



# FINAL REPORT 2018

For Public Release

## *Part 1 - Summary Details*

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Please use your TAB key to complete Parts 1 & 2.

**CRDC Project Number:** CSE 1602

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**Project Title:** Developing education capacity in the Australian Cotton Industry

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**Project Commencement Date:** 01/07/2015 **Project Completion Date:** 20/06/2018

**CRDC Research Program:** 4 People

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**Signature