extension in the cotton industry. The Forum will produce proceedings papers, consolidated extension messages and future extension and research priorities.

Delivered

Yes

A **Carbon Farming in Cotton and Grains Systems Technical Forum** was held in September 2015 with 231 researcher and industry leader participants – a report of the forum was published in December 2015<sup>v</sup>.

Five respondents (14%) in the Coutts J&R Grower and Consultant Survey indicated they had participated in the Carbon Farming Technical Forum.

#### Other activities undertaken as part of Objective 3 included:

- A presentation on Climate Risk Management in Cotton to 100 stakeholders (50 from industry and 50 from government) in Canberra, March 2016<sup>viii</sup>;
- An R&D for Profit Climate Meeting with four government project officers to scope and plan for the project case studies in cotton and grain in Orange, February 2016<sup>viii</sup>;
- A meeting with an MCV climate researcher to discuss results of the CSIRO MCV project and how to factor it into extension material in Hobart, February 2016<sup>viii</sup>; and
- Participation in the Cotton Industry Nitrogen Forum in August 2014 which *provided some valuable information on the gaps in extension and research which will ultimately aid in better outcomes for industry*<sup>iii</sup>.

## Objective 4 & 5

Increase cotton industry understanding of emissions reduction and sequestration from cropping fields and non-cropped areas of the farm landscape.

### Summary

Extension campaigns to increase industry awareness and understanding of seasonal forecasting, nitrogen efficiency, energy use, natural resource management, and the ERF were successfully delivered and engaged large numbers of growers and advisers across all cotton growing regions. These campaigns included a mix of face-to-face interaction (e.g. workshops and field days), personalised e-communication (e.g. e-newsletters and webinars), and broad industry level communication (e.g. industry publications and media coverage). Revised myBMP input efficiency, soil health, and natural assets modules were also developed and delivered as part of the extension campaigns. Relevant carbon farming tools were identified and evaluated and incorporated into the CottonInfo website, although the development of the project's Carbon Calculator experienced delays and is scheduled for completion in early 2017.

There was strong evidence that the project had increased grower and adviser understanding – particularly in the areas of seasonal forecasting, nitrogen efficiency, and energy use – although not to the extent of the aspirational KPI targets. The project was also credited with influencing and supporting grower decision making and on-farm practice changes – particularly in the areas of reducing energy use and improving emissions management (e.g. implementing solar irrigation and carbon footprint benchmarking), improving nitrogen management (e.g. soil testing), and seasonal forecasting (e.g. installing weather stations and improved irrigation timing). The planned target of 25% of industry implementing plant tissue analysis to monitor crop nutrition balances to meet crop nutrient demand also appeared to have been achieved with industry surveys and activity evaluations finding that between 40-50% of growers had used leaf/petiole testing when deciding on fertiliser rates.

The project did however appear to have limited impact on grower and adviser understanding of the ERF and carbon sequestration – again most likely due to the shift in project focus following carbon policy changes. There was also limited data available on myBMP awareness and participation.

### Activities Delivered

*Note: Full details of Objective 4 & 5 activities undertaken are available in the Part C Activity Audit.*

#### Seasonal Forecasting (4a)

##### ACTIVITY 4a: Improved use of seasonal forecasting information

Improved use of short, medium and long term seasonal forecasting information to facilitate more informed decisions regarding the efficient use of farm inputs (including, but not limited to, agronomy practices, fertiliser use, irrigation regimes and fuel and energy use) and agronomy practices to minimise greenhouse gas emissions.

Delivered

Yes

A **Carbon Technical Specialist review of forecasting tools** was undertaken in October 2013 to evaluate their applicability for improved seasonal forecasting to support the implementation of practices to reduce GHG emissions (KPI 4ai)<sup>j</sup>. A **seasonal extension forecasting campaign** was

then developed and forwarded to the Commonwealth in December 2013 (KPI 4a<sup>ii</sup>) with the commencement of climate workshops and brochures delivered to growers and advisers as well as information resources delivered to industry<sup>ii</sup>.

Seasonal Forecasting extension activities undertaken included:

**Face-to-face interaction (e.g. workshop, field days, meetings):**

- Six IrriSAT workshops introducing participants to the IrriSAT technology and IrriSAT app held between July 2015 and May 2016 in Griffith, Emerald, Narromine, Moree, and Goondiwindi – attended by 95 growers and advisers<sup>v</sup> <sup>vii</sup>;
- Participation in six local Cotton Grower Association (CGA) meetings – which included looking at seasonal outlook – held between December 2015 and 2016 in Goondiwindi, Rowena, Toowoomba, Moree, Walgett, and Wee Waa – attended by 320 growers and advisers<sup>vii</sup> <sup>v</sup>;
- Presentations on climate risk and seasonal forecasting at a number of meetings and forums between August 2014 and August 2016 including the Crop Consultants Annual General Meeting (130 advisers)<sup>vii</sup>, the CSIRO Climate Change Conference (22 growers & industry)<sup>vii</sup>, and the 2014 Cotton Conference (1,400 growers & advisers)<sup>v</sup>; and
- Five climate related case studies undertaken between March 2014 and April 2015 aimed at raising awareness of local climatic influences and the use of seasonal forecasting to better manage farm inputs such as nitrogen fertiliser<sup>viii</sup>.

**Personalised e-communication (e.g. e-newsletters, webinars):**

- Two Climate Risk Webinars that provided an overview of climatic information for growers and advisors to apply to nitrogen management decisions and crop selection delivered in June and October 2014<sup>iii</sup>;
- Two seasonal forecasting YouTube videos including MOJO the climate animation<sup>vi</sup> <sup>v</sup>; and
- Related newsletter articles

**Broad industry level (e.g. industry publications):**

- Climate risk case study published in the Spotlight magazine (1,300 grower & adviser recipients) and website in May 2015<sup>v</sup>;
- A brochure titled '2014, 2014, An El Niño year?' distributed to 500 growers between April and May 2015 through Cotton Grower Associations and Irrigators Councils, aimed to aid and assist in grower decision making in terms of crop selection and fertiliser decisions<sup>iii</sup>; and
- A number of seasonal forecasting related news stories and media releases including: a news story on 'seasonal forecasting for better environmental outcomes' published in print and online in March 2016<sup>vi</sup>; a media release on 'MOJO the climate animation' distributed through Cotton eNews (1,300 grower & adviser recipients) in November 2014<sup>vi</sup>, and a media release in July 2015 published in Fairfax Ag Media on the use of seasonal forecasting in risk management<sup>vi</sup>.

## Nitrogen Management & Energy Use (4b, 4c, 4d, 4e)

### ACTIVITY 4b: Revised myBMP modules

Input Efficiency and Soil Health Best Management Practice modules revised and improved.	Delivered
	Yes

**Revised versions of Energy and Input Efficiency, and Soil Health (includes Soil Nutrition)** modules that incorporate emissions management issues were endorsed by industry and available to incorporate into myBMP in November 2014<sup>iv</sup>, with the modules submitted to the Department in February 2016 (KPI 4b)<sup>v</sup>.

### ACTIVITY 4c: Incorporation of Carbon farming tools

Relevant carbon farming tools incorporated into the myBMP and CottASSIST suite of decision tools for cotton growers and their advisers and promoted to industry via industry extension, publications and newsletters.	Delivered
	Yes

**Relevant carbon farming tools** were identified and evaluated for relevance to cotton farming, with all available calculators listed on CottonInfo's carbon webpage in June 2015 (KPI 4ci & 4cii)<sup>iv</sup>.

### ACTIVITY 4d: Carbon farming extension campaign

Carbon farming in cotton extension campaign.	Delivered
	Yes

A **targeted extension campaign** to provide information and raise awareness about greenhouse gas emissions and carbon sequestration in cotton farming production systems was developed and submitted to the Commonwealth in January 2014 (KPI 4di)<sup>ii</sup>.

Delivery of the three-year extension campaign commenced in February 2014 (KPI 4dii), with activities undertaken to-date including:

#### Face-to-face interaction (e.g. workshop, field days, meetings):

- Six 'Solar Pumping and Energy Efficiency for Irrigators' field days to promote the use of renewable technology and energy efficient pumping practices, held between November 2015 and September 2016 in Darlington Point, Narrabri, Narromine, Bonshaw, Hillston, and Cecil Plains – attended by 330 growers and advisers<sup>vi viii</sup>;
- Five CottonInfo 'Cotton Nutrition Tour' field days that took ten leading nutrition researchers on farm with cotton growers, held in February 2016 at Gunnedah, Warren, Griffith, Emerald, Moree – attended by approximately 360 growers and advisers<sup>vi viii</sup>;
- Eight Cotton Nutrition workshops to engage growers on improving crop nutrition and nitrogen use efficiency, held between December 2014 and April 2015 in Riverina, Liverpool Plains, Bourke, Emerald – attended by 150 growers and advisers<sup>iv viii</sup>;
- Two energy efficiency 'Big Days Out' field days aimed at empowering irrigated cotton-growing enterprises to improve energy efficiency, reduce energy costs and increase

understanding of emissions reduction from cropping fields, held in February 2015 at St George and Gunnedah – attended by 140 growers, advisers, and industry<sup>iv</sup> <sup>viii</sup>; and

- Ten Soil Carbon workshops intended to increase cotton industry understanding of emissions reduction and carbon sequestration from cropping fields, held between March and June 2014 in Walgett, Spring Plains, Emerald, Warren, Moree, Dalby, Hillston, Hay, Moonie – attended by 130 growers and advisers<sup>ii</sup> <sup>iii</sup>; and
- Five Solar/Diesel Hybrid Irrigation Bore Feasibility/Case Studies undertaken between January and December 2015 with 11 growers in the Namoi and Macquarie regions<sup>viii</sup>.

**Personalised e-communication (e.g. e-newsletters, webinars):**

- Three NUE and Crop Nutrition webinars aimed at building capacity on the drivers of yield and NUE for reduced emissions, delivered in June 2016 to 80 growers and advisers<sup>vii</sup>;
- Three webinars on improving NUE and ERF awareness, delivered in June 2015 to 55 growers and advisers<sup>v</sup>;
- Related newsletter articles

**Broad industry level (e.g. industry publications):**

- Fact sheets on solar energy policy settings and applications to cotton production, published to the CottonInfo website in September 2016<sup>vii</sup>;
- Case studies published to the CottonInfo website between May 2015 and September 2016 including: Grid Connected Solar Irrigation case studies<sup>vii</sup>, Energy Efficiency case studies<sup>v</sup>, and an ERF Cotton Nitrogen Method case study<sup>v</sup>;
- Articles published in the Spotlight Magazine and website (1,300 grower and adviser subscribers) between March 2014 and October 2015 including: ‘Measuring soil carbon losses’<sup>v</sup>, ‘Improving nitrogen use efficiency in cotton’<sup>iii</sup>, ‘Carbon neutral cotton farms’<sup>iii</sup>, and ‘Improving energy efficiency in irrigation pumping’<sup>iii</sup>;
- Articles published in The Australian Cottongrower Magazine (1,400 grower and adviser subscribers) between August 2014 and May 2016 including: ‘Energy efficiency case study’<sup>vi</sup>, ‘Reduce fertiliser needs by accounting for soil microbes’**Error! Bookmark not defined.**, ‘How well is your nitrogen program performing?’<sup>iii</sup>, and ‘Reducing nitrogen fertiliser costs using a Faba bean rotation’<sup>iii</sup>; and
- A number of nitrogen management and energy use related news stories and media releases published between February 2014 and October 2016 including news stories on the ‘Solar and bore pumps case study’<sup>vii</sup> and the ‘Nitrogen optimisation tool’<sup>vi</sup>.

**ACTIVITY 4e: Delivery of revised myBMP modules**

Delivery of the revised Best Management Practice modules for Energy and Input Efficiency, and Soil Health, with a particular focus on emissions management.	Delivered <b>Yes</b>
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The revised myBMP modules were delivered as part of related Objective 4 extension activities.

## Natural Resource Management (5a, 5b, 5c, 5d)

### ACTIVITY 5a: Revised myBMP natural assets module

Natural assets module revised to include information and practices relating to carbon sequestration and emissions reduction in the non-cropping areas of cotton farming landscapes.	Delivered
	Yes

A **review of myBMP Natural Assets module** was completed in August 2014<sup>iii</sup> and following new research a revised module was submitted in March 2016 (KPI 5ai)<sup>vi</sup>. The purpose of the revision was to include information and practices relating to carbon sequestration and emissions reduction in the non-cropping areas of cotton farming landscapes.

### ACTIVITY 5b: Carbon management in cotton landscapes extension campaign

Carbon management in cotton landscapes extension campaign.	Delivered
	Yes

A **targeted extension campaign** to provide information and raise awareness about emissions and carbon sequestration from non-cropping areas was included as part of the CFI Extension Plan submitted to the commonwealth in January 2014<sup>ii</sup>. Extension activities delivered as part of this campaign included (KPI 5bii):

#### Face-to-face interaction (e.g. workshop, field days, meetings):

- A Presentation at the 2014 Cotton Conference on 'The value of non-cropped areas on a cotton farm'<sup>iii</sup>;
- NRM riparian zone extension involving 100 growers in the Gwydir region to promote riparian zones in cotton farming through canoeing and wildlife displays for families<sup>viii</sup>; and
- An NRM Carbon Footprint Case Study undertaken in January 2015 with one NSW grower<sup>viii</sup>.

#### Personalised e-communication (e.g. e-newsletters, webinars):

- Related newsletter articles

### ACTIVITY 5c: Delivery of revised myBMP natural assets module

Delivery of the revised BMPs for Natural Assets with a particular focus on emissions management and sequestration.	Delivered
	Yes

A **targeted campaign** to support growers to work through the **revised Natural Asset BMPs** was developed and provided to the Commonwealth in July 2014<sup>v</sup>. Extension activities delivered as part of this campaign included (KPI 5ci):

**Face-to-face interaction (e.g. workshop, field days, meetings):**

- Four myBMP Natural Assets Workshops held in November 2015 (3 workshops)<sup>v</sup> and February 2016<sup>vi</sup> – attended by 135 growers; and
- Three myBMP Natural Assets Workshops for Advisers held in February 2015 at Toowoomba, Griffith, and Narrabri – attended by 30 NRM advisers and industry<sup>iv</sup>.

**Personalised e-communication (e.g. e-newsletters, webinars):**

- A Riparian Woodlands Tour Flyer promoting myBMP natural assets module delivered to 1,300 email recipients in October 2015<sup>v</sup>.
- Related newsletter articles

**ACTIVITY 5c: Carbon Calculator**

Promote the Carbon Calculator for Native Vegetation on cotton farms and similar tools.

Delivered

Delayed

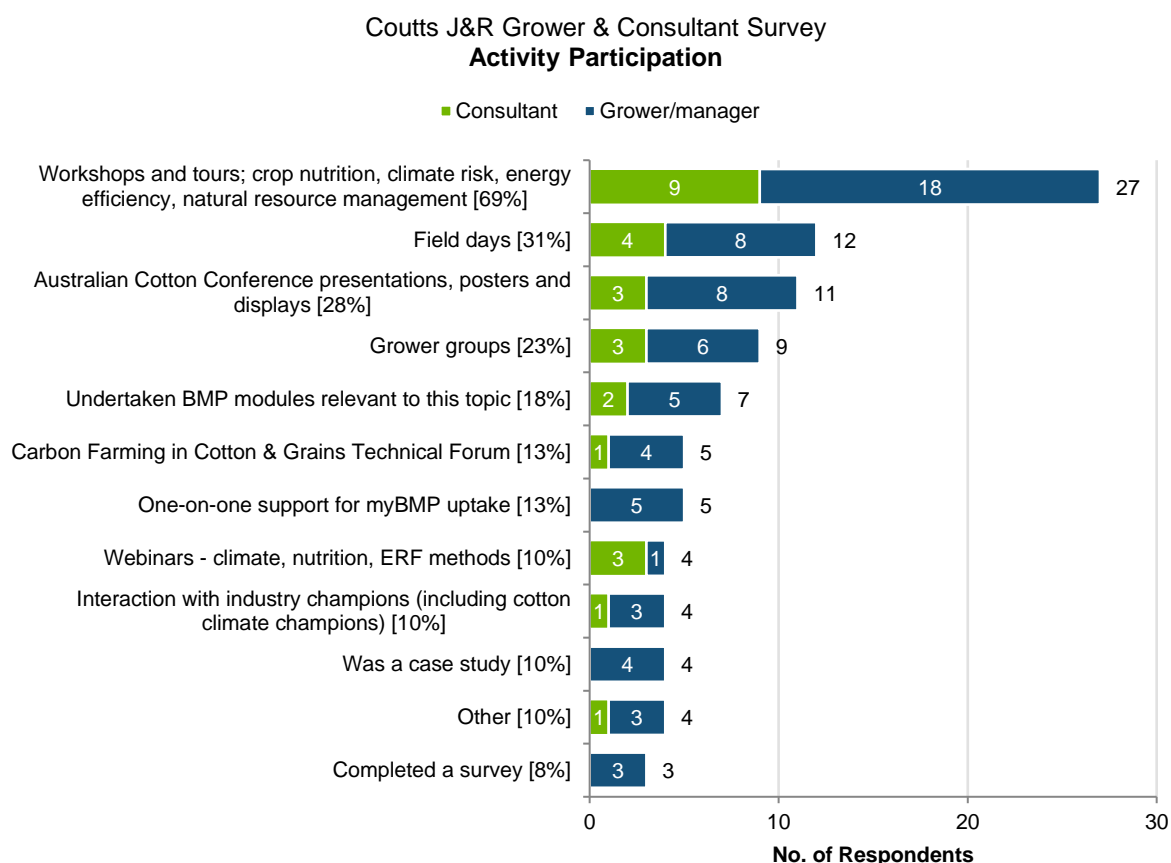
**Promotion of the Carbon Calculator for Native Vegetation on cotton farms** and similar tools (KPI 5di) has been delayed due to the delay in peer reviewed research finding on sequestration rates<sup>vi</sup>. The latest progress report indicated that the carbon calculator is scheduled to be completed in Q1 2017<sup>vii</sup>.

## Coutts J&R Survey Respondents

Respondents to the Coutts J&R Grower and Consultant Survey were asked to indicate which project activities they had participated in as well as what information they had received or accessed. All respondents had participated in either workshops and tours or field days, while 28% had attended the Australian Cotton Conference, 23% were involved in grower groups, 18% had undertaken relevant BMP modules, 13% had attended the Carbon Farming Technical Forum, and 13% had received one-on-one support for myBMP uptake. Ten percent of respondents had either viewed webinars, interacted with industry champions, or were involved in case studies.

Activity topics mentioned by respondents included energy use and efficiency (8 mentions – e.g. solar irrigation and energy audits), climate and forecasting models (6 mentions – e.g. understanding climate risk and satellite imagery), and nitrogen use and crop nutrition (4 mentions – e.g. soil testing and benchmarking).

**Chart 2: Respondent participation in project activities**



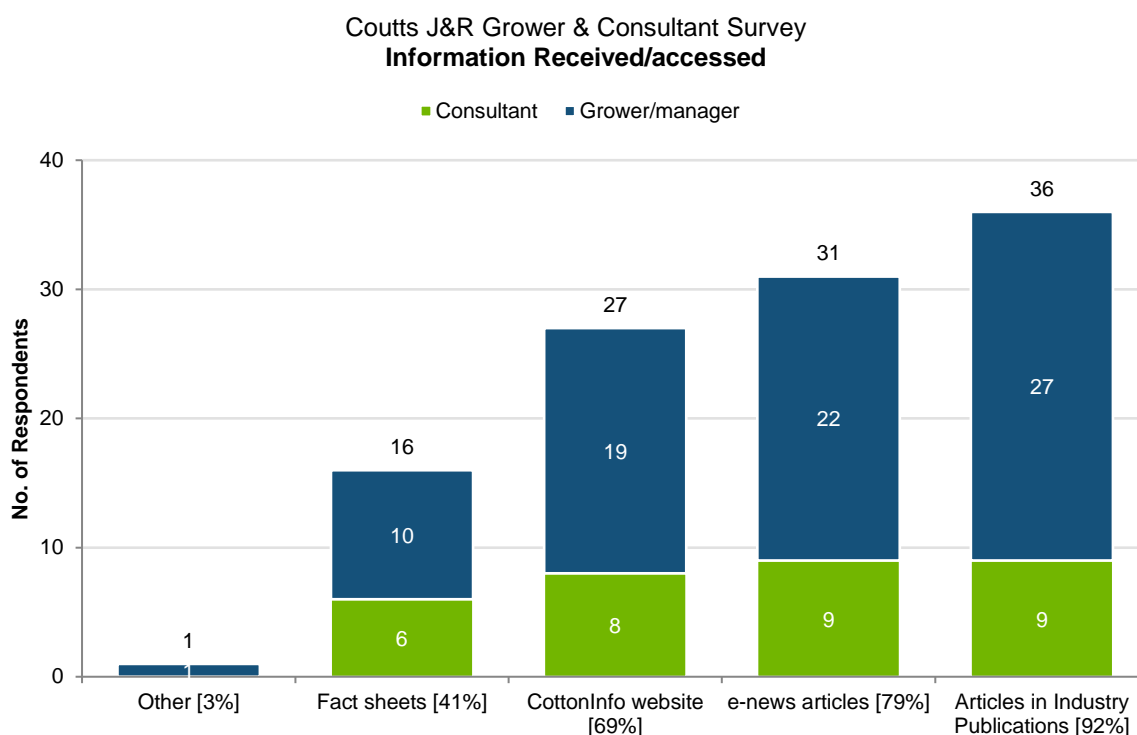
Reading articles in industry publications was the most common method respondents accessed information (92%), followed by e-newsletter articles (79%), the CottonInfo website (69%), and fact sheets (41%).

The e-newsletters were highlighted as being particularly helpful (9 mentions), especially by consultants, who described them as being *very helpful, useful, informative, prompt to find out more, weekly forecast, and helps plan activities for next fortnight*. Industry magazines – primarily CRDC’s Spotlight – were also noted by growers and consultants as being interesting and informative (7 mentions). Some growers noted that all sources of information were helpful to some degree (6 mentions), with a few interested in comparing information from different sources and seeing what others in the industry were doing (3 mentions). The fact sheets (4 mentions) and the CottonInfo website (2 mentions) were also mentioned as being particularly useful.

Asked to provide any suggestions on what information they would have liked more of, growers listed a number of topics (6 mentions) including *water use efficiency, solar pump case studies, nutrition, diseases, reduced fertiliser usage, and pumping efficiency*. They also highlighted the need for more research on specific topics (5 mentions) including *diseases and energy and pumping efficiency*. A couple of growers believed up-to-date summaries on the current information and research findings would be useful, while another couple required more assistance and advice to help facilitate changes.

Information that consultants wanted more of included *cover cropping in cotton production system and how to integrate carbon farming into dryland systems*, with one consultant describing the need for *summaries and information about where different research and progress are up to* and another interested in more locally relevant information.

**Chart 3: Information received/accessed by respondents**



## Impacts

### Seasonal Forecasting (KPI 4a<sup>iii</sup>)

#### KPI 4a<sup>iii</sup>: Increased confidence using seasonal forecasting information

50%\* of cotton growers have increased confidence in the use of short, medium and long term seasonal forecasting information and are able to translate this into better decision making surrounding more efficient use of farm inputs and better agronomy practices to reduce emissions. *[by May 2017]*

Status
Positive Gains

### Industry Surveys

Analysis and comparison of the CRDC Cotton Growing Practices Surveys (2013-2016<sup>6</sup>) revealed **increased cotton grower confidence and understanding in the use of seasonal forecasting information** to aid on-farm decision making – although not to the extent of the KPI 4a<sup>ii</sup> 50% target. Comparison of the surveys showed:

- A 10% increase in grower respondents who agreed or totally agreed they were confident in the use of **seasonal forecasting information** to aid crop selection, nitrogen and irrigation decisions – up from 44% in 2013 to 54% in 2016;
- The 90% of grower respondents who understood or thoroughly understood the **EI-Nino Southern Oscillation effect on local rainfall & temperature** remained consistent in 2014 and 2016;

<sup>6</sup> draft findings only as at January 2016; report not yet published or publicly available.

- A 20% increase in grower respondents who understood or thoroughly understood **southern annular mode and other climate process that impact on rainfall for their area** – up from 33% in 2014 to 53% in 2016; and
- A 2% increase in the already high percentage of grower respondents who understood how to **source climate information useful to on-farm decision making** – up from 89% in 2014 to 91% in 2016.

The 2016 Cotton Growing Practices Survey<sup>6</sup> also showed that the CottonInfo team, information resources, and myBMP had assisted 82% of grower respondents (n=62) improve their **water & moisture management, seasonal forecasting & climate** practices – 20% a little, 29% moderately, 29% significantly, and 4% very significantly.

The CRDC Cotton Consultants Surveys (2013/14 and 2015/16) also demonstrated positive gains in consultant understanding with 62% of respondents (n=63) indicating the CottonInfo Moisture Manager newsletter and IrriSat climate workshops had resulted in an **increased use and understanding of seasonal forecasting and better decisions**. There were also a 3% increase in the already high number of consultant respondents who had some to strong understanding of **El-Nino Southern Oscillation effect on rainfall in your area** – up from 96% in 2013/14 to 99% in 2015/16 – and an 11% increase in the number who understood **other climate process that impact rainfall in your area** – up from 78% in 2013/14 to 89% in 2015/16. The 2015/16 survey also showed that the CottonInfo team, information resources, and myBMP had assisted 88% of consultant respondents (n=140) improve **seasonal forecasting & climate practices** on client's farms – 14% a little, 32% moderately, 32% significantly, and 10% very significantly.

Supporting these findings, a Coutts J&R survey of Cotton Growers and Consultants undertaken in December 2016 indicated a fairly large increase in both grower and consultant understanding on the **use of seasonal forecasting to make better decisions** – with growers providing an overall average rating of 7.0 out of 10 (n=27) and consultants an overall average rating of 7.3 out of 10 (n=11).

Half of those surveyed (6 consultants and 13 grower) also indicated that the project had influenced them **to start or increase the use of seasonal forecasting information or tools in their decision making or advice they provide**. Grower comments on what seasonal forecasting actions they had taken included using *weather forecasting [to see] how each season is going to be different, manage irrigation in a more timely fashion, and installation of weather towers in the area [that] are highly sophisticated*.

Some growers highlighted that the information and tools relating to weather, climate and forecasting had been particularly insightful (5 mentions), with described 'lightbulb' moments including *our capacity to be able to understand the productive tools that are available for forecasting the weather and for the ability to be able to use those in management planning for our farming operations; how to use the forecasting to make better farm decisions; and we need to get our nitrogen in early so we have time to get it down with the help of the seasonal weather forecasting if it is going to be wet or are we going to lose it*.

## Activity Evaluations

Summaries of activity evaluation data including post-activity participant feedback sheets (*note: more detailed analysis is located in the Part C: Activity Audit section of this report*):

- **IrriSAT Workshops (July – August 2015):** Fifty-six grower and adviser feedback sheet respondents indicated the workshop had met their aims and expectations (4.4 avg. on a 1-5 scale) and had increased their understanding and confidence in using the IrriSAT technology – +1.2 to +2.1 avg. gains on a 1-5 scale when comparing self-assessed before and after workshop understanding and confidence on IrriSAT topics. Eight-five percent indicated they would likely adopt the IrriSAT technology, while 11% had already adopted it.
- **Climate Risk Management Workshop (August 2015):** Organiser comments indicated that all five participants had signed up to the moisture manager newsletter and intended to apply information to farm decisions. It was noted that *the level of knowledge of this particular group is considered low, so large gains were made in explaining basic climate processes*<sup>viii</sup>.
- **Climate Researcher Farm Tour (April 2015):** Organiser comments noted that four growers had *really enjoyed talking to the scientists about climate processes* and had improved their understanding of climate outputs available at the BOM website and how to apply the information to on-farm decision making<sup>viii</sup>.
- **Yanco Cotton Shortcourse (August 2014):** According to organisers, *all attendees showed an interest in following the industry e-news with the view to applying forecasting information to operational activities on cotton and grain farming*<sup>viii</sup>.
- **Climate Risk Presentation to Walgett CGA (December 2014):** It was noted that all participants intend improve their understanding of *climate process to make more informed decisions with fertiliser use and managing farm inputs*<sup>viii</sup>.

## Nitrogen Management & Energy Use (KPI 4div, KPI 4dvi, KPI 4eii, KPI 4eiii)

**KPI 4div:** Improved understanding of the ERF, emissions management and sequestration

75%* of cotton growers and 90% of advisers have an improved understanding of the ERF, emissions management and sequestration in cotton farming. <i>[by May 2017]</i>	<p><b>Status</b></p> <p><b>Mixed Gains</b></p>
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*Note: This KPI overlaps with KPI 6aiii which focuses on ERF understanding gains.*

## Industry Surveys

Changes in grower and adviser understanding of emissions management and sequestration in cotton farming were varied (i.e. some decreased and some increased) when comparing results from the CRDC Cotton Growing Practices (2013-2016) and Cotton Consultants Surveys (2013/14 and 2015/16).

Comparison showed the percentage of growers understanding or thoroughly understanding the following topics decreased:

- -13% decrease in grower respondents who understood or thoroughly understood **sequestering soil carbon in carbon farming system** – down from 43% in 2014 (n=171) to 30% in 2016 (n=140).
- -3% decrease in grower respondents who understood or thoroughly understood **native vegetation carbon sequestration** – down from 41% in 2014 (n=171) to 38% in 2016 (n=140).
- -16% decrease in grower respondents who understood or thoroughly understood **the carbon footprint of my farming operation** – down from 49% in 2014 (n=171) to 33% in 2016 (n=140).
- -13% decrease in the already low number of grower respondents who understood or thoroughly understood **the Emissions Reduction Fund and how to participate** – down from 16% in 2014 (n=171) to 9% in 2016 (n=140).

Positive gains were shown however in the percentage of growers that agreed or totally agreed that they had adequate information to calculate NUE; a good understanding of how to best maximise NUE; and an understanding of how to reduce nitrous oxide emissions from their systems:

- +22% increase in grower respondents who agreed or totally agreed **adequate information was available to calculate nitrogen use efficiency** – up 45% in 2013 (n=154) to 67% in 2016 (n=140).
- +11% increase in grower respondents who agreed to totally agreed they had a **good understanding of how to best maximise N use efficiency** – up from 62% in 2013 (n=154) to 74% in 2016 (n=140).
- +12% increase in grower respondents who agreed to totally agreed they understood **how to reduce nitrous oxide emissions from their systems** – up from 28% in 2013 (n=154) to 40% in 2016 (n=140).

The percentage of advisers/consultants with some to strong understanding of emissions management and sequestration topics remained fairly consistent (i.e. only varying a few percent) when comparing the 2013/14 (n=51) and 2015/16 (n=63) consultant surveys. Across both surveys, around two-thirds had some to strong understanding of **sequestering soil carbon in farming systems**; one-third had some to strong understanding of the **carbon farming initiative**; almost all had some to strong understanding of the **process by which nitrogen is lost in a cotton farming system**; and all had some to strong understanding of the **practices to minimise losses from applied fertiliser**. The one area which did show a noticeable increase in the percentage of consultants with understanding, was **farming practices to improve nitrogen fertiliser efficiency and reduce emissions** – up 11% from 81% in 2013/14 to 97% in 2015/16.

Although there were mixed changes in understanding of nitrogen management and energy use topics, the 2016 Grower and 2015/16 Consultant surveys did highlight the impact of the CottonInfo team, information resources, and myBMP on improving farm practices, with results showing it had:

- Assisted 63% of grower respondents improve **energy use** practices – 33% a little, 16% moderately, 12% significantly, and 2% very significantly (n=140); and
- Assisted 57% of consultants improve **energy use** practices on client's farms – 26% a little, 21% moderately; and 10% significantly (n=62).
- Assisted 84% of grower respondents improve **nutrition and soil** practices – 26% a little, 29% moderately, 21% significantly, and 8% very significantly (n=140); and

- Assisted 95% of consultants improve **nutrition and soil** practices on client's farms – 16% a little, 35% moderately, 39% significantly, and 5% very significantly (n=62).

Findings from the Coutts J&R Consultant and Grower Survey showed similarities in the limited increases in understanding emerging from the CRDC survey comparisons, with respondents rating the level with which project activities and information had increased their understanding fairly little to moderately for the following topics (on a 0 to 10 scale where 0=little increase and 10=large increase):

- **Carbon Sequestration in cotton farming** – average ratings of 5.0 for growers (n=27) and 4.5 for advisers (n=11).
- **Economic and risks associated with participating in the ERF and implementing mitigation and sequestration practices farming** – average ratings of 4.8 for growers (n=27) and 5.3 for advisers (n=11).
- **Reducing emissions on farm** – average ratings of 4.7 for growers (n=27) and 4.9 for advisers (n=11).
- **Emissions Reduction Fund** – average ratings of 4.1 for growers (n=27) and 3.9 for advisers (n=11).

Continuing to draw parallels with the CRDC survey comparisons, growers and consultants in the Coutts J&R survey indicted their biggest gains in understanding were on the topics of nitrogen management and efficiency:

- **How losses of applied nitrogen occur in irrigated cotton** – average ratings of 7.2 for growers (n=27) and 7.5 for advisers (n=11).
- **How better managing nitrogen application can reduce N2O emissions and improve sustainability credentials** – average ratings of 7.0 for growers (n=27) and 7.1 for advisers (n=11).

On the topic of **input and energy efficiency** the impact of project activities and information on understanding was higher for growers than consultants – average ratings of 6.3 for growers (n=27) and 4.8 for advisers (n=11).

Some growers highlighted that the information on nitrogen use and crop nutrition had been particularly insightful (6 mentions), with described 'lightbulb' moments including *no use giving it a lot of nutrition if no water* and *timing of nitrogen application reducing loses through over watering*.

Asked to indicate what **actions had been influenced or supported by project activities and information**, 49% (13 growers and 6 consultants) had taken actions to improve energy use efficiency, 49% (12 growers and 7 consultants) had taken actions to improve emissions management, and 33% (10 growers and 3 consultants) had taken actions to increase sequestration of carbon and better manage riparian zones. Comment on actions undertaken included:

- **Improve energy use efficiency and emissions management:**
  - *Growers: buying a tractor that incorporates emissions reduction; pump and motor selection and upgrading from the old ones and the emissions are less; upgraded to more modern tractors better traction and better fuel consumption; made more queries with the supplier of the solar for the bores; a full report on our energy use; and calculated our carbon footprint.;*

- Consultants: advice you give to grower to reduce fertilizers and carbon emissions; several growers that have taken on board as well as solar power and offset usage; and some of my clients are doing energy audits to help them reduce energy cost which will help reduce emissions in the long run.
- **Increase sequestration of carbon and better manage riparian zones:**
  - Growers: zero till and stubble retention; continued a 12 year program of zero till; did a trial and then this year the soils test and then taken into account the soil testing and matching the water to our nutrition; nitrogen by soil testing and knowing where it is coming from and where it is going too; and reducing the use of the fertilizers
  - Consultants: riparian there has been work on that they are starting to manage those zones better and looking after waterways and preserving rather than planting a lot more trees.

As a result of these actions taken, respondents had **observed benefits** including: economic benefits (8 mentions – e.g. reduced input costs, lower energy bills, more sustainable farming, and increased profit); environmental benefits (6 mentions – e.g. reduced erosion and healthier ecosystems); improved nitrogen use (6 mentions – e.g. efficiency improvements and reduced emissions and run-off); improved soil and crop health (4 mentions); and improved monitoring and information accuracy (2 mentions).

Expected future benefits were similar to those already observed, with the majority hoping for economic improvements (16 mentions) including increased productivity and efficiency and reduced energy and input costs.

## Activity Evaluations

Summaries of activity evaluation data including post-activity participant feedback sheets (*note: more detailed analysis is located in the Part C: Activity Audit section of this report*):

- **Cotton Nutrition & NUE Workshops (July 2016 and November 2016)**: Twenty-six growers and advisers completing post-workshop feedback sheets indicated the workshop had met their expectations (4.2 avg. on a 1-5 scale) and increased their knowledge on the topics presented. A high percentage (40-70%) indicated they would likely adopt the nutrition concepts, while 20-50% had adopted them already. Organiser comments on the workshops described how *since the project commenced, growers and adviser knowledge has increased substantially in the area of nutrient budgeting and growing high yields, sustainably. A large proportion of the industry is splitting applications of nitrogen to help better manage supply with crop demand. Best Management Practices (BMPs) on timing and application are largely occurring at this stage of the project.*
- **Solar Pumping and Energy Efficiency for Irrigators Field Days (November 2015 – September 2016)**: Post-activity surveys indicated attendees found the field days useful, gaining knowledge in a variety of areas including reducing greenhouse gas emissions, renewable energy applications and energy efficiency. Understanding of funding options and government incentives available for implementing energy efficient practices and renewable energy was increased, with a belief that real benefits can be achieved by utilising sustainable practices such as renewable energy and becoming energy efficient. Organisers noted there was *lots of interest in feasibility and quotes with commercial solar suppliers.*

- Cotton Nutrition Tour Field Days (February 2016):** Feedback sheets from 124 attendees indicated the field days had met aims and expectations (4.0 avg. on a 1-5 scale), with a 40% average increase in understanding of the nitrogen cycle and sustainable yields topics presented. The practices most likely to be adopted after the field days were ‘investigating irrigation deficits and nitrogen rates to improve crop gross margins’ (73%) and ‘consider mineralised nitrogen calculations in more detail when nutrient budgeting’ (66%). Positive comments from the Griffith field day included *got a lot out of the day; excellent trial; and liked the range of speakers and quick presentations.*
- Soil Health Workshop (October 2015):** Of the fourteen post-workshop feedback sheet respondents, 71% rated the workshop as good or very good and 64% felt the workshop had met their aims and expectations, with content and delivery rated highly (4.0 avg. on a 1-5 scale). Most respondents indicated an improvement in the levels of understanding as a result of the workshop.
- Cotton Nutrition Workshops (December 2014 – April 2015):** A feedback report covering the four December 2014 workshops (48 respondents) noted that 100% of respondents indicated the workshop would help them in the management of soils, crop nutrition and nitrogen use efficiency for cotton production. In terms of achieving the project objectives, the report concluded that *the cotton nutrition workshops have gone some way in up-skilling cotton and grains industry advisers and building extension networks and key influencers as evidenced by the post workshop evaluations. This knowledge will aid in advisors offering emissions management so they are skilled in their advice and discussions with cotton clients.* Additional data from the April 2015 Emerald workshops found 32 respondents rated the workshops very highly, providing above average ratings of all the content delivered (3.7-4.7 avg. on a 1-5 scale). Around three-quarters intended to make practice changes following the workshop including 76% who intended to soil test every year and 41% intending to use NutriLOGIC every year following the explanation of its functions.
- Energy Efficiency ‘Big Days Out’ Field Days (February 2015):** Fifty post-activity survey respondents indicated the field days had met their aims and expectations in improving their understanding of energy efficiency on cotton farms (4.3 avg. on a 1-5 scale). Understanding gains were made in all presented topics, with the largest gain made in renewable technology (+1.3 avg. on a 1-5 scale). Of those respondents who indicated they would likely adopt on-farm practices as a result of the information presented: 75% indicated they were likely to adopt renewable energy technology (n=46), 69% energy efficiency audits (n=36), 54% pump efficiency actions (n=37), and 38% tractor efficiency actions (n=17). The field days were noted in the activity evaluation report to *have improved the capacity of cotton growers and industry personnel to understand the complexity of energy consumption and greenhouse gas emissions on farms and ways these can be reduced.* They were described as *having generated interest amongst growers on undertaking energy audits, actions to improve energy efficiency and exploring the opportunities of using renewable energy to supplement diesel and electricity on farm.*
- Soil Carbon Workshops (March – June 2014):** A post-activity survey report described the workshops as being conducted in a *relaxed, interactive and informal manner,* with respondents *showing an interest in improving farming systems to build soil carbon.* Overall, average ratings showed the workshops had helped participants understand the topics presented, with the highest understanding gains in ‘how organic matter helps the soil and crops’ (4.2 avg. on a 1-5 scale), ‘the functions of soil organic matter and carbon’ (4.0 avg.), and ‘ways to build soil carbon’ (3.6 avg.). Progress Report 3 noted that growers and advisers attending were *generally very conscious of long term sustainability and the role of soil carbon in soil biological functions.*

- **Industry Workshops on Nitrogen Use (December 2013):** Of the 82 post-activity survey respondents, 94% thought the workshops had been beneficial in helping understanding of soil and nutrition. Progress Report 2 described how the survey results *indicate nitrogen supply is becoming more tailored to fit with nitrogen demand, and growers and advisers surveyed are splitting nitrogen applications through the crop growth cycle.*

#### KPI 4dvi: Plant tissue analysis

25%* of industry implementing plant tissue analysis to monitor crop nutrition balances to meet crop nutrient demand. [by May 2017]	<b>Status</b>
	<b>Yes</b>

#### Industry Surveys

The 2016 CRDC Cotton Growing Practices Survey found that 47% of the 140 respondents have used leaf/petiole testing when deciding on fertiliser rates for their 2015/16 crop, while consultants in the 2015/16 CRDC Cotton Consultants Survey reported they were using leaf/petiole testing with 35% of their total combined 157 clients covering a total of 78,082 hectares – 40% of the total 193,601 hectares represented.

Around half of respondents (14 growers and 7 consultants) to the Coutts J&R Consultant and Grower Survey indicated they had implemented plant tissue analysis to monitor crop nutrition balances as a result of influence or support from project activities and information.

#### Activity Evaluations

Feedback from the December 2014 Cotton Nutrition Workshops showed 40% of the 48 respondents were using plant tissue testing to monitor nutrient balances to meet crop nutrient demand. Substantial increases were recorded on those intending to use petiole/leaf testing, with 46% of the thirty-two April 2015 Cotton Nutrition Workshops respondents indicating they would use it each year. A survey report from the 2013 Industry Workshops on Nitrogen Use also indicated that 39% of the 82 respondents use (or would like to use) plant tissue analysis to monitor crop nutrition balances to meet crop nutrient demand.

#### KPI 4eii & KPI 4eiii: Revised myBMP modules

90%* of cotton growers have been exposed to the revised modules [by December 2016] and 60%* of growers have completed the Self Assessment Tools for the revised myBMP modules. [by May 2017]	<b>Status</b>
	<b>Unknown</b>

Minimal data was available on the total percentage of growers that have been exposed to or have completed the Self Assessment Tools for the revised modules.

#### Industry Surveys

Twenty-eight percent of respondents (8 growers and 3 consultants) to the Coutts J&R Consultant and Grower Survey indicated they had participated in myBMP self-assessment tools for the revised myBMP modules. Comments on participation in the revised myBMP modules included a

grower who uses *BMP* to have a check list to see how our operations are performing and a consultant who noted that 10% of my clients have been to *BMP* assessments.

## Natural Resource Management (KPI 5cii, KPI 5ciii, KPI 5dii)

### KPI 5cii & KPI 5ciii: Revised myBMP natural assets module

90%\* of cotton growers have been exposed to the revised natural assets Module [by December 2016] and 60%\* of growers have completed the Self Assessment Tools for the revised natural assets myBMP module. [by May 2017]

Status

Unknown

No data was available on the total percentage of growers who have been exposed to or have completed the Self Assessment Tools for the revised natural assets module.

### KPI 5dii: Awareness of the Carbon Calculator

50%\* of cotton growers and advisers are aware of the Carbon Calculator for cotton landscapes and/or other relevant tools [by May 2017]

Status

Delayed

According to the latest project progress report, the carbon calculator has been delayed and is scheduled for completion in Q1 2017<sup>vii</sup>. Despite the delays, the calculator's testing and development phase has resulted in 11% of the 140 CRDC Cotton Growing Practices 2016 respondents aware of it.

## Objective 6

Clarify to cotton industry participants the opportunities, benefits and trade-offs of participating in the ERF and/or implementing potential mitigation/sequestration options.

### Summary

Delivery of Objective 6 activities – focused primarily on creating awareness of the ERF and carbon sequestration – was severely impacted by carbon policy changes and the resulting limited incentives for cotton industry participation. Despite this, extension activities were still delivered through face-to-face interaction (e.g. workshops and meetings), personalised e-communication (e.g. webinars), and industry publications (e.g. fact sheets and journal articles). There was some evidence of positive gains being made, with 40% of consultants in the CRDC Cotton Consultants Survey confident they could access information about the opportunities, benefits and trade-offs of participating in the ERF and/or implementing potential mitigation/sequestration options. Overall awareness of ERF issues remained however well below anticipated percentages, with Progress Report 6 reporting awareness at 15%.

### Activities Delivered

*Note: Full details of Objective 6 activities undertaken are available in the Part C Activity Audit.*

## ACTIVITY 6a: Extension campaign

Extension campaign to provide information and raise awareness.

Delivered

External  
Issues

The **CFI Extension plan** was submitted to the commonwealth in January 2014 (KPI 6ai)<sup>ii</sup>, though issues associated with recent developments in carbon policy and ERF were noted in Progress Report 3, which explained that the *anticipated CO2 price from direct action tender [was] likely to fall in a range \$5-\$10/t making industry participation in CFI a remote possibility*<sup>iii</sup>. The difficulty in *extending negative messages regarding ERF Policy* was highlighted in Progress Report 5, which explained that *incentives for cotton industry participation are limited at the current ERF auction rates and high administration costs involved with participating in broad-acre cropping methods – especially when growers can be myBMP approved and perform best practice, receive a bale premium of \$8-15 without signing a detailed contract with the Australian Government*<sup>t</sup>.

Despite issues surrounding carbon policy changes and the resulting change in project focus (i.e. emphasis on seasonal forecasting, nitrogen management and energy use activities), ERF activities that were undertaken included (KPI 6aii):

### Face-to-face interaction (e.g. workshop, field days, meetings):

- Promotion and awareness raising of ERF at the Rangelands Carbon Conference at Cobar in October 2016 – attended by 185 growers and industry representatives<sup>v</sup>.
- A presentation to the PM&C on carbon farming opportunities to the indigenous land council in February 2016 – attended by 30 indigenous land council members<sup>vi</sup>.
- A grower meeting providing feedback to visiting DotE officers regarding ERF Methods and cotton/grain at Narromine in May 2015 – attended by 15 government representatives and growers<sup>v</sup>.
- Two FertCare Nitrogen Use Efficiency/ERF Workshops held in August and September 2015 – attended by 55 advisers<sup>v</sup>. [Also related to Objective 4]

### Personalised e-communication (e.g. e-newsletters, webinars):

- ERF Vegetation methods webinar held in January 2016 – attended by 5 industry representatives and 1 grower<sup>vi</sup>.
- Three Webinars on improving NUE and ERF awareness held in June 2015 – attended by 55 growers and advisers<sup>v</sup>. [Also related to Objective 4]
- Related newsletter articles

### Broad industry level (e.g. industry publications):

- Seven industry ERF fact sheets published on the CottonInfo website between March 2016 and May 2016 explaining different ERF methods and their application to cotton/grain<sup>vi vii</sup>.
- Journal article on Nitrogen Use & ERF published in the AFBM journal in May 2015<sup>v</sup>. [Also related to Objective 4]
- ERF Blog article published in January 2015 to disseminate information to growers regarding the release of the cotton-nitrogen carbon farming method<sup>viii</sup>.

## ACTIVITY 6b: Economic and risk analysis

Economic and risk analysis to determine and cost the opportunities, benefits and risks involved in participating in the ERF and implementing mitigation and sequestration practices.

Delivered

Delays /  
Ongoing

Progress Report 5 noted the development of the **economic model specifically tailored to cotton farming** was *in progress as methods are developed* (KPI 6bi)<sup>v</sup>. There appeared to be some issues though with Progress Report 6 noting the contract with NSW DPI had been severed and a new contract was pending approval<sup>vi</sup>. An **economic analysis of potentially relevant ERF methodologies** undertaken for representative cotton farming scenarios (KPI 6bii) was reported to have commenced in January 2014, with Progress Report 3 indicating a benefit-cost analysis on a CFI project cotton-nitrogen methodology was under review and work with the Department of the Environment on methodology improvements was continuing<sup>iii</sup>.

## Impacts

### KPI 6a<sup>iii</sup>: Awareness of the ERF

75%\* of cotton growers and 90%\* of advisers are aware of the ERF and have an improved understanding of the ERF and emissions management in cotton farming [by May 2017]

Status

Limited

*Note: This KPI overlaps with KPI 4div which focuses on emissions management understanding gains made in emissions management.*

### Industry Surveys

Progress Report 6 indicated awareness of ERF issues was at 15%<sup>vi</sup>, while the CRDC Cotton Growing Practices Survey 2016 showed awareness of ERF related carbon fact sheets an information resources as (n=140):

- 21% (Webinar) Carbon farming opportunities for cotton growers
- 16% (Fact sheet) ERF – fertiliser use efficiency in irrigated cotton
- 10% (Fact sheet) Cotton and the ERF
- 10% (Fact sheet) ERF – Soil carbon sequestration
- 11% (Fact sheet) ERF – Industrial electricity and fuel efficiency
- 3% (Fact sheet) ERF – Reforestation and afforestation
- 4% (Fact sheet) ERF – Native vegetation regrowth
- 1% (Case study) Investigating carbon farming in the Macquarie

Only one consultant respondent in the Coutts J&R Consultant and Grower Survey indicated they had provided information/advice to growers about the issues and opportunities in participating in the ERF.

## KPI 6aiv: Access to ERF information

Cotton growers and advisers believe they have access to the required information to make decisions about participating in the ERF* <i>[by May 2017]</i>	<b>Status</b> <b>Positive gains</b>
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### Industry Surveys

According to the CRDC Cotton Consultants Survey 2015/16, 40% of the 63 consultant respondents were somewhat or very confident that if a client was considering participating in an ERF project they could access information about the opportunities, benefits and trade-offs of participating in the ERF and/or implementing potential mitigation/sequestration options.

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<sup>i</sup> Progress Report No.1 (July 2013 - December 2013)  
<sup>ii</sup> Progress Report No.2 (December 2013 - May 2014)  
<sup>iii</sup> Progress Report No.3 (May 2014 - December 2014)  
<sup>iv</sup> Progress Report No.4 (December 2014 - May 2015)  
<sup>v</sup> Progress Report No.5 (May 2015 - December 2015)  
<sup>vi</sup> Progress Report No.6 (December 2015 - May 2016)  
<sup>vii</sup> Progress Report No.7 (May 2016 - December 2016)  
<sup>viii</sup> CottonInfo YourDATA M&E Database

## PART C: ACTIVITY AUDIT

(Note: based on the amended May 2015 Schedule of Project Objectives, Activities and Delivery Timeframes)

### Objective 1

Project extension officers skilled to provide high quality information and support about greenhouse gas emissions management and the Emissions reduction Fund.

Activity and /or deliverable	KPI Type	Key Performance Indicators	Achievements	Source
<p><b>Activity 1.</b> Project staff and extension officers (10) to complete carbon farming training for extension providers provided by the Commonwealth.</p> <p>The training model used will be a combination of all attending and train the trainer, but Cotton RDC will be accountable for ten project staff and extension officers completing all training provided by the Commonwealth.</p>	Staff Training	<p><b>[Achieved] KPI 1a.</b> 10 Project staff and extension officers (Regional Delivery Officers and Technical Specialists) complete Carbon Farming Initiative eLearning course. <i>[September 2013]</i></p>	<p>10 members of the CottonInfo team completed e-learning course and face to face training. (1 member completed in Dec 13)</p> <ul style="list-style-type: none"> <li>• <b>Month:</b> Sep 13</li> </ul>	Progress Report 1 (Jul 13-Dec 13)
	Staff Training	<p><b>[Achieved] KPI 1b.</b> Project staff and extension officers (Regional Delivery Officers and Technical Specialists) attend the two face-to-face sessions and the two webinars per financial year (according to the training model being used by Cotton RDC). <i>[Annually]</i></p>	<p>Carbon Farming Meeting &amp; Training:</p> <ul style="list-style-type: none"> <li>• <b>Participants:</b> All employed staff attended (Jon Welsh absent)</li> <li>• <b>Month:</b> Nov 16</li> <li>• <b>Location:</b> Sydney</li> </ul>	Progress Report 7 (May 16 – Dec 16)
			<p>Carbon Farming Meeting &amp; Training:</p> <ul style="list-style-type: none"> <li>• <b>Month:</b> May 16</li> <li>• <b>Participants:</b> All RDOs</li> <li>• <b>Location:</b> Macquarie</li> </ul>	YourDATA
			<p>Carbon Farming Meeting &amp; Training:</p> <ul style="list-style-type: none"> <li>• <b>Participants:</b> 9 members of the Cotton Info team (all RDOs) attended the webinar and completed the face to face training</li> <li>• <b>Location:</b> Melbourne</li> <li>• <b>Month:</b> Mar 15</li> <li>• The general discussion was very good for the first 2 webinars and the attendance dropped off for the last one.</li> </ul>	Progress Report 4 (Dec 14–May 15); YourDATA

			Webinar & Training: <ul style="list-style-type: none"> <li>• <b>Participants:</b> 7 members of the Cotton Info team attended the webinar and completed the face to face training</li> <li>• <b>Month:</b> Jun 14, Oct 14</li> </ul>	Progress Report 3 (May 14-Dec 14)
			Webinar & Training: <ul style="list-style-type: none"> <li>• <b>Participants:</b> 9 members of the Cotton Info team attended the webinar and completed the face to face training</li> <li>• <b>Month:</b> Feb 14 (webinar) &amp; Mar 14 (training)</li> </ul>	Progress Report 2 (Dec 13-May 14)
		<b>Other Activities</b>	Carbon Technical Lead completing relevant Grad Cert in Climate Change at UoM	Progress Report 3 (May 14-Dec 14)

## Objective 2

Up-skill cotton & grains industry advisers, extension networks and key influencers

Activity and /or deliverable	KPI Type	Key Performance Indicators	Achievements	Source
<b>Activity 2.</b> Provide targeted training to up-skill industry advisers about emissions management and the ERF so that they are skilled to incorporate these issues in their advice and discussions with cotton clients: Delivery to be by workshops, webinars, and to be incorporated as module of Cotton and the environment course of the Grad Cert Rural Science: Cotton Production Course (UNE).	Development	<b>[Achieved] KPI 2a.</b> Training course on the fundamentals of carbon and nutrition is developed, and incorporated into the Cotton Production Course. <i>[January 2014]</i>	Content submitted to UNE January 2014 <ul style="list-style-type: none"> <li>Content presented to students as per approved subject material May 2014</li> </ul>	Progress Report 2 (Dec 13-May 14)
	Adviser training	<b>[Achieved] KPI 2b.</b> At least six training workshops are held (1 workshop in each of 6 key cotton growing region) in 2015 and 2016. <i>[August 2015 &amp; 2016]</i>  See Activity 4d & 4e: Extension campaign delivered from February 2014 to April 2017	50 workshops conducted since project commencement, including: <ul style="list-style-type: none"> <li>8 Cotton Nutrition workshops plus 2 Energy Workshops:               <ul style="list-style-type: none"> <li><b>Month:</b> Apr 15 – Dec 15</li> <li><b>Hectares:</b> 73,000ha of a national crop of 200,000ha</li> </ul> </li> <li>10 soil carbon workshops completed in partnership with QDAFF and Cotton Grower Services.               <ul style="list-style-type: none"> <li><b>Month:</b> Mar 14 – Jun 14</li> </ul> </li> <li>8 Nitrogen use workshops completed               <ul style="list-style-type: none"> <li><b>Month:</b> Dec 13</li> </ul> </li> </ul>	Progress Report 7 (May 16 – Dec 16); Progress Report 4 (Dec 14–May 15) ; Progress Report 3 (May 14-Dec 14); Progress Report 2 (Dec 13-May 14)
	Adviser training	<b>[Achieved] KPI 2c.</b> The course is offered in 2015 and 2016 via a series of at least 6 webinars. <i>[August 2015 &amp; 2016]</i>	6 webinars in July 2015 and July 2016 on Nitrogen Use Efficiency, Crop Nutrition and ERF Awareness	
	Training & Extension	<b>Other Activities</b>	Share findings of Automated Irrigation BCA to class at UoM: <ul style="list-style-type: none"> <li><b>Participants:</b> 20 lecturers &amp; students</li> <li><b>Month:</b> Oct 16;</li> <li><b>Location:</b> Melbourne</li> </ul> Nitrogen trials - messaging and extension: <ul style="list-style-type: none"> <li><b>Participants:</b> All industry extension staff and Jon Welsh</li> <li><b>Month:</b> Jul 16</li> <li><b>Location:</b> CRDC Narrabri</li> </ul>	Progress Report 7 (May 16 – Dec 16)

				2016 interim report)
			<p>UNE lecture on carbon and climate:</p> <ul style="list-style-type: none"> <li>• <b>Participants:</b> 30 current and future advisers &amp; growers</li> <li>• <b>Month:</b> May 16</li> <li>• <b>Location:</b> Armidale</li> <li>• Seasonal forecasting reducing emissions and improving NUE</li> </ul>	Progress Report 7 (May 16 – Dec 16)
			<p>UNE lecture on carbon and climate:</p> <ul style="list-style-type: none"> <li>• <b>Participants:</b> 15 Students</li> <li>• <b>Month:</b> May 16</li> <li>• <b>Location:</b> Armidale</li> </ul>	Progress Report 6 (Dec 15 –May 16)
			<p>CCRSPI Conference:</p> <ul style="list-style-type: none"> <li>• <b>Participants:</b> 118 researchers &amp; industry leaders</li> <li>• <b>Month:</b> May 16</li> <li>• Sharing extension methods</li> </ul>	Progress Report 6 (Dec 15 –May 16); YourDATA
			<p>Training presentation to DoA and E&amp;O:</p> <ul style="list-style-type: none"> <li>• <b>Participants:</b> 100 E&amp;O project officers</li> <li>• <b>Month:</b> Feb 16</li> <li>• Sharing extension methods</li> </ul>	Progress Report 6 (Dec 15 –May 16)
			<p>UNE Climate Change &amp; Weather module delivered:</p> <ul style="list-style-type: none"> <li>• <b>Participants:</b> 20 post grad students</li> <li>• <b>Month:</b> May 15</li> <li>• <b>Location:</b> Armidale</li> </ul>	Progress Report 4 (Dec 14–May 15)
			<p>UNE Cotton Production Course:</p> <ul style="list-style-type: none"> <li>• <b>Participants:</b> 20 post grad students</li> <li>• <b>Month:</b> May 15</li> <li>• <b>Location:</b> Armidale</li> </ul>	YourDATA
			<p>Climate Risk UNE/GRDC Grains Grad Cert:</p> <ul style="list-style-type: none"> <li>• <b>Participants:</b> 30 post grad students</li> <li>• <b>Month:</b> Mar 15</li> <li>• <b>Location:</b> Armidale</li> <li>• Present Climate risk syllabus to students in the UNE Grad Cert/Masters of Agriculture</li> </ul>	YourDATA
			N presentation to CottonInfo:	YourDATA

			<ul style="list-style-type: none"> <li>• <b>Participants:</b> 12 Industry</li> <li>• <b>Month:</b> Sep 14</li> <li>• To discuss potential extension strategies for the CFI project in 2015/16</li> </ul>	
			<p>UNE Cotton Production Course:</p> <ul style="list-style-type: none"> <li>• <b>Participants:</b> 30 students</li> <li>• <b>Month:</b> May 14</li> <li>• <b>Location:</b> UNE Armidale</li> <li>• Present carbon and climate chapters to students enrolled in the environment unit</li> </ul>	<p>Progress Report 2 (Dec 13-May 14); YourDATA</p>

## Objective 3

Consolidate the current, cross-sectoral science and provide clear direction for future extension and research activities.

Activity and /or deliverable	KPI Type	Key Performance Indicators	Achievements	Source
<b>Activity 3a.</b> Collect data on project status using the CRDC funded Cotton Grower Practices and Cotton Consultants surveys conducted at the beginning and end of the project.	Evaluation	<b>[Achieved] KPI 3ai.</b> Questions designed and incorporated into the Cotton Grower Practices surveys and Cotton Consultants surveys to collect data on project status. <i>[October 2015 – August 2016]</i>	Surveys under review due to small crop and low access to irrigation water <ul style="list-style-type: none"> <li>• <b>Month:</b> Jun 15</li> </ul>	Progress Report 4 (Dec 14–May 15)
			CFI Questions submitted and approved by survey lead authors: <ul style="list-style-type: none"> <li>• <b>Month:</b> Jun 14</li> </ul>	Progress Report 3 (May 14-Dec 14)
	Evaluation	<b>[Achieved] KPI 3aii.</b> Cotton Consultants and Cotton Growers Practices surveys delivered 2014 (as baseline) and 2017 <i>[May 2014 – May 2017]</i>	Cotton Consultants and Cotton Growers Practices Survey reports available on the CDRC Website Industry Publication section	CRDC Website
			Consultants survey submitted <ul style="list-style-type: none"> <li>• <b>Month:</b> Dec 16</li> </ul>	Progress Report 7 (May 16 – Dec 16)
		Consultants survey submitted <ul style="list-style-type: none"> <li>• <b>Month:</b> May 16</li> </ul>	Progress Report 6 (Dec 15 –May 16)	
		Grower survey results submitted with project report	Progress Report 5 (May 15 –Dec 15)	
<b>Activity 3b.</b> Cross-sectoral and cross-industry collaboration on carbon farming <ul style="list-style-type: none"> <li>• Establish steering committee and/or</li> </ul>	Project management	<b>[Achieved] KPI 3aiii.</b> Project Steering Committee (PSC) established; annual PSC meetings held commencing 2013. <i>[Annually by August]</i>	Steering committee report submitted	Progress Report 7 (May 16 – Dec 16)
			Steering Committee Meeting: <ul style="list-style-type: none"> <li>• <b>Participants:</b> 6 stakeholders</li> <li>• <b>Month:</b> Jun 16</li> <li>• Inform stakeholders of progress and future activities</li> </ul>	Progress Report 7 (May 16 – Dec 16)

reference panel to manage the project.			Steering committee report submitted	Progress Report 6 (Dec 15 –May 16)
			2 Project Steering Committee meetings held with a combined PRP and PSC: <ul style="list-style-type: none"> <li>• <b>Participants:</b> 7 stakeholders (June teleconference)</li> <li>• <b>Month:</b> Jun 14, Dec 14</li> </ul>	Progress Report 3 (May 14-Dec 14); YourDATA
			2 Project Steering Committee meetings (1 combined with PRP): <ul style="list-style-type: none"> <li>• <b>Participants:</b> 7 stakeholders</li> <li>• <b>Month:</b> Dec 13, Apr 14</li> </ul>	Progress Report 2 (Dec 13-May 14)
			Project Steering Committee established and first meeting convened: <ul style="list-style-type: none"> <li>• <b>Participants:</b> 7 stakeholders</li> <li>• <b>Month:</b> Sep 13</li> </ul>	Progress Report 1 (Jul 13-Dec 13)
	Project management	[Achieved] Project Reference Panel (PRP) established, annual PRP meetings held commencing 2013. <i>[Annually by September]</i>	Reference Panel Meeting: <ul style="list-style-type: none"> <li>• <b>Participants:</b> 20 stakeholders</li> <li>• <b>Month:</b> Mar 16</li> <li>• <b>Location:</b> Darling Downs</li> <li>• Created a number of ideas and suggestions related to measuring emissions targets and ways to regulate industry emissions through industry targets</li> </ul>	Progress Report 6 (Dec 15 –May 16); YourDATA
			PRP Meeting: <ul style="list-style-type: none"> <li>• <b>Participants:</b> 26 (all) project stakeholders</li> <li>• <b>Month:</b> Apr 15</li> <li>• <b>Location:</b> Moree</li> <li>• Brought together core and in-kind stakeholders to discuss priority extension messages from current research as well as how to best manage future industry emissions targets</li> </ul> <p><b>Feedback Summary Report:</b></p> <ul style="list-style-type: none"> <li>• Overall, presenters and participants were well engaged in the project forum</li> <li>• A number of issues were raised to help address current project extension challenges, and provide valuable feedback for future industry RD&amp;E</li> </ul>	Progress Report 4 (Dec 14–May 15); YourDATA

			<ul style="list-style-type: none"> <li>• Common theme through all suggested extension is to ensure the BMPs are well defined, well extended and farmers are encouraged to use the myBMP accreditation platform</li> <li>• In terms of achieving the panel objectives outlined, the discussion points encouraged the free flow of information throughout a balanced group of specialised researchers, R&amp;D Managers and technical specialists attending. This knowledge will aid in developing future extension messages for the remainder of the project and strengthen peer-to-peer networks in the industry.</li> </ul>	
			PRP meeting held (combined with PSC meeting): <ul style="list-style-type: none"> <li>• <b>Participants:</b> 22 stakeholders</li> <li>• <b>Month:</b> Apr 14</li> <li>• <b>Location:</b> Narrabri</li> </ul>	Progress Report 2 (Dec 13-May 14)
			Project Reference Panel (PRP) established - All participants identified by telephone and email. <ul style="list-style-type: none"> <li>• <b>Month:</b> Nov 13</li> <li>• <b>Participants:</b> 14 stakeholders</li> </ul>	Progress Report 1 (Jul 13-Dec 13)
<b>Activity 3c.</b> Convene a Carbon Farming in Cotton and Grains Systems Technical Forum to encourage a collaborative, integrated, systematic focus for carbon farming research, development and extension in the cotton industry. The Forum will produce proceedings papers, consolidated extension messages and future extension and research priorities.	Extension Activity	<b>[Achieved] KPI 3c.</b> Technical Forum is held, and a report of the Forum is published. <i>[December 2015]</i>	E&O Technical forum: <ul style="list-style-type: none"> <li>• <b>Participants:</b> 231 researchers &amp; industry leaders</li> <li>• <b>Month:</b> Sep 15</li> <li>• <b>Location:</b> Darling Downs</li> <li>• Report submitted by post - Dec 15</li> </ul>	Progress Report 5 (May 15 –Dec 15); YourDATA
<b>Other Objective 3 Activities</b>	Extension Activities	<b>Other Activities</b>	Presentation on climate risk management in cotton: <ul style="list-style-type: none"> <li>• <b>Participants:</b> 100 (50 industry, 50 government)</li> <li>• <b>Month:</b> Mar 16</li> <li>• <b>Location:</b> Canberra</li> </ul>	YourDATA

			<ul style="list-style-type: none"> <li>Present extension approach to climate risk management in Cotton to Department of Agriculture multi-sector Extension and Outreach project officers in Canberra</li> </ul>	
			R&D for profit climate meeting: <ul style="list-style-type: none"> <li><b>Participants:</b> 4 government</li> <li><b>Month:</b> Feb 16</li> <li><b>Location:</b> Orange</li> <li>Initial meeting to meet project officer and scope the plan for the project case studies in cotton/grains</li> </ul>	YourDATA
			Meeting with MCV climate researcher Dr Peter McIntosh: <ul style="list-style-type: none"> <li><b>Participants:</b> 2 industry</li> <li><b>Month:</b> Feb 16</li> <li><b>Location:</b> Hobart</li> <li>Discuss results of the CSIRO MCV project and factor this into extension material</li> </ul>	YourDATA
			CFI E&O presentation: <ul style="list-style-type: none"> <li><b>Participants:</b> 72 (70 industry, 2 government)</li> <li><b>Month:</b> Oct 15</li> <li>A presentation to the Department of Agriculture, the Department of the Environment and other CFI project proponents on the CFI projects' contribution to the 17th annual cotton conference on the Gold Coast</li> </ul>	YourDATA
			NANORP Industry Meeting: <ul style="list-style-type: none"> <li><b>Participants:</b> 1 industry</li> <li><b>Month:</b> Sep 15</li> <li><b>Location:</b> Hobart</li> <li>Gather information from all NANORP related projects to then extend findings to industry constituents</li> <li>Participant indicated they would disseminate findings to R&amp;D and CA policy colleagues</li> </ul>	YourDATA
			MCV Meeting: <ul style="list-style-type: none"> <li><b>Month:</b> Aug 15</li> <li>Discussing climate research and funding opportunities and extension through industry collaboration</li> </ul>	YourDATA
			Life Cycle Assessment networking meeting: <ul style="list-style-type: none"> <li><b>Participants:</b> 7 industry</li> </ul>	YourDATA

			<ul style="list-style-type: none"> <li>• <b>Month:</b> Apr 15</li> <li>• <b>Location:</b> Namoi</li> <li>• Discussed carbon research related to the cotton production system and application to assist product penetration in the global apparel market</li> <li>• Great to gain perspective of our peers in the US and their dealings in global apparel markets</li> </ul>	
			<p>Consultation with Department of Environment:</p> <ul style="list-style-type: none"> <li>• <b>Participants:</b> 8 (3 growers, 3 industry, 2 government)</li> <li>• <b>Month:</b> Aug 14</li> <li>• <b>Location:</b> Macquarie</li> <li>• Consultation with the Department of the Environment regarding the cotton-nitrogen method. Macquarie Food and Fibre and a number of growers were present.</li> <li>• <b>Outcomes:</b> the cotton method requires fine tuning to ensure grower participation</li> </ul>	YourDATA
			<p>Cotton Industry Nitrogen Forum:</p> <ul style="list-style-type: none"> <li>• <b>Participants:</b> 63 (20 growers, 20 agronomists, 23 industry)</li> <li>• <b>Month:</b> Aug 14</li> <li>• <b>Location:</b> Goondiwindi</li> <li>• To understand research, extension and production linkages.</li> <li>• To identify weaknesses and current opportunities in nitrogen management in the Australian cotton industry</li> <li>• Provided some valuable information on the gaps in extension and research which will ultimately aid in better outcomes for industry</li> </ul> <p><b><u>YourDATA Comments:</u></b></p> <ul style="list-style-type: none"> <li>• The whole event was very well received and was well run</li> </ul> <p><b><u>Survey Report:</u></b></p> <ul style="list-style-type: none"> <li>• 89% agreed/strongly agreed they were well informed about the objectives of the workshop (n=45)</li> <li>• 91% agreed/strongly agreed the workshop lived up to their expectations (n=45)</li> <li>• 97% agreed/strongly agreed the forum was well designed and the presenter and discussion groups stimulated my learning</li> <li>• 94% agreed/strongly agreed they will be able to use what they learned in this workshop</li> </ul>	Progress Report 3 (May 14-Dec 14); YourDATA

			<ul style="list-style-type: none"> <li>• Top three things respondents wanted to see happen post-workshop: <ul style="list-style-type: none"> <li>○ Results of more on farm data trials</li> <li>○ Clear up mineralisation research and to help standardise N budget calculations</li> <li>○ Clear direction for ongoing research and extension</li> </ul> </li> </ul>	
			<p>Collaboration with MCV Industry Conference:</p> <ul style="list-style-type: none"> <li>• <b>Participants:</b> 30 (15 growers, 15 industry)</li> <li>• <b>Month:</b> Mar 14</li> <li>• <b>Location:</b> ANU Canberra</li> <li>• To collaborate and exchange ideas, applications and understand the latest climate research and extension tools</li> <li>• To disseminate current research findings and preferred strategies in climate extension</li> </ul>	YourDATA
	Issue		The constant difficulty of aligning the Department of Agriculture objectives with other Industry Joint Venture partners with our grower audience in regards to seasonal forecasting extension and reducing emissions	Progress Report 4 (Dec 14–May 15)

# Objective 4

Increase cotton industry understanding of emissions reduction and sequestration from **cropping fields**.

Activity and /or deliverable	KPI Type	Key Performance Indicators	Achievements	Source
<b>Activity 4a.</b> Improved use of short, medium and long term seasonal forecasting information to facilitate more informed decisions regarding the efficient use of farm inputs (including, but not limited to, agronomy practices, fertiliser use, irrigation regimes and fuel and energy use) and agronomy practices to minimise greenhouse gas emissions, using: <ul style="list-style-type: none"> <li>• Webinars</li> <li>• Workshops</li> <li>• Information resources.</li> </ul>	Development	<b>[Achieved] KPI 4ai.</b> New Bureau of Meteorology (BoM) forecasting models and other forecasting tools identified and evaluated for their applicability for improved seasonal forecasting to support the implementation of practices to reduce GHG emissions. <i>[October 2013]</i>	Carbon Technical Specialist review of forecasting tool commenced in October and a draft strategy completed for review. myBMP climate tool draft strategy currently due for submission to DAFF on December 20.	Progress Report 1 (Jul 13-Dec 13)
	Development	<b>[Achieved] KPI 4aii.</b> Campaign to promote relevant tools developed and provided to the Commonwealth <i>[December 2013]</i>	Seasonal extension forecasting campaign developed and forwarded to Commonwealth. Climate workshops and brochures delivered to growers and advisers commenced as well as information resources delivered to industry. <ul style="list-style-type: none"> <li>• <b>Month:</b> Dec 13</li> </ul>	Progress Report 2 (Dec 13-May 14)
	Target	<b>KPI 4aiii.</b> 50%* of cotton growers have increased confidence in the use of short, medium and long term seasonal forecasting information and are able to translate this into better decision making surrounding more efficient use of farm inputs and better agronomy practices to reduce emissions. <i>[by May 2017]</i>	<p style="text-align: center;"><b>Growers</b></p> <ul style="list-style-type: none"> <li>• +10% increase in respondents who agree or totally agree they are confident in the use of <b>seasonal forecasting information</b> to aid crop selection, nitrogen and irrigation decisions:               <ul style="list-style-type: none"> <li>○ 44% agree or totally agree in 2013 (n=154)</li> <li>○ 54% agree or totally agree in 2016 (n=140)</li> </ul> </li> <li>• 90% understand or thoroughly understand the <b>El-Nino Southern Oscillation effect on local rainfall &amp; temperature</b> in both 2014 (n=171) and 2016 (n=140) (no overall increase)</li> <li>• +20% increase in respondents who understand or thoroughly understand <b>southern annular mode and other climate process that impact on rainfall for their area:</b> <ul style="list-style-type: none"> <li>○ 33% understand or thoroughly understand in 2014 (n=171)</li> <li>○ 53% understand or thoroughly understand in 2016 (n=140)</li> </ul> </li> <li>• +2% increase in respondents who understand how to <b>source climate information useful to on-farm decision making:</b> <ul style="list-style-type: none"> <li>○ 89% understand or thoroughly understand in 2014 (n=171)</li> </ul> </li> </ul>	CRDC Cotton Growers Survey 2013 2014 & 2016

			<ul style="list-style-type: none"> <li>○ 91% understand or thoroughly understand in 2016 (n=140)</li> <li>• 2016: Percentage of growers that indicated CottonInfo team, information resources and myBMP assisted them improve their farm practices (n=62): <ul style="list-style-type: none"> <li>○ Assisted 82% improve <b>water &amp; moisture management, seasonal forecasting &amp; climate</b> practices. (20% a little; 29% moderate; 29% significant; 4% very significant)</li> </ul> </li> </ul>	
			<p>Fairly large increase in understanding on the <b>use of seasonal forecasting to make better decisions</b> (overall average of 7.0 where 0=little increase and 10=large increase; n=27)</p>	<p>Coutts J&amp;R Survey of Cotton Growers and Consultants (Dec 2016)</p>
<b>Advisers/Consultants</b>				
			<ul style="list-style-type: none"> <li>• 2015/16: 62% of consultants (n=63) indicated the CottonInfo Moisture Manager newsletter and IrriSat climate workshops resulted in an <b>increased use and understanding of seasonal forecasting and better decisions</b></li> <li>• 2015/16: 90% have understanding (71% some and 19% strong) of <b>seasonal forecasting</b> (n=63)</li> <li>• +3% increase in understanding of <b>El-Nino Southern Oscillation effect on rainfall in your area:</b> <ul style="list-style-type: none"> <li>○ 96% with some to strong understanding in 2013/14 (n=51)</li> <li>○ 99% with some to strong understanding in 2015/16 (n=63)</li> </ul> </li> <li>• +11% increase in understanding of <b>other climate process that impact rainfall in your area:</b> <ul style="list-style-type: none"> <li>○ 78% with some to strong understanding in 2013/14 (n=51)</li> <li>○ 89% with some to strong understanding in 2015/16 (n=63)</li> </ul> </li> <li>• 2015/16: Percentage of consultants that indicated CottonInfo team, information resources and myBMP assisted them improve clients farm practices (n=140): <ul style="list-style-type: none"> <li>○ Assisted 88% improve <b>seasonal forecasting &amp; climate practices</b> on client's farms. (14% a little; 32% moderate; 32% significant; 10% very significant)</li> <li>○ Assisted 98% improve <b>water &amp; moisture management</b> on client's farms. (23% a little; 32% moderate; 35% significant; 8% very significant)</li> </ul> </li> </ul>	<p>CRDC Cotton Consultants Survey 2013/14 &amp; 2015/16</p>

			Fairly large increase in understanding on the <b>use of seasonal forecasting to make better decisions</b> (overall average of 7.3 where 0=little increase and 10=large increase; n=11)	Coutts J&R Survey of Cotton Growers and Consultants (Dec 2016)
<b>Activity 4b.</b> Input Efficiency and Soil Health Best Management Practice modules revised and improved.	Development	<b>[Achieved] KPI 4b.</b> Revised versions of Energy and Input Efficiency, and Soil Health (includes Soil Nutrition) modules that incorporate emissions management issues endorsed by industry and available to incorporate into myBMP. <i>[Soil Health August 2014, Input Efficiency July 2015]</i>	myBMP energy & input efficiency module submitted to the Dept in Feb 2016	Progress Report 6 (Dec 15–May 16)
			Revised versions of Energy and Input Efficiency, and Soil Health (includes Soil Nutrition) modules that incorporate emissions management issues endorsed by industry and available to incorporate into myBMP • <b>Month:</b> Nov 14	Progress Report 4 (Dec 14–May 15)
<b>Activity 4c.</b> Relevant carbon farming tools incorporated into the myBMP and CottASSIST suite of decision tools for cotton growers and their advisers and promoted to industry via industry extension, publications and newsletters.	Development	<b>[Achieved] KPI 4ci.</b> Existing tools identified and evaluated for relevance to cotton farming. <i>[June 2014]</i>	All available carbon calculators listed in cottoninfo's carbon web page: • <b>Month:</b> Jun 15	Progress Report 4 (Dec 14–May 15)
	Uptake	<b>[Achieved] KPI 4cii.</b> Suitable tools are incorporated and or linked to myBMP, as appropriate. <i>[June 2014]</i>	Linked to CottonInfo	Progress Report 5 (May 15–Dec 15)
<b>Activity 4d.</b> Carbon farming in cotton extension campaign including: • Field days and farm walks with guest speakers • Newsletter articles: CottonTales, etc • Articles in industry publications – Cotton Research and Development	Development	<b>[Achieved] KPI 4di.</b> Targeted extension campaign to provide information and raise awareness about greenhouse gas emissions and carbon sequestration in cotton farming production systems developed and provided to the Commonwealth. <i>[January 2014]</i>	CFI Extension plan submitted to commonwealth. • <b>Month:</b> Jan 14	Progress Report 2 (Dec 13–May 14)
	Extension campaign	<b>KPI 4dii.</b> Extension campaign delivered from February 2014 to April 2017.	See Activity 4 extension campaign table	
	Development	<b>KPI 4diii.</b> Updated extension campaign for post-project activities developed. <i>[by May 2017]</i>		

<p>Corporation (CRDC) Spotlight, Australian Cottongrower magazine</p> <ul style="list-style-type: none"> <li>• Fact sheets</li> <li>• Australian Cotton Conference posters and display</li> <li>• Growers groups</li> <li>• One-on-one support for myBMP uptake</li> <li>• Industry champions (including cotton Climate Champions)</li> <li>• Case studies</li> <li>• Social media</li> <li>• Webinars</li> <li>• Investigate potential for carbon app for tablet and smartphone</li> </ul>	<p>Target</p>	<p><b>KPI 4div.</b> 75%* of cotton growers and 90% of advisers have an improved understanding of the ERF, emissions management and sequestration in cotton farming. <i>[by May 2017]</i></p>	<ul style="list-style-type: none"> <li>• Carbon footprint 46% understood</li> <li>• Knowledge gains of 30-40% across workshop attendees</li> </ul>	<p>Progress Report 6 (Dec 15 –May 16); Progress Report 7 (May 16 – Dec 16)</p>
			<b>Growers</b>	
			<ul style="list-style-type: none"> <li>• -13% decrease in understanding of <b>sequestering soil carbon in carbon farming system:</b> <ul style="list-style-type: none"> <li>○ 43% understand or thoroughly understand in 2014 (n=171)</li> <li>○ 30% understand or thoroughly understand in 2016 (n=140)</li> </ul> </li> <li>• -3% decrease in understanding of <b>native vegetation carbon sequestration:</b> <ul style="list-style-type: none"> <li>○ 41% understand or thoroughly understand in 2014 (n=171)</li> <li>○ 38% understand or thoroughly understand in 2016 (n=140)</li> </ul> </li> <li>• -16% decrease in understanding of <b>the carbon footprint of my farming operation</b> <ul style="list-style-type: none"> <li>○ 49% understand or thoroughly understand in 2014 (n=171)</li> <li>○ 33% understand or thoroughly understand in 2016 (n=140)</li> </ul> </li> <li>• -13% decrease in understanding of <b>the Emissions Reduction Fund and how to participate:</b> <ul style="list-style-type: none"> <li>○ 16% understand or thoroughly understand in 2014 (n=171)</li> <li>○ 9% understand or thoroughly understand in 2016 (n=140)</li> </ul> </li> <li>• +22% increase in agreement that <b>adequate information is available to calculate nitrogen use efficiency:</b> <ul style="list-style-type: none"> <li>○ 45% agree or totally agree in 2013 (n=154)</li> <li>○ 67% agree or totally agree in 2016 (n=140)</li> </ul> </li> <li>• +11% increase in agreement that respondents have a <b>good understanding of how to best maximise N use efficiency:</b> <ul style="list-style-type: none"> <li>○ 62% agree or totally agree in 2013 (n=155)</li> <li>○ 73% agree or totally agree in 2016 (n=140)</li> </ul> </li> <li>• +12% increase in agreement that respondents <b>understand how to reduce nitrous oxide emissions from their systems:</b> <ul style="list-style-type: none"> <li>○ 28% agree or totally agree in 2013 (n=154)</li> <li>○ 40% agree or totally agree in 2016 (n=140)</li> </ul> </li> </ul>	<p>CRDC Cotton Growers Survey 2013, 2014 &amp; 2016</p>

			<ul style="list-style-type: none"> <li>• 2015/16: Percentage of growers that indicated CottonInfo team, information resources and myBMP assisted them improve their farm practices (n=140): <ul style="list-style-type: none"> <li>○ Assisted 63% improve <b>energy use</b> practices. (33% a little; 16% moderate; 12% significant; 2% very significant)</li> <li>○ Assisted 84% improve <b>nutrition &amp; soils</b> practices. (26% a little; 29% moderate; 21% significant; 8% very significant)</li> <li>○ Assisted 59% improve <b>natural resource management</b> practices. (31% a little; 18% moderate; 10% significant)</li> </ul> </li> </ul>	
			<ul style="list-style-type: none"> <li>• Level of increased understanding resulting from project activities/information (0=little increase and 10=large increase; n=27): <ul style="list-style-type: none"> <li>○ 7.2 average – How losses of applied nitrogen occur in irrigated cotton</li> <li>○ 7.0 average – How better managing nitrogen application can reduce N2O emissions and improve sustainability credentials</li> <li>○ 6.3 average – Input and energy efficiency</li> <li>○ 4.8 average – Economic and risks associated with participating in the ERF and implementing mitigation and sequestration practices.</li> <li>○ 5.0 average – Carbon Sequestration in cotton farming</li> <li>○ 4.7 average – Reducing emissions on farm</li> <li>○ 4.1 average – Emissions Reduction Fund</li> </ul> </li> </ul>	<p>Coutts J&amp;R Survey of Cotton Growers and Consultants (Dec 2016)</p>
<b>Advisers/Consultants</b>				
			<ul style="list-style-type: none"> <li>• 2013/14 n = 51; 2015/16 n = 63</li> <li>• -3% decrease in understanding in the understanding of <b>sequestering soil carbon in carbon farming system</b>: <ul style="list-style-type: none"> <li>○ 67% some to strong understanding in 2013/14 (n=51)</li> <li>○ 65% some to strong understanding in 2015/16 (n=63)</li> </ul> </li> <li>• + 1% increase in the <b>understanding of Carbon Farming Initiative</b>: <ul style="list-style-type: none"> <li>○ 35% some to strong understanding in 2013/14 (n=51)</li> <li>○ 36% some to strong understanding in 2015/16 (n=63)</li> </ul> </li> <li>• -2% decrease in the <b>understanding of process by which nitrogen is lost in a cotton farming system</b>: <ul style="list-style-type: none"> <li>○ 100% some to strong understanding in 2013/14 (n=51)</li> <li>○ 98% some to strong understanding in 2015/16 (n=63)</li> </ul> </li> </ul>	<p>CRDC Cotton Consultants Survey 2013/14 &amp; 2015/16</p>

			<ul style="list-style-type: none"> <li>• +11% increase in the <b>understanding of farming practices to improve nitrogen fertiliser efficiency and reduce emissions:</b> <ul style="list-style-type: none"> <li>○ 86% with some to strong understanding in 2013/14 (n=51)</li> <li>○ 97% with some to strong understanding in 2015/16 (n=63)</li> </ul> </li> <li>• <b>Understanding of practices to minimise losses from applied fertiliser:</b> <ul style="list-style-type: none"> <li>○ 100% with some to strong understanding in 2015/16 (n=63) – no data from previous surveys</li> </ul> </li> <li>• 2015/16: Percentage of consultants that indicated CottonInfo team, information resources and myBMP assisted them improve clients farm practices (n=62): <ul style="list-style-type: none"> <li>○ Assisted 57% improve <b>energy use practices</b> on client's farms. (26% a little; 21% moderate; 10% significant)</li> <li>○ Assisted 95% improve <b>nutrition &amp; soils practices</b> on client's farms. (16% a little; 35% moderate; 39% significant; 5% very significant)</li> <li>○ Assisted 79% improve <b>natural resource management</b> on client's farms. (31% a little; 40% moderate; 8% significant)</li> <li>○ Assisted 98% improve <b>water &amp; moisture management</b> on client's farms. (23% a little; 32% moderate; 35% significant; 8% very significant)</li> </ul> </li> </ul>	
			<ul style="list-style-type: none"> <li>• Level of increased understanding resulting from project activities/information (0=little increase and 10=large increase; n=11): <ul style="list-style-type: none"> <li>○ 7.5 average – How losses of applied nitrogen occur in irrigated cotton</li> <li>○ 7.1 average – How better managing nitrogen application can reduce N2O emissions and improve sustainability credentials</li> <li>○ 4.8 average – Input and energy efficiency</li> <li>○ 5.3 average – Economic and risks associated with participating in the ERF and implementing mitigation and sequestration practices.</li> <li>○ 4.5 average – Carbon Sequestration in cotton farming</li> <li>○ 4.9 average – Reducing emissions on farm</li> <li>○ 3.9 average – Emissions Reduction Fund</li> </ul> </li> </ul>	<p>Coutts J&amp;R Survey of Cotton Growers and Consultants (Dec 2016)</p>

	Target	<b>KPI 4dvi.</b> 25%* of industry implementing plant tissue analysis to monitor crop nutrition balances to meet crop nutrient demand. <i>[by May 2017]</i>	Petiole testing (KPI4dvi) is rapidly becoming superseded by digital in-crop technologies. Many of these are not yet market ready, although many advisers are aware of them	Progress Report 5 (May 15 –Dec 15)
			<b>Growers</b>	
			<ul style="list-style-type: none"> <li>• 2013: 66% have used <b>leaf/petiole test</b> (n=156) <ul style="list-style-type: none"> <li>○ 13% have a petiole nitrogen test conducted on every field every season on irrigated cotton (n=120)</li> <li>○ Some growers use only leaf and/or petiole testing, conducted every season.</li> </ul> </li> <li>• 2016: 47% have used leaf/petiole test when deciding on fertiliser rates for their 2015/16 crop. (n=140)</li> </ul>	CRDC Cotton Growers Survey 2013, 2016
			<b>Advisers/Consultants</b>	
		<ul style="list-style-type: none"> <li>• 2013/14: Cotton consultants (n=46) using <b>leaf/petiole test with 43% (225) of clients</b> covering a total of 106,796 ha – 39% of the total 276,717 ha represented by clients</li> <li>• 2015/16: Cotton consultants (n=52) using <b>leaf/petiole test with 35% (157) of clients</b> covering a total of 78,082 ha – 40% of the total 193,601 ha represented by clients</li> </ul>	CRDC Cotton Consultants Survey 2013/14 & 2015/16	
	Evaluation	<b>[Achieved]</b> <b>KPI 4dvii.</b> Evaluation of the extension campaign (industry feedback through workshop surveys, etc.) is presented in project reports. <i>[by May 2017]</i>	Activity evaluation reports were uploaded to the YourDATA M&E database.	YourDATA
<b>Activity 4e.</b> Delivery of the revised Best Management Practice modules for Energy and Input Efficiency, and Soil Health, with a particular focus on emissions management using: <ul style="list-style-type: none"> <li>• One-on-one support</li> <li>• Cluster groups</li> <li>• Workshops</li> </ul>	Development	<b>[Achieved]</b> <b>KPI 4ei.</b> Targeted campaign to support growers to work through the revised BMP Modules developed and provided to the Commonwealth. <i>[July 2014]</i>	CFI Extension plan submitted to commonwealth. <b>Month:</b> Jan 14	Progress Report 2 (Dec 13-May 14)
	Extension campaign	<b>KPI 4eii.</b> Extension campaign delivered from August 2014 to April 2017	See Activity 4 extension campaign table	
	Target	90%* of cotton growers have been exposed to the revised modules. <i>[by December 2016]</i>		

<ul style="list-style-type: none"> <li>• BMP hotline</li> <li>• BMP third party audits</li> <li>• Webinars</li> <li>• Case studies</li> </ul>	Target	<b>KPI 4eiii.</b> 60%* of growers have completed the Self Assessment Tools for the revised <i>myBMP</i> modules. [by May 2017]		
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\*As measured through the CRDC funded Cotton Grower Practices and Cotton Consultants surveys conducted at the beginning and end of the project.

## Activity 4. Extension Campaign

Extension Type	Name	Month	Details	Source
<b>Events/Activities</b>				
<b>Workshops / Field Days</b>	3 Cotton Nutrition & NUE Workshops [Nitrogen Management]	Jul 16, Nov 16	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 49 growers &amp; advisers</li> <li>• <b>Total participant ha:</b> 10,580 irrigated, 600 dryland (Narromine/Warren participants)</li> <li>• <b>Location:</b> Goondiwindi, Narromine, Warren</li> <li>• <b>Partners:</b> Researchers</li> </ul> <p><b>Feedback Summary</b></p> <ul style="list-style-type: none"> <li>• Workshop met aims and expectations (avg. 4.2 out of 5 rating, n=26)</li> <li>• Knowledge increases indicated (difficulty calculating exact gains from report)</li> <li>• High percentage (40-70%) likely to adopt presented nutrition concepts – 20-50% have already adopted</li> <li>• Discussion on survey results: <ul style="list-style-type: none"> <li>○ Since the project commenced, growers and adviser knowledge has increased substantially in the area of nutrient budgeting and growing high yields, sustainably. A large proportion of the industry is splitting applications of nitrogen to help better manage supply with crop demand. Best Management Practices (BMPs) on timing and application are largely occurring at this stage of the project.</li> <li>○ Interest in nutrition has shifted towards other micro-nutrients in the system and field history to increase cotton yields.</li> </ul> </li> </ul>	YourDATA; Extension on nitrogen use efficiency and cotton nutrition (December 2016 interim report)

			<ul style="list-style-type: none"> <li>○ Face to face workshops with researchers presenting still remain a popular delivery method for extension and peer to peer learning. However, webinar recording have proven a useful complimentary tool for growers and advisers unable to attend.</li> </ul> <p><b><u>YourDATA Comments (Narromine/Warren)</u></b></p> <ul style="list-style-type: none"> <li>● All growers reported that they got something out of it and appreciated the workshop</li> <li>● <b>Reported actions:</b> <ul style="list-style-type: none"> <li>○ 1 grower was going to apply gas and he decided against it after information on chick pea residue was presented.</li> <li>○ 5 growers intend to do soil tests that will look a BSES levels.</li> <li>○ Growers who intended to knife in P, changed their mind given that it may prune the roots and would not help them this season.</li> </ul> </li> </ul> <p><b><u>Feedback Survey (Narromine/Warren)</u></b></p> <ul style="list-style-type: none"> <li>● 9 respondents to post-workshop survey</li> <li>● 100% agreed topics were relevant and useful</li> <li>● +1.6 Increase in topic knowledge (2.3 avg. before to 3.9 avg. after on a 1-5 scale, n=7)</li> <li>● 71% felt knowledge would equate to on-farm practice change (n=7)</li> </ul>	
	<p>6 Solar Pumping and Energy Efficiency for Irrigators Field Days <a href="#">[Energy Use]</a></p>	<p>Nov 15 – Sep 16</p>	<ul style="list-style-type: none"> <li>● <b>Participants:</b> 330 growers &amp; advisers</li> <li>● <b>Location:</b> Darlington Point (Nov 15), Narrabri (Dec 15), Narromine (Mar 16), Bonshaw (May 16), Hillston (May 16), Cecil Plains (Sep 16)</li> <li>● <b>Partners:</b> OEH, NSW/Qld Farmers Association and Cotton Australia</li> <li>● To show research on energy efficiency techniques and application of renewables in irrigation to save money and GHG emissions</li> <li>● To promote the use of renewable technology and energy efficient pumping practices to irrigators</li> <li>● Energy workshops have been well supported.</li> <li>● Tremendous gains in emissions abatement to be made via the RET incentives on energy intensive bore pumping scenarios</li> </ul> <p><b><u>Feedback Survey</u></b></p> <ul style="list-style-type: none"> <li>● Attendees found the seminar useful</li> <li>● Gained knowledge in a variety of areas including reducing greenhouse gas emissions, renewable energy applications and energy efficiency.</li> <li>● Belief that real benefits can be achieved by utilising sustainable practices such as renewable energy and becoming energy efficient.</li> <li>● Increased understanding of funding options and government incentives available for implementing energy efficient practices and renewable energy.</li> </ul>	<p>Progress Report 6 (Dec 15 –May 16); YourDATA; Workshop Evaluation (19 Dec 16)</p>

			<p><b><u>YourDATA Comments (Narromine)</u></b></p> <ul style="list-style-type: none"> <li>• Lots of interest in feasibility and quotes with commercial solar suppliers</li> </ul>	
	5 CottonInfo Nutrition Tour Field Days [Nitrogen Management]	Feb 16	<ul style="list-style-type: none"> <li>• <b>Participants</b> ~360 growers and advisers</li> <li>• <b>Total participant ha:</b> ~140,000</li> <li>• <b>Locations:</b> Gunnedah, Warren, Griffith, Emerald, Moree</li> <li>• <b>Partners:</b> Run jointly by CottonInfo, researchers and their universities, commercial partners (Incitec Pivot Limited, SST Software, Yara Australia, Koch Fertilizers and FertCare) and supported by funding from the Australian Government.</li> </ul> <p><b><u>Feedback Survey</u></b></p> <ul style="list-style-type: none"> <li>• 124 post-workshop survey respondents (36% of attendees)</li> <li>• Met the aims and expectations of attendees (overall avg. rating 4 out of 5)</li> <li>• Knowledge increases: <ul style="list-style-type: none"> <li>○ 52% increase in understanding loss pathways and GHGs</li> <li>○ 52% increase in nutrient budgeting including phosphorus</li> <li>○ 39% increase in Quantifying and budgeting for mineralised N</li> <li>○ 35% increase in Improving soil health and nitrogen use efficiency</li> <li>○ 33% increase in Irrigation deficits and optimising applied N</li> <li>○ 29% increase in Nitrogen cycle and sustainable yields</li> </ul> </li> <li>• Practices most likely to be adopted: <ul style="list-style-type: none"> <li>○ 73% Investigating irrigation deficits and nitrogen rates to improve crop gross margins</li> <li>○ 66% Consider mineralised nitrogen calculations in more detail when nutrient budgeting</li> </ul> </li> <li>• 38% indicated adjusting timing and application of nitrogen to improve NUE has already been adopted.</li> </ul> <p><b><u>Additional Participant Feedback (Griffith field day):</u></b></p> <ul style="list-style-type: none"> <li>• 7 positive comments (e.g. got a lot out of the day, excellent trial, liked the range of speakers and quick presentations)</li> <li>• 6 suggestions (e.g. too general and not enough detail, more time to speak with researchers)</li> <li>• 1 indicating practice change intention (e.g. will be reducing N inputs to around 250 N)</li> </ul>	Progress Report 6 (Dec 15 –May 16); YourDATA
	2 IrriSAT Workshops [Seasonal Forecasting]	Dec 15 - May 16	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 30 advisers &amp; growers</li> <li>• <b>Total participant ha:</b> 32,820 (Dec 15 workshop)</li> <li>• <b>Location:</b> Goondiwindi</li> <li>• <b>Partners:</b> Researchers</li> </ul> <p><b><u>Feedback Survey (Dec 15 Workshop)</u></b></p> <ul style="list-style-type: none"> <li>• 10 respondents to post-workshop survey</li> <li>• Workshop met aims and expectations (4.8 avg. on a 1-5 scale, n=10)</li> <li>• Topics were considered useful (4.9 avg. on a 1-5 scale, n=10)</li> </ul>	Progress Report 6 (Dec 15 –May 16); YourDATA

			<ul style="list-style-type: none"> <li>• Understanding increases (before and after on a 1-5 scale): <ul style="list-style-type: none"> <li>○ +1.0 Drivers of crop evapotranspiration (3.6 avg. to 4.6 avg. n=10)</li> <li>○ +1.4 Deriving site specific crop coefficients (Kc) from NDVI (2.9 avg. to 4.3 avg. n=10)</li> </ul> </li> <li>• Confidence increases (before and after on a 1-5 scale): <ul style="list-style-type: none"> <li>○ +2.3 Using the IrriSAT technology to determine daily crop water use (1.8 avg. to 4.1 avg. n=10)</li> <li>○ +2.0 Using the IrriSAT technology to benchmark crop productivity for your field or farm (1.8 avg. to 3.8 avg. n=10)</li> <li>○ +1.9 Using seasonal forecasting and sea surface temperatures to aid in practices to improve efficiency of farm inputs and planning (2.1 avg. to 4.0 avg. n=10)</li> </ul> </li> <li>• 90% likely to adopt the IrriSAT technology – 10% already adopted</li> </ul>	
	Climate & Farm Business Profit Drivers Workshop [Seasonal Forecasting]	Dec 15	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 40 young growers</li> <li>• <b>Location:</b> Moree</li> <li>• Social gathering of young farmers with 2x speakers in an informal dinner setting</li> <li>• A great young group with lots of engagement</li> </ul>	YourDATA
	Soil Health Workshop [Nitrogen Management]	Oct 15	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 25 (15 growers &amp; 10 agronomists)</li> <li>• To promote the metrics used in soil health with the view to decision making for a sustainable future</li> </ul> <p><b>Feedback Survey</b></p> <ul style="list-style-type: none"> <li>• 14 respondents</li> <li>• Most participants indicated an improvement in their levels of understanding</li> <li>• 64% felt the workshop met their aims and expectations</li> <li>• Content and delivery rated highly (averages of 4.0 out of 5)</li> <li>• 71% rated the workshop overall good (21%) or very good (50%)</li> </ul>	YourDATA
	2 Cotton Nutrition Workshops [Nitrogen Management]	Sep 15	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 55 advisers &amp; growers</li> <li>• <b>Location:</b> Griffith, Hillston</li> </ul>	Progress Report 5 (May 15 –Dec 15)
	Rain-grown Field Day [Seasonal Forecasting]	Sep 15	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 55 (30 growers, 10 agribusiness, 15 industry)</li> <li>• <b>Location:</b> Rowena</li> <li>• <b>Hectares:</b> 124,200 rain-grown, 32,500 irrigation (from the 29 survey respondents)</li> </ul> <p><b>Feedback Survey</b></p> <ul style="list-style-type: none"> <li>• 29 Respondents</li> <li>• 35% improved their understanding of row configuration and the economics of rain-grown cotton</li> </ul>	YourDATA

			<ul style="list-style-type: none"> <li>• 70% grower and 100% adviser increase in confidence to plant rain-grown cotton</li> <li>• 3 Agribusiness financiers surveyed reported a much improved understanding of rain-grown cotton and an increased confidence in rain grown cotton.</li> </ul>	
	2 FertCare Nitrogen Use Efficiency/ERF Workshops [Nitrogen Management]	Aug – Sep 15	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 55 advisers</li> <li>• <b>Location:</b> Forbes, Darling Downs</li> <li>• <b>Also Objective KPI 6aii</b></li> <li>• Delivery of the revised Best Management Practice modules for Energy and Input Efficiency, and Soil Health, with a particular focus on emissions management</li> </ul>	Progress Report 5 (May 15 –Dec 15); YourDATA
	Climate Risk Management Workshop [Seasonal Forecasting]	Aug 15	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 5 growers</li> <li>• <b>Total participant ha:</b> 125,000 (5,000 irrigated, 120,000 dryland)</li> <li>• <b>Location:</b> Bellata</li> </ul> <p><b><u>YourDATA Comments</u></b></p> <ul style="list-style-type: none"> <li>• All participants signed up to moisture manager newsletter and indicated they would apply information to farm decisions</li> <li>• The level of knowledge of this particular group is considered low, so large gains were made in explaining basic climate processes</li> </ul>	YourDATA
	4 IrriSAT Workshops [Seasonal Forecasting]	Jul – Aug 15	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 65 advisers &amp; growers</li> <li>• <b>Total participant ha:</b> 138,960</li> <li>• <b>Location:</b> Griffith, Emerald, Narromine, Moree</li> <li>• Introduce consultants and growers to the IrriSAT technology and IrriSAT app</li> </ul> <p><b><u>YourDATA Comments</u></b></p> <ul style="list-style-type: none"> <li>• 45 participants indicating they would Adopt IrriSAT technology and trial this season</li> <li>• Good content, very useful to include Jon Welsh in program to look at seasonal forecasting tools.</li> </ul> <p><b><u>Feedback Survey</u></b></p> <ul style="list-style-type: none"> <li>• 56 respondents to post-workshop surveys</li> <li>• Workshop met aims and expectations (4.4 avg. on a 1-5 scale, n=55)</li> <li>• Topics were considered useful (4.5 avg. on a 1-5 scale, n=54)</li> <li>• Understanding increases (before and after on a 1-5 scale): <ul style="list-style-type: none"> <li>○ +1.5 Drivers of crop evapotranspiration (2.6 avg. to 4.1 avg. n=54)</li> <li>○ +1.7 Deriving site specific crop coefficients (Kc) from NDVI (2.2 avg. to 3.9 avg. n=54)</li> </ul> </li> <li>• Confidence increases (before and after on a 1-5 scale): <ul style="list-style-type: none"> <li>○ +2.0 Using the IrriSAT technology to determine daily crop water use (1.6 avg. to 3.6 avg. n=54)</li> </ul> </li> </ul>	Progress Report 5 (May 15 –Dec 15); YourDATA

			<ul style="list-style-type: none"> <li>○ +2.1 Using the IrriSAT technology to benchmark crop productivity for your field or farm (1.6 avg. to 3.7 avg. n=54)</li> <li>○ +1.2 Using seasonal forecasting and sea surface temperatures to aid in practices to improve efficiency of farm inputs and planning (2.1 avg. to 3.3 avg. n=54)</li> <li>● 85% likely to adopt the IrriSAT technology – 11% already adopted</li> </ul> <p><b><u>Workshop ‘Narratives’</u></b></p> <ul style="list-style-type: none"> <li>● <i>“The workshop showed the knowledge and technology currently available to growers for making irrigation decisions. Growers who attended the workshop will be using this technology to help their irrigation decisions this coming cotton season. (Consultant, Emerald)</i></li> <li>● <i>The technology holds a lot of value in terms of benchmarking and he looks forward to using it.. The ability to easily benchmark our fields productivity in terms of yield to water use across our farms is definitely and exciting feature of the technology. Overall I found the IrriSAT workshop very interesting and look forward to using the technology in the future. (Grower, Emerald)</i></li> <li>● <i>... I recommend this tool to anyone interested in benchmarking their crop against others in the same season or to track against previous seasons. It will help make good water and crop management decisions (Consultant, Coleambally)</i></li> </ul>	
	Climate Researcher Farm Tour [Seasonal Forecasting]	Apr 15	<ul style="list-style-type: none"> <li>● <b>Participants:</b> 9 (4 growers, 2 agronomists, 3 industry)</li> <li>● <b>Total participant ha:</b> 17,500 (3,500 irrigated, 14,000 dryland)</li> <li>● <b>Location:</b> Moree</li> <li>● To meet growers and discuss climate information needs and retain feedback to improve extension.</li> </ul> <p><b><u>YourDATA Comments</u></b></p> <ul style="list-style-type: none"> <li>● 4 Growers now have a better understand climate ouputs available at the BOM website and how to apply the information to on-farm decision making</li> <li>● The growers really enjoyed talking to the scientists about climate processes</li> </ul>	YourDATA
	8 Cotton Nutrition Workshops [Nitrogen Management]	Dec 14 – Apr 15	<ul style="list-style-type: none"> <li>● <b>Participants:</b> 150 growers &amp; advisers</li> <li>● <b>Locations:</b> Riverina, Liverpool Plains, Bourke, Emerald</li> <li>● <b>Total participant ha:</b> 54,000</li> <li>● To engage growers on improving crop nutrition and nitrogen use efficiency</li> </ul> <p><b><u>YourDATA Comments</u></b></p> <ul style="list-style-type: none"> <li>● The Bourke cotton growers/advisors were grateful for the workshop and encouraged us to continue to service their needs with topical technical information</li> </ul> <p><b><u>Feedback Report (Dec 2014 Workshops – Riverina, Liverpool Plain, Bourke)</u></b></p> <ul style="list-style-type: none"> <li>● 48 respondents (40 growers &amp; 8 advisers)</li> </ul>	Progress Report 4 (Dec 14–May 15); YourDATA

			<ul style="list-style-type: none"> <li>• 23,640ha and 11,090ha covered by growers and advisors respectively – approx. 17% of the entire Australian cotton production area in five workshops</li> <li>• 100% indicated the workshop would help them in the management of soils, crop nutrition and nitrogen use efficiency for cotton production.</li> <li>• 40% use plant tissue testing to monitor nutrient balances to meet crop nutrient demand (33% planning to)</li> <li>• In terms of achieving the project objectives outlined, the cotton nutrition workshops have gone some way in up-skill cotton &amp; grains industry advisers, extension networks and key influencers evidenced by the post workshop evaluations. This knowledge will aid in advisors offering emissions management so they are skilled in their advice and discussions with cotton clients.</li> </ul> <p><b><u>Feedback Survey (Apr 2015 Workshops - Emerald)</u></b></p> <ul style="list-style-type: none"> <li>• 32 respondents</li> <li>• Overall participants rated the workshop very highly (72% excellent &amp; 28% good)</li> <li>• Above average ratings of workshop content (1-5 scale): <ul style="list-style-type: none"> <li>○ 4.7 average - Assessing current nutrient management in cotton production areas</li> <li>○ 4.6 average - Understanding the main drives/limitations of yield and nutrient requirement in cotton</li> <li>○ 4.6 average - Outlining key indicators soil fertility and their management</li> <li>○ 4.7 average - Assessing the need for key nutrients and management options in cotton</li> <li>○ 4.2 average - Role of plant tissue in managing crop nutrition beyond crop establishment</li> <li>○ 3.7 average - Nutrition resources available online at the myBMP website</li> <li>○ 3.7 average - Undertaking Soil Health myBMP module on laptops with assistance</li> </ul> </li> <li>• Practice change following the workshop: <ul style="list-style-type: none"> <li>○ 76% intend to soil test every year (and increase of 14%)</li> <li>○ Substantial increase in the intent to use petiole/leaf testing was recorded, with 46% indicating they would use it each year.</li> <li>○ 41% participants reported that they would use NutriLOGIC every year, following the explanation of its functions (greatest intended change in practice)</li> </ul> </li> <li>• myBMP status of attendees: <ul style="list-style-type: none"> <li>○ 21% accredited</li> <li>○ 18% participating online &amp; plan to be accredited</li> <li>○ 18% participating online completed level 1</li> <li>○ 18% tried out website every now and then</li> </ul> </li> <li>• 25% new to myBMP</li> </ul>	
	2 Energy Efficiency 'Big Days Out' Field Days [Energy Use]	Feb 15	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 140 growers, advisers &amp; industry</li> <li>• <b>Location:</b> St George &amp; Gunnedah</li> <li>• <b>Hectares represented:</b> 19,000 irrigated</li> </ul>	Progress Report 4 (Dec 14–May 15); YourDATA

			<ul style="list-style-type: none"> <li>The purpose of the workshops were to empower irrigated cotton-growing enterprises to improve energy efficiency, reduce energy costs and increase understanding of emissions reduction from cropping fields.</li> </ul> <p><b><u>Feedback Survey</u></b></p> <ul style="list-style-type: none"> <li>50 Respondents</li> <li>Overall, participants indicated that the workshop had met aims and expectations (average overall rating of 4.3/5) in improving their understanding of energy efficiency on cotton farms.</li> <li>Understanding gains (before vs. after workshops on a 1-5 scale): <ul style="list-style-type: none"> <li>+1.3 Renewable technology (2.6 avg. to 3.9 avg.)</li> <li>+1.1 Government emissions and energy policies</li> <li>+1.0 Energy efficiency audits (2.8 avg. to 3.8 avg.)</li> <li>+0.9 Pump Efficiency (3.0 avg. to 3.9 avg.)</li> <li>+0.5 Tractor Efficiency (3.2 avg. to 2.7 avg.)</li> </ul> </li> <li>Likelihood of adopting on-farm practices as a result of information presented at the workshops: <ul style="list-style-type: none"> <li>75% Renewable energy technology (14% already adopted; n=36)</li> <li>69% Energy efficiency audits (9% already adopted; n=36)</li> <li>54% Pump efficiency actions (16% already adopted; n=37)</li> <li>38% Tractor efficiency actions (6% already adopted; n=17)</li> </ul> </li> <li>The Big Days Out and related media and promotion activities have improved the capacity of cotton growers and industry personnel to understand complexity of energy consumption and greenhouse gas emissions on farms and ways these can be reduced.</li> <li>The days have generated interest amongst growers on undertaking energy audits, actions to improve energy efficiency and exploring the opportunities of using renewable energy to supplement diesel and electricity on farm.</li> <li>The overall response to the events is summarised by a grower at the Big Day Out at Gunnedah "The day was run very professionally, good information, good pace".</li> </ul>	
	Climate Risk – Fitzroy Valley [Seasonal Forecasting]	Dec 14	<ul style="list-style-type: none"> <li><b>Participants:</b> 200 growers &amp; advisers</li> <li>Posted on CottonInfo website Apr 15</li> </ul>	Progress Report 4 (Dec 14–May 15)
	Yanco cotton shortcourse [Seasonal Forecasting]	Aug 14	<ul style="list-style-type: none"> <li><b>Participants:</b> 22 growers</li> <li><b>Location:</b> Yanco</li> <li>Seasonal forecasting information</li> </ul> <p><b><u>YourDATA Comments</u></b></p> <ul style="list-style-type: none"> <li>All attendees showed an interest in following the industry e-news with the view to applying forecasting information to operational activities on cotton and grain farming</li> <li>What worked: The streamflow forecasting at the BOM - a keen interest from growers</li> </ul>	YourDATA

			<ul style="list-style-type: none"> <li>• There was approximately 70 interested attendees but we could only accommodate 22. Also, the presentation may have been too detailed for the farm staff attending</li> </ul>	
	10 Soil Carbon Workshops [Nitrogen Management]	Mar – Jun 14	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 130 growers &amp; advisers</li> <li>• <b>Locations:</b> Walgett, Spring Plains, Emerald, Warren, Moree, Dalby, Hillston, Hay, Moonie</li> <li>• Increase cotton industry understanding of emissions reduction and carbon sequestration from cropping fields</li> <li>• Growers and advisers attending are generally very conscious of long term sustainability and the role of soil carbon in soil biological functions. Workshops surveys have identified gaps in information available to growers on soil carbon to aid in crop production decisions.</li> </ul> <p><b>Progress Report highlights</b></p> <ul style="list-style-type: none"> <li>• Growers and advisers attending are generally very conscious of long term sustainability and the role of soil carbon in soil biological functions.</li> <li>• Gaps identified in information available to growers on soil carbon to aid in crop production decisions.</li> </ul> <p><b>Survey Report</b></p> <ul style="list-style-type: none"> <li>• Workshops were conducted in a relaxed, interactive and informal manner. Some difficulties were encountered with support from growers and advisors due to an unseasonably wet autumn picking period.</li> <li>• Respondents showed an interest in improving farming systems to build soil carbon. However, a request for more data on the optimal rotation of break crops features in all feedback sheets indicating potential gaps in research and extension.</li> <li>• Level soil Carbon workshops helped participants understand (n=123 on a 1-5 scale where 1=poor and 5=good): <ul style="list-style-type: none"> <li>○ 4.2 avg. - How organic matter helps the soil and crops</li> <li>○ 4.0 avg. - The functions of soil organic matter and carbon</li> <li>○ 3.9 avg. - Ways to build soil carbon</li> <li>○ 3.6 avg. - The value of soil carbon</li> <li>○ 3.0 avg. - The carbon farming initiative</li> <li>○ 3.0 avg. - Decision making to increase sustainability of practices</li> </ul> </li> </ul>	Progress Report 2 (Dec 13-May 14); Progress Report 3 (May 14-Dec 14); YourDATA
	Climate risk management training [Seasonal Forecasting]	May 14	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 40 (25 growers &amp; 15 agronomists)</li> <li>• <b>Location:</b> NSW</li> </ul>	YourDATA

	Nitrogen management in cotton and the CFI [Nitrogen Management]	May 14	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 14 (8 growers, 8 industry)</li> <li>• <b>Location:</b> Darling Downs</li> <li>• To extend on recent findings of nitrogen loss and N2O emissions pathways</li> </ul> <p><b>YourDATA Comments:</b></p> <ul style="list-style-type: none"> <li>• 3 participants indicated they would adjust nitrogen management to reduce losses and apply when plant demand is greatest</li> </ul>	YourDATA
	8 Industry Workshops on Nitrogen Use [Nitrogen Management]	Dec 13	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 82 (50 growers, 5 farm staff, 20 agronomists, 7 industry)</li> <li>• <b>Locations:</b> Cecil Plains, Dalby, Warren, Goondiwindi, Boggabilla, Burren Junction &amp; Narrabri, Moree, St George, Griffith</li> <li>• Update industry on matching nitrogen use with nitrogen demand</li> </ul> <p><b>Progress Report highlights</b></p> <ul style="list-style-type: none"> <li>• Survey results indicate nitrogen supply is becoming more tailored to fit with nitrogen demand, and growers and advisers surveyed are splitting nitrogen applications through the crop growth cycle.</li> </ul> <p><b>Survey Report</b></p> <ul style="list-style-type: none"> <li>• 39% use (or would like to use) plant tissue analysis to monitor crop nutrition balances to meet crop nutrient demand (n=82)</li> <li>• 94% thought the workshops had been beneficial in helping understanding soil and nutrition (n=82)</li> <li>• The workshop survey discussion reveals the sample of workshop participants generally, are moving towards matching crop nutrient demand with crop nutrient supply. Also, results show clearly the overwhelming majority of growers and advisers surveyed actively measured soil nutrients and all of those surveyed are currently, or would like to use petiole testing.</li> </ul>	Progress Report 2 (Dec 13-May 14); YourDATA
	Issues	May 16 – Dec 16	Some informal workshops on climate have no M&E data making reporting outcomes difficult	Progress Report 7 (May 16 – Dec 16)
		May 14 – Dec 14	Out of 11 Soil carbon workshops, 1 soil carbon workshop had to be cancelled due to lack of numbers. A delayed picking period and timely sowing rains made participation difficult	Progress Report 3 (May 14-Dec 14)
May 14 – Dec 14		Farmer participation in myBMP audits: Cotton Australia currently approaching farmers to work through the voluntary audits and having difficulty creating interest and finding new participants	Progress Report 3 (May 14-Dec 14)	
Dec 13 – May 14		4 x Soil carbon workshops postponed due to rains delaying cotton picking – completed in June	Progress Report 2 (Dec 13-May 14)	

Meetings/ Forums	2 Conference presentations / UNE lecture [Energy Use] [Seasonal Forecasting]	Aug 16	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 600 growers &amp; advisers</li> <li>• Energy efficiency and climate risk management</li> </ul>	Progress Report 7 (May 16 – Dec 16)
	6 Local CGA meetings [Seasonal Forecasting] [Nitrogen Management]	Dec 15 – Dec 16	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 320 growers &amp; advisers</li> <li>• <b>Location:</b> Goondiwindi, Rowena, Toowoomba, Moree, Walgett, Wee Waa</li> <li>• Seasonal outlook and nutrition tour findings</li> </ul>	Progress Report 7 (May 16 – Dec 16); Progress Report 6 (Dec 15 – May 16); YourDATA
	CCA Presentation Moree [Seasonal Forecasting]	May 16	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 130 agronomists/consultants</li> <li>• <b>Location:</b> Moree</li> <li>• To raise awareness on climatic influences on broadacre agriculture production</li> </ul>	YourDATA
	Climate risk management presentation [Seasonal Forecasting]	Apr 16	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 39 (30 growers, 5 farm staff, 4 agronomists)</li> <li>• <b>Location:</b> Rowena</li> <li>• To present growers of all available climate forecasting information to apply for decision making</li> </ul>	YourDATA
	Extension campaign at Cotton Collective Industry Forum	Aug 15	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 80 (50 growers, 20 agribusiness 10 industry)</li> <li>• <b>Location:</b> Narrabri</li> <li>• Targeted extension campaign to provide information and raise awareness about greenhouse gas emissions and carbon sequestration in cotton farming production systems</li> </ul>	YourDATA
	Crop consultants AGM on seasonal forecasting and N use [Seasonal Forecasting] [Nitrogen Management]	Jul 15	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 130 advisers</li> <li>• <b>Location:</b> Moree</li> <li>• Improved use of short, medium and long term seasonal forecasting information to facilitate more informed decisions regarding the efficient use of farm inputs (including, but not limited to, agronomy practices, fertiliser use, irrigation regimes and fuel and energy use) and agronomy practices to minimise greenhouse gas emissions</li> </ul>	Progress Report 5 (May 15 – Dec 15); YourDATA
	NSW Energy Minister Meeting [Energy Use]	Jul 15	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 6 (2 growers, 2 industry, 2 government)</li> <li>• <b>Location:</b> Narrabri</li> </ul>	YourDATA

			<ul style="list-style-type: none"> <li>• Demonstrate to Minister Roberts the initiatives underway in the Cotton Industry to use energy more efficiently through renewables with the added bonus of reducing greenhouse gas emissions.</li> </ul>	
	Carbon Farming Forum Moree [Nitrogen Management]	Apr 15	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 23 (3 agronomists, 20 industry)</li> <li>• <b>Location:</b> Moree</li> <li>• Presented current status of Action on the Ground projects in Moree and RDO Nitrogen trial program to researchers involved in CFI funded projects.</li> </ul>	YourDATA
	Climate Risk presentation - Walgett CGA [Seasonal Forecasting]	Dec 14	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 12 (7 growers, 2 agronomists, 3 industry)</li> <li>• <b>Location:</b> Walgett</li> <li>• To up-skill growers/advisors on the use of seasonal forecasting to better manage nitrogen fertiliser and decisions around crop selection</li> </ul> <p><b>YourDATA Comments:</b></p> <ul style="list-style-type: none"> <li>• All participants intend to attempt to understand climate process to make more informed decisions with fertiliser use and managing farm inputs</li> <li>• What worked: Explaining how to cross reference computer guidance with critical indicators</li> </ul>	YourDATA
	CSIRO Climate Change Conference Presentation [Seasonal Forecasting]	Sep 14	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 22 (2 growers, 20 industry)</li> <li>• <b>Location:</b> UWS Hawkesbury</li> <li>• A forum of cotton industry researchers and extension personnel related to climate change</li> <li>• Cross-collaboration with CSIRO and UWS on climate change related research.</li> </ul>	YourDATA
	Presentations at Cotton Conference 2014 [Nitrogen Management] [Seasonal Forecasting] [NRM]	Aug 14	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 1,400 growers &amp; advisers</li> <li>• <b>Location:</b> Gold Coast</li> <li>• The value of non-cropped areas on a cotton farm; Nitrogen use efficiency throughout the regions; Climate risk management</li> <li>• Up-skill growers and advisers on the use of seasonal forecasting with the view to improving nitrogen use efficiency and crop selection</li> <li>• Positive publicity was subsequently received in the rural press</li> <li>• <b>Also Activity 5c: KPI 5ci</b></li> </ul>	Progress Report 3 (May 14-Dec 14); YourDATA
<b>Webinars</b>	3 NUE and crop nutrition Webinars [Nitrogen Management]	Jun 16	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 80 advisers &amp; growers</li> <li>• Build capacity on the drivers of yield and NUE for reduced emissions</li> </ul>	Progress Report 7 (May 16 – Dec 16); YourDATA
	Canopy Sensor Webinar	Nov 15	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 14 growers</li> <li>• To understand progress of research with canopy temperature sensors and how they can be used in irrigation scheduling</li> </ul>	YourDATA

	[Seasonal Forecasting]			
	3 Webinars on improving NUE and ERF awareness [Nitrogen Management]	Jun 15	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 55 advisers &amp; growers</li> <li>• Also Objective KPI 6aii</li> </ul>	Progress Report 5 (May 15 –Dec 15)
	2 CFI Climate Risk Webinars [Seasonal Forecasting]	Jun 14, Oct 14	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 46 growers &amp; advisers</li> <li>• Provide an overview of climatic information for growers and advisors to apply to nitrogen management decisions and crop selection</li> <li>• Encourage use of the Industry e-news on climate, and to apply seasonal forecasting information to on-farm decisions</li> </ul> <p><b><u>YourDATA Comments (Oct 14 Webinar)</u></b></p> <ul style="list-style-type: none"> <li>• All participants planning to follow regular updates of moisture manager, to consider various climatic indicators and seasonal forecasting models when procuring inputs such as fertiliser</li> <li>• The content was very well received - 6 emails offering thank you and congratulations from participants. All registered participants were emailed pdf of the slides after the event</li> </ul>	Progress Report 3 (May 14-Dec 14); YourDATA
	CFI Extension Webinar [Nitrogen Management]	Dec 13	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 12 growers &amp; advisers</li> <li>• An introduction to the E&amp;O project, CFI and nitrogen use efficiency</li> <li>• Update industry on CFI issues</li> </ul> <p><b><u>YourDATA Comments:</u></b></p> <ul style="list-style-type: none"> <li>• The actual webinar delivery worked well</li> <li>• Carbon policy is difficult to extend when there have been major political changes</li> </ul>	Progress Report 2 (Dec 13-May 14); YourDATA
One-on-one	Picked N Trial [Nitrogen Management]	Apr 16	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 2 growers</li> </ul>	YourDATA
	Grower visit – Coolah GRG [Seasonal Forecasting]	Apr 16	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 1 grower</li> <li>• <b>Total participant ha:</b> 30,000</li> <li>• <b>Location:</b> Namoi</li> </ul> <p><b><u>YourDATA Comments</u></b></p> <ul style="list-style-type: none"> <li>• <b>Intended actions:</b> Install weather monitoring gear and do a cotton trial</li> </ul>	YourDATA
	5 Solar/Diesel Hybrid Irrigation	Jan 15 - Dec 15	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 11 growers</li> <li>• <b>Location:</b> Namoi, Macquarie</li> </ul>	YourDATA

Bore Feasibility/Case Studies [Energy Use]		<ul style="list-style-type: none"> <li>• Feasibility studies on incorporating hybrid solar/diesel technology to an irrigation bore</li> </ul> <p><b>YourDATA Comments</b></p> <ul style="list-style-type: none"> <li>• <b>Intended actions:</b> <ul style="list-style-type: none"> <li>○ Pursue a formal quote to install a hybrid system (1 grower, 600 ha irrigated)</li> <li>○ Install a renewable/hybrid system to offset diesel use and reduce emissions (1 grower, 500ha irrigated)</li> <li>○ Install solar diesel hybrid system to reduce the cost of groundwater extraction and reduce greenhouse gas emissions (4 growers, 2,000ha irrigated)</li> <li>○ Monitor inputs for solar prices and electricity prices. Fix Power Factor Correction on existing pumps (3 growers, 7,000ha irrigated)</li> </ul> </li> <li>• <b>Comments:</b> <ul style="list-style-type: none"> <li>○ On-farm visit much more effective than email and telephone to gather information</li> <li>○ The grower has a high cost due to an old diesel motor, therefore returns are very attractive to install a new system</li> <li>○ A great learning experience for the farmers and technical specialists alike</li> </ul> </li> </ul>	
Grower consult [Seasonal Forecasting]	Aug 15	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 1 grower</li> <li>• Discussing irrigation recording and feedback on moisture manager industry climate reporting</li> </ul>	YourDATA
GHG case study – Auscott [Energy Use]	Jun 15	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 1 grower</li> <li>• <b>Total participant ha:</b> 10,000 irrigated and 5,000 dryland</li> <li>• <b>Location:</b> Namoi</li> <li>• To gather information on land use and crop rotations to formulate an assessment of GHG assessment and provide mitigation scenarios.</li> </ul>	YourDATA
CEFC energy finance subsidy [Energy Use]	Jun 15	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 2 growers &amp; 1 agribusiness</li> <li>• <b>Total participant ha:</b> 800 irrigated and 1,200 dryland</li> <li>• <b>Location:</b> Namoi</li> <li>• To determine benefits of Clean Energy Finance Corporation media release on interest subsidy applied to renewable energy</li> </ul>	YourDATA
Climate Risk Case Study [Seasonal Forecasting]	Apr 15	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 1 grower</li> <li>• <b>Total participant ha:</b> 2,000 irrigated and 15,000 dryland</li> <li>• <b>Location:</b> Namoi</li> <li>• To document good grower practices on dealing with climate information and risk management - findings were documented in a case study published in the CottonInfo Website</li> </ul> <p><b>YourDATA Comments</b></p> <ul style="list-style-type: none"> <li>• <b>Intended actions:</b> Use climate information provided by cottoninfo to improve planning and better manage farm inputs</li> </ul>	YourDATA

	Weather Station Installation [Seasonal Forecasting]	Mar 15	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 2 growers</li> <li>• <b>Total participant ha:</b> 500 irrigated and 1,000 dryland</li> <li>• <b>Location:</b> Boggabri</li> <li>• Weather station was purchased at Auction at Gunnedah Big Day Out February, 2015</li> </ul> <p><b>YourDATA Comments</b></p> <ul style="list-style-type: none"> <li>• <b>Intended actions:</b> Utilise information to avoid spray drift and better manage fertiliser applications and other farming practices</li> </ul>	YourDATA
	4 Climate & Input Efficiency Case Studies [Seasonal Forecasting] [Energy Use]	Mar 14, Dec 14	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 5 growers</li> <li>• <b>Locations:</b> Namoi, Gywdir</li> <li>• To promote the use of energy and water efficiency within the cotton industry</li> <li>• To raise awareness of local climatic influences and the use of seasonal forecasting to better manage farm inputs such as nitrogen fertiliser</li> </ul> <p><b>YourDATA Comments:</b></p> <ul style="list-style-type: none"> <li>• 1 grower intends to follow up to date information from cotton-info e news and apply information to farm management decisions</li> <li>• 2 growers intend to follow major climatic indicators through the industry e-news and translate into management decisions</li> </ul>	YourDATA
<b>Trial</b>	Nitrogen Trial [Nitrogen Management]	Oct 14	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 7 (3 growers, 2 farm staff, 2 agronomists)</li> <li>• <b>Total participant ha:</b> 9,500 (3,000 irrigated, 6,500 dryland)</li> <li>• <b>Location:</b> Namoi</li> <li>• Rate trial to measure NFUE</li> </ul>	YourDATA
<b>Materials (e.g. communications, marketing, training)</b>				
<b>Newsletters / emails</b>	Email Newsletters: Fortnightly Moisture Manager, Climate e-news, e-alerts, CRDC spotlight	Fortnightly / periodically	<ul style="list-style-type: none"> <li>• <b>Recipients:</b> 3,300 growers &amp; advisers</li> <li>• <b>Open rate:</b> 30-38% open rate</li> <li>• To provide quality and timely information on climate processes, commentary and model outputs for improved agronomic decision making through more efficient use of farm inputs</li> </ul> <p><b>Progress Report</b></p> <ul style="list-style-type: none"> <li>• Open rate has improved from 307 recipients (20 September, 2014) opening the Moisture Manager to 483 recipients (16 November, 2015) of a possible 1300 at the time of this progress report. The open rate is now 1300 of a possible 3300 subscribers and is opened or forwarded 3 times for every opening.</li> <li>• Click rates of the project climate reporting show an engaged grower/adviser audience.</li> </ul> <p><b>Analytics Data (Sep 14-Aug 15)</b></p> <ul style="list-style-type: none"> <li>• <b>CottonInfo e-news:</b></li> </ul>	Progress Report 6 (Dec 15 –May 16); Progress Report 7 (May 16 – Dec 16); YourDATA

			<ul style="list-style-type: none"> <li>○ No. of newsletters: 22</li> <li>○ Avg, successful deliveries: 1,017</li> <li>○ Avg. open rate: 31%</li> <li>○ Avg. click rate: 2.2%</li> <li>● <b>CottonInfo moisture manager:</b> <ul style="list-style-type: none"> <li>○ No. of newsletters: 23</li> <li>○ Avg, successful deliveries: 976</li> <li>○ Avg. open rate: 32%</li> <li>○ Avg. click rate: 3.5%</li> </ul> </li> <li>● <b>CottonInfo e-alert:</b> <ul style="list-style-type: none"> <li>○ No. of newsletters: 4</li> <li>○ Avg, successful deliveries: 865</li> <li>○ Avg. open rate: 32%</li> <li>○ Avg. click rate: 4.2%</li> </ul> </li> <li>● <b>CRDC Spotlight Winter 2015:</b> <ul style="list-style-type: none"> <li>○ No. of newsletters: 1</li> <li>○ Successful deliveries: 1,265</li> <li>○ Avg. open rate: 40%</li> <li>○ Avg. click rate: 7.3%</li> </ul> </li> </ul>	
<b>Website</b>	Cottoninfo.com.au		<ul style="list-style-type: none"> <li>● <b>Visits:</b> 166</li> <li>● <b>Page views:</b> 461 / per week</li> </ul>	Progress Report 6 (Dec 15 –May 16); Progress Report 7 (May 16 – Dec 16)
	Carbon farming section	Feb 15	<ul style="list-style-type: none"> <li>● Published to CottonInfo website</li> <li>● <b>Views:</b> 4,200 (in 8 weeks)</li> </ul>	Progress Report 4 (Dec 14–May 15)
	Workshop M&E	2015	<ul style="list-style-type: none"> <li>● All workshop M&amp;E posted on Website (NRM, Big Day Out, Nitrogen workshop, Panel meeting)</li> </ul>	Progress Report 4 (Dec 14–May 15)
<b>Videos</b>	Successful cotton with limited water Youtube Video Webinar	Aug 16	<ul style="list-style-type: none"> <li>● <b>Views:</b> 100 (inc. attendees)</li> </ul>	Progress Report 7 (May 16 – Dec 16)
	Seasonal Forecasting Youtube Video	Aug 16	<ul style="list-style-type: none"> <li>● <b>Views:</b> 96</li> </ul>	Progress Report 7 (May 16 – Dec 16)
	CottonInfo promotional Youtube video	Aug 16	<ul style="list-style-type: none"> <li>● <b>Views:</b> 183 (inc. attendees)</li> </ul>	Progress Report 7 (May 16 – Dec 16)

	Solar and irrigating - Andrew Gill case study Youtube Video	Jul 16	<ul style="list-style-type: none"> <li>• <b>Views:</b> 70</li> </ul>	Progress Report 7 (May 16 – Dec 16)
	MOJO the Climate animation (YouTube video)		<ul style="list-style-type: none"> <li>• <b>Views:</b> 3,880 (25 Nov, 2015), 1,900 (1 Dec, 2014)</li> </ul>	Progress Report 5 (May 15 –Dec 15)
<b>Fact sheets</b>	Solar energy - policy settings and applications to cotton production	Sep 16	<ul style="list-style-type: none"> <li>• Published to CottonInfo website</li> <li>• Had some great feedback from growers, the cotton industry and NSW irrigators council</li> </ul>	Progress Report 7 (May 16 – Dec 16)
	NANORP/CRDC Fact Sheets	May 16	<ul style="list-style-type: none"> <li>• Published to NANORP/CottonInfo websites</li> </ul>	Progress Report 6 (Dec 15 –May 16)
<b>Flyers / Brochures</b>	Cotton Nutrition Tour Brochure handout	Jan 16	<ul style="list-style-type: none"> <li>• <b>Recipients:</b> 600 distributed</li> </ul>	Progress Report 6 (Dec 15 –May 16)
	Energy Efficiency Flyer promoting 2 workshops	Nov 15	<ul style="list-style-type: none"> <li>• <b>Recipients:</b> 1,300 growers &amp; advisers on email list</li> </ul>	Progress Report 5 (May 15 –Dec 15)
	IrrisAT Workshop Flyer promoting workshops	May 15	<ul style="list-style-type: none"> <li>• <b>Recipients:</b> 1,300 growers &amp; advisers on email list</li> </ul>	Progress Report 5 (May 15 –Dec 15)
	Nitrogen Workshop Flyer	Apr 15	<ul style="list-style-type: none"> <li>• Distributed via email/post</li> </ul>	Progress Report 4 (Dec 14–May 15)
	Big Day Out Flyer	Feb 15	<ul style="list-style-type: none"> <li>• Distributed via email</li> </ul>	Progress Report 4 (Dec 14–May 15)
	Brochure to Fitzroy Valley CGA	Dec 14	<ul style="list-style-type: none"> <li>• <b>Recipients:</b> 100 growers, researchers &amp; advisers via email</li> <li>• Using indicators to finetune planting and fertilising operations</li> </ul>	Progress Report 3 (May 14-Dec 14)
	Brochure – 2014, An El Niño year?	Apr - May 14	<ul style="list-style-type: none"> <li>• <b>Recipients:</b> 500 growers</li> <li>• Distributed through Cotton Grower Associations, Irrigators councils</li> <li>• Aid and assist in grower decision making in terms of crop selection and fertiliser decisions</li> </ul>	Progress Report 3 (May 14-Dec 14)
<b>Case studies</b>	Grid connected solar - irrigation case studies	Sep 16	<ul style="list-style-type: none"> <li>• Published to CottonInfo website</li> </ul>	Progress Report 7 (May 16 – Dec 16)

	NANORP case studies	May 16	<ul style="list-style-type: none"> <li>Published to NANORP/CottonInfo websites</li> </ul>	Progress Report 6 (Dec 15 –May 16)
	Energy efficiency case studies	May 15	<ul style="list-style-type: none"> <li>Published to CottonInfo website</li> </ul>	Progress Report 5 (May 15 –Dec 15)
	Climate risk case study	May 15	<ul style="list-style-type: none"> <li><b>Recipients:</b> 1,300 grower &amp; advisers through Spotlight magazine &amp; website</li> </ul>	Progress Report 5 (May 15 –Dec 15)
	ERF Cotton Nitrogen Method case study	May 15	<ul style="list-style-type: none"> <li>Published to CottonInfo website</li> </ul>	Progress Report 5 (May 15 –Dec 15)
<b>Articles / Papers / Presentations</b>	2 Cotton conference presentations	Aug 16	<ul style="list-style-type: none"> <li>Published on Australian Cotton Conference website</li> <li>600 attendees at conference</li> </ul>	Progress Report 7 (May 16 – Dec 16)
	Article in Cottongrower magazine on energy efficiency case study	May 16	<ul style="list-style-type: none"> <li><b>Recipients:</b> 1000 subscribers</li> </ul>	Progress Report 6 (Dec 15 –May 16)
	Journal article on Nitrogen use & ERF	May 15	<ul style="list-style-type: none"> <li>Published in AFBM journal</li> <li>[Also Objective KPI 6a]ii</li> </ul>	Progress Report 5 (May 15 –Dec 15)
	Article on Measuring N loss and indirect emissions	Jun 15	<ul style="list-style-type: none"> <li><b>Recipients:</b> 1,300 grower &amp; advisers through Spotlight magazine &amp; website</li> </ul>	Progress Report 5 (May 15 –Dec 15)
	Article on measuring soil carbon losses	Oct 15	<ul style="list-style-type: none"> <li><b>Recipients:</b> 1,300 grower &amp; advisers through Spotlight magazine &amp; website</li> </ul>	Progress Report 5 (May 15 –Dec 15)
	Big Day Out Presentation	Feb 15	<ul style="list-style-type: none"> <li>Published to CottonInfo website (energy page)</li> </ul>	Progress Report 4 (Dec 14–May 15)
	4 Articles in Spotlight Magazine	Sep 14	<ul style="list-style-type: none"> <li><b>Recipients:</b> 1,400 grower &amp; advisers through Spotlight magazine &amp; website</li> <li>Improving nitrogen use efficiency in cotton; Carbon neutral cotton farms: the value of non-cropped areas; Improving energy efficiency in irrigation pumping; Cotton industry environmental credentials on the world stage</li> <li>[Also Objective KPI 6a]ii</li> </ul>	Progress Report 3 (May 14-Dec 14)
	Cotton conference Presentations	Aug 14	<ul style="list-style-type: none"> <li>Papers presented at the Gold Coast Cotton Conference 2014 published</li> </ul>	Progress Report 3 (May 14-Dec 14)

	2 Articles in The Australian Cotton Grower	Oct 14	<ul style="list-style-type: none"> <li>• <b>Recipients:</b> 1,400 growers &amp; advisers through The Australian Cotton Grower</li> <li>• Reduce fertiliser needs by accounting for soil microbes; How well is your nitrogen program performing?</li> </ul>	Progress Report 3 (May 14-Dec 14)
	Article on reducing nitrogen fertiliser costs using a Faba bean rotation	Aug 14	<ul style="list-style-type: none"> <li>• <b>Recipients:</b> 1,400 growers &amp; advisers through The Australian Cotton Grower</li> </ul>	Progress Report 3 (May 14-Dec 14)
	Article on improving input and energy efficiency on farm	Mar 14	<ul style="list-style-type: none"> <li>• <b>Recipients:</b> 1,300 grower &amp; advisers through Spotlight magazine &amp; website</li> </ul>	Progress Report 3 (May 14-Dec 14)
	Article on UNE production course: updated environment unit: carbon and energy policy and seasonal forecasting	Mar 14	<ul style="list-style-type: none"> <li>• <b>Recipients:</b> 1,300 grower &amp; advisers through Spotlight magazine &amp; website</li> </ul>	Progress Report 3 (May 14-Dec 14)
<b>Media coverage</b>	News story on Solar and bore pumps case study	Oct 16	<ul style="list-style-type: none"> <li>• Published online (Northern Daily Reader)</li> </ul>	Progress Report 7 (May 16 – Dec 16)
	News story on Nitrogen optimisation tool	Feb 16	<ul style="list-style-type: none"> <li>• Published in print &amp; online</li> </ul>	Progress Report 6 (Dec 15 –May 16)
	News story on seasonal forecasting for better environmental outcomes	Mar 16	<ul style="list-style-type: none"> <li>• Published in print &amp; online</li> </ul>	Progress Report 6 (Dec 15 –May 16)
	Energy Media Releases	Mar 15	<ul style="list-style-type: none"> <li>• Fairfax Ag Media</li> <li>• Potential 8 million regional readers</li> </ul>	Progress Report 4 (Dec 14–May 15)
	Media release on MOJO climate animation	Nov 14	<ul style="list-style-type: none"> <li>• Distributed through Cotton e-news</li> <li>• Potential 1,300 growers &amp; advisers</li> </ul>	Progress Report 3 (May 14-Dec 14)

	Media release on Australian Cotton Conference	Aug 14	<ul style="list-style-type: none"> <li>• Fairfax Ag Media</li> <li>• Potential 8 million regional readers</li> </ul>	Progress Report 3 (May 14-Dec 14)
	Media release	Jul 14	<ul style="list-style-type: none"> <li>• Fairfax Ag Media</li> <li>• Potential 8 million regional readers</li> <li>• Bureau of Meteorology head visits Narrabri; the use of seasonal forecasting in risk management</li> </ul>	Progress Report 3 (May 14-Dec 14)
	Media release	Feb 14	<ul style="list-style-type: none"> <li>• Industry email and Rural Press, ABC local radio</li> <li>• Potential 2,000 growers &amp; advisers</li> <li>• Soil Carbon Workshops</li> </ul>	Progress Report 2 (Dec 13-May 14)
	Issue	May 16 – Dec 16	2x press releases from projects not picked up by the media. Documents were changed to satisfy funding deed requirement, essentially making a newsworthy article not palatable to the wider media	Progress Report 7 (May 16 – Dec 16)
	Issue	Dec 14 – May 15	Difficulty with journalists omitting accidentally or otherwise project recognition. At least 3 press articles were unable to be attributed in this reporting period due to branding being removed.	Progress Report 4 (Dec 14–May 15)

## Objective 5

Increase cotton industry understanding of carbon sequestration and emissions reduction in **non-cropped areas** of the farm landscape.

Activity and /or deliverable	KPI Type	Key Performance Indicators	Achievements	Source
<b>Activity 5a.</b> Natural assets module revised to include information and practices relating to carbon sequestration and emissions reduction in the non-cropping areas of cotton farming landscapes.	Development	<b>[Achieved] KPI 5ai.</b> Revised version of Natural Assets module that incorporates information regarding carbon sequestration and GHG emissions endorsed by industry and available to growers <i>[August 2014]</i>	myBMP Natural Assets module revised following new research and submitted: <ul style="list-style-type: none"> <li>• <b>Month:</b> Mar 16</li> </ul>	Progress Report 6 (Dec 15 –May 16)
			Module review complete. Due to gaps in research on native vegetation the whole farm calculator will include a calculations of sequestration from non-cropped areas: <ul style="list-style-type: none"> <li>• <b>Month:</b> Aug 14</li> </ul>	Progress Report 3 (May 14-Dec 14)
	Endorsement	<b>KPI 5aii.</b> Industry endorsement of revised modules <i>[August 2014]</i>		
<b>Activity 5b.</b> Carbon management in cotton landscapes extension campaign <ul style="list-style-type: none"> <li>• Field days and farm walks with guest speakers</li> <li>• Newsletter articles: CottonTales, etc</li> <li>• Articles in industry publications – CRDC Spotlight, Australian Cottongrower magazine</li> <li>• Fact sheets</li> </ul>	Extension campaign	<b>[Achieved] KPI 5bi.</b> Targeted extension campaign to provide information and raise awareness about emissions and carbon sequestration from non-cropping areas designed. <i>[by August 2015]</i>	CFI Extension plan submitted to commonwealth. <ul style="list-style-type: none"> <li>• <b>Month:</b> Jan 14</li> </ul>	Progress Report 2 (Dec 13-May 14)
	Extension campaign	<b>KPI 5bii.</b> Extension campaign delivered from September 2015 to April 2017.	See Activity 5 extension campaign table	
	Development	Updated extension campaign for post-project activities developed. <i>[by December 2016]</i>		

<ul style="list-style-type: none"> <li>• Australian Cotton Conference posters and display</li> <li>• Growers groups</li> <li>• One-on-one support for myBMP uptake</li> <li>• Industry champions (including cotton Climate Champions)</li> <li>• Case studies</li> <li>• Social media</li> <li>• Webinars.</li> </ul>				
<b>Activity 5c.</b> Delivery of the revised BMPs for Natural Assets with a particular focus on emissions management and sequestration <ul style="list-style-type: none"> <li>• One-on-one support</li> <li>• Cluster groups</li> <li>• Workshops</li> <li>• BMP hotline</li> <li>• BMP third party audits</li> <li>• Webinars</li> <li>• Case studies.</li> </ul>	Development	<b>[Achieved] KPI 5ci.</b> Targeted campaign to support growers to work through the revised Natural Asset BMPs developed and provided to the Commonwealth	Plan delivered (Jul 14)	Progress Report 5 (May 15 –Dec 15)
	Extension campaign	<b>KPI 5ci.</b> <i>Extension campaign delivered [by August 2016]</i>	See Activity 5 extension campaign table	
	Target	<b>KPI 5cii.</b> 90%* of cotton growers have been exposed to the revised natural assets Module. <i>[by December 2016]</i>		
	Target	<b>KPI 5ciii.</b> 60%* of growers have completed the Self Assessment Tools for the revised natural assets myBMP module. <i>[by May 2017]</i>	Farmer participation in myBMP audits: Cotton Australia currently approaching farmers to work through the voluntary audits and having difficulty creating interest and finding new participants	Progress Report 4 (Dec 14–May 15)
	Evaluation	<b>KPI 5civ.</b> Evaluation of extension campaign (industry feedback via workshop surveys etc.) presented in project reports. <i>[by May 2017]</i>		
<b>Activity 5d.</b> Promote the Carbon Calculator for	Endorsement	<b>KPI 5di.</b> Information regarding the Carbon Calculator for Native Vegetation is	Carbon Calculator will also be delayed to finish in Q1 2017.	Progress Report 7 (May 16 – Dec 16)

Native Vegetation on cotton farms and similar tools.		incorporated into industry extension campaign. <i>[by July 2015]</i>	Carbon Calculator delayed due to the delay in peer reviewed research finding on sequestration rates. The calculator road test and review should be complete at the end of the 2015/16 workplan	Progress Report 6 (Dec 15 –May 16)
	Target	<b>KPI 5dii.</b> By 2017, at least 50%* of cotton growers and advisers are aware of the Carbon Calculator for cotton landscapes and/or other relevant tools <i>[by May 2017]</i>	<b>Growers:</b> <ul style="list-style-type: none"> <li>• 11% of respondents aware of the carbon footprint calculator (n=140)</li> <li>• 1% of respondents aware of FarmGAS calculator scenario tool (n=140)</li> </ul>	CRDC Cotton Growers Survey 2016

\*As measured through the CRDC funded Cotton Grower Practices and Cotton Consultants surveys conducted at the beginning and end of the project.

## Activity 5. Extension Campaign

Extension Type	Name	Month	Details	Source
<b>Events/Activities</b>				
<b>Workshops / Field Days</b>	myBMP natural assets workshop <a href="#">[NRM]</a>	Feb 16	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 30 growers</li> <li>• <b>Location:</b> Emerald</li> <li>• <b>Partners:</b> Researchers</li> </ul>	Progress Report 6 (Dec 15 –May 16); YourDATA
	3 myBMP natural assets workshops <a href="#">[NRM]</a>	Nov 15	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 105 growers</li> </ul>	Progress Report 5 (May 15 –Dec 15)
	NRM riparian zone extension <a href="#">[NRM]</a>	Nov 15	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 100 growers</li> <li>• <b>Location:</b> Gywdir</li> <li>• To promote riparian zones in cotton farming through canoeing and wildlife displays for families</li> </ul>	YourDATA
	3 myBMP Natural Assets workshops for advisers <a href="#">[NRM]</a>	Feb 15	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 30 NRM advisers &amp; industry</li> <li>• <b>Location:</b> Toowoomba, Griffith, Narrabri</li> <li>• Attendances generally low.</li> </ul> <p><b><u>YourDATA Comments</u></b></p>	Progress Report 4 (Dec 14–May 15); YourDATA

			<ul style="list-style-type: none"> <li>• 10 NRM participants intended to take actions including future collaborative opportunities and potential to provide supporting resources for natural assets module.</li> <li>• Workshops were useful: in showing the link between research and best practice recommendations; using myBMP as a framework to explore collaborative opportunities; and demonstrating to NRM groups that the cotton industry is working in the NRM space.</li> </ul> <p><b>Feedback Survey</b></p> <ul style="list-style-type: none"> <li>• 23 Respondents</li> <li>• Main message is that all participating organisations want to explore further with the CottonInfo team, the opportunities for future collaboration to help cut duplication and deliver against a range of milestones not just natural assets.</li> <li>• Overall strong agreement that the workshop helped (1-5 scale): <ul style="list-style-type: none"> <li>○ 4.3 average - Identify regional contacts</li> <li>○ 4.4 average - Understand CottonInfo research outcomes, latest tools and publications for natural resource management</li> <li>○ 4.4 average - Understand the cotton myBMP program</li> <li>○ 4.5 average - Learn the latest research on the ecosystem services of NV in cotton landscapes</li> <li>○ 4.2 average - Understand the standards and supporting resources and tools within the natural assest module</li> <li>○ 4.1 average - Understand the latest research on emissions and soil carbon sequestration in non cropped areas to understand how emissions can be reduced</li> <li>○ 4.2 average - Identify pathways for engaging with the cotton industry to help deliver my business/organisation targets</li> <li>○ 4.1 average - consider using myBMP as a framework to engage landholders</li> </ul> </li> </ul>	
	Issues	Dec 14 – May 15	A myBMP adviser workshop could not be accredited to the project due to emissions management research not being available or Natural Assets Module review uncompleted	Progress Report 4 (Dec 14–May 15)
		Dec 14 – May 15	Proposed Natural Assets grower workshops and NRM Field Day RivCom have had to be postponed due to lack of interest. 5 workshops had to be cancelled due to lack of interest.	Progress Report 4 (Dec 14–May 15)
<b>One-on-one</b>	NRM carbon footprint case study [NRM]	Jan 15	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 1 grower</li> <li>• <b>Total participant ha:</b> 1,400 irrigated and 15,000 dryland</li> <li>• <b>Location:</b> NSW</li> </ul> <p><b>YourDATA Comments</b></p> <ul style="list-style-type: none"> <li>• <b>Intended actions:</b> Continue to preserve and maintain non-cropped area - riparian vegetation</li> </ul>	YourDATA
<b>Materials (e.g. communications, marketing, training)</b>				

<b>Flyers</b>	Riparian Woodlands Tour Flyer promoting myBMP natural assets module <a href="#">[NRM]</a>	Oct 15	<ul style="list-style-type: none"> <li>• <b>Recipients:</b> 1,300 growers &amp; advisers through email list</li> </ul>	Progress Report 5 (May 15 –Dec 15)
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## Objective 6

Clarify to cotton industry participants the opportunities, benefits and trade-offs of participating in the ERF and/or implementing potential mitigation/sequestration options.

Activity and /or deliverable	KPI Type	Key Performance Indicators	Achievements	Source
<b>Activity 6a.</b> Extension campaign to provide information and raise awareness, including: <ul style="list-style-type: none"> <li>• Field days and farm walks with guest speakers</li> <li>• Newsletter articles: CottonTales, etc</li> <li>• Articles in industry publications – CRDC Spotlight, Australian Cottongrower magazine</li> <li>• Fact sheets</li> <li>• Australian Cotton Conference posters and display</li> <li>• Growers groups</li> <li>• One-on-one support for myBMP uptake</li> <li>• Industry champions (including cotton Climate Champions)</li> <li>• Case studies</li> <li>• Social media</li> <li>• Webinars.</li> </ul>	Extension campaign	<b>KPI 6ai.</b> Targeted extension campaign to provide information and raise awareness about how the ERF relates to cotton and grain farming systems developed <i>[by January 2014]</i>	Difficulty extending negative messages regarding ERF Policy; incentives for cotton industry participation are limited at the current ERF auction rates and high administration costs involved with participating in broad-acre cropping methods – especially when growers can be myBMP approved and perform best practice, receive a bale premium of \$8-15 without signing a detailed contract with the Australian Government	Progress Report 5 (May 15 –Dec 15)
			Recent developments in Carbon Policy/ERF: Anticipated CO2 price from direct action tender likely to fall in a range \$5-\$10/t making industry participation in CFI a remote possibility	Progress Report 3 (May 14-Dec 14)
	Extension campaign	<b>KPI 6aii.</b> Extension campaign delivered from February 2014 to April 2017	See Activity 6 extension campaign table	
	Target	<b>KPI 6aiii.</b> 75%* of cotton growers and 90%* of advisers are aware of the ERF and have an improved understanding of the ERF and emissions management in cotton farming <i>[by May 2017]</i>	<ul style="list-style-type: none"> <li>• ERF issues 15% awareness</li> </ul>	Progress Report 6 (Dec 15 –May 16); Progress Report 7 (May 16 – Dec 16)
			<b>Growers:</b> <ul style="list-style-type: none"> <li>• Awareness of carbon fact sheets and information resources (n=140):               <ul style="list-style-type: none"> <li>○ 21% (Webinar) Carbon farming opportunities for cotton growers</li> <li>○ 10% (Fact sheet) Cotton and the ERF</li> <li>○ 16% (Fact sheet) ERF – fertiliser use efficiency in irrigated cotton</li> <li>○ 10% (Fact sheet) ERF – Soil carbon sequestration</li> </ul> </li> </ul>	CRDC Cotton Growers Survey 2016

			<ul style="list-style-type: none"> <li>○ 11% (Fact sheet) ERF – Industrial electricity and fuel efficiency</li> <li>○ 3% (Fact sheet) ERF – Reforestation and afforestation</li> <li>○ 4% (Fact sheet) ERF – Native vegetation regrowth</li> <li>○ 1% (Case study) Investigating carbon farming in the Macquarie</li> </ul>	
	Target	<b>KPI 6aiv.</b> Cotton growers and advisers believe they have access to the required information to make decisions about participating in the ERF* <i>[by May 2017]</i>	<b>Advisers/Consultants:</b> <ul style="list-style-type: none"> <li>● 40% of consultants where somewhat (38%) or very confident (2%) that if a client was considering participating in an ERF project they could access information about the <b>opportunities, benefits and trade-offs of participating in the ERF and/or implementing potential mitigation/sequestration options.</b> (n=63)</li> <li>○ 4 consultants reported that a total of four clients have, or are, participating in an ERF project.</li> </ul>	CRDC Cotton Consultants Survey 2015/16
<b>Activity 6b.</b> Economic and risk analysis to determine and cost the opportunities, benefits and risks involved in participating in the ERF and implementing mitigation and sequestration practices.	Development	<b>[Ongoing] KPI 6bi.</b> Economic model developed that is specifically tailored to cotton farming. <i>[by July 2016]</i>	Contract with NSW DPI severed. New contract approval pending	Progress Report 6 (Dec 15 –May 16)
			In progress as methods are developed	Progress Report 5 (May 15 –Dec 15)
	Development	<b>KPI 6bii.</b> Economic analysis of potentially relevant ERF methodologies undertaken for representative cotton farming scenarios. <i>[by July 2016]</i>	[Commenced] Update current Cotton Gross Margin analysis; prepare a benefit-cost analysis on a CFI project cotton-nitrogen methodology (currently under review). Continuing to work with the Department of the Environment on methodology improvements. <ul style="list-style-type: none"> <li>● <b>Month:</b> Jan 14 – May 17</li> </ul>	Progress Report 3 (May 14-Dec 14)

\*As measured through the CRDC funded Cotton Grower Practices and Cotton Consultants surveys conducted at the beginning and end of the project.

## Activity 6. Extension Campaign

Extension Type	Name	Month	Details	Source
Events/Activities				

<b>Meetings/ Forums</b>	Presentation to PM&C to extend ERF opportunities	Feb 16	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 30 indigenous land council</li> <li>• Presentation on carbon farming opportunities to the indigenous land council, who have extensive landholding including a cotton farm at Mungindi</li> </ul>	Progress Report 6 (Dec 15 –May 16); YourDATA
	Grower meeting providing feedback to visiting DotE officers regarding ERF Methods and cotton/grain	May 15	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 15 government &amp; growers</li> <li>• <b>Location:</b> Narromine</li> </ul>	Progress Report 5 (May 15 –Dec 15)
<b>Conference / Symposium</b>	Rangelands Carbon Conference promoting ERF participation and awareness	Oct 15	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 185 growers &amp; industry</li> <li>• <b>Location:</b> Cobar</li> <li>• To contribute to a carbon conference and the application of government emissions policy to cotton growing</li> </ul>	Progress Report 5 (May 15 –Dec 15); YourDATA
<b>Webinars</b>	ERF Vegetation methods webinar	Jan 16	<ul style="list-style-type: none"> <li>• <b>Participants:</b> 6 (5 industry, 1 grower)</li> </ul>	Progress Report 6 (Dec 15 –May 16); YourDATA
<b>Materials (e.g. communications, marketing, training)</b>				
<b>Website</b>	ERF Blog Article	Jan 15	<ul style="list-style-type: none"> <li>• To disseminate information to growers regarding the release of the cotton-nitrogen carbon farming method. Aggregators are approaching farmers to participate in the method and cottoninfo has received a number of enquiries from grower groups</li> </ul>	YourDATA
<b>Fact sheets</b>	7 Industry ERF Fact sheets	Mar 16 – May 16	<ul style="list-style-type: none"> <li>• Published on CottonInfo website</li> <li>• Explaining different ERF methods and their application to cotton/grain</li> </ul>	Progress Report 6 (Dec 15 –May 16); Progress Report 7 (May 16 – Dec 16)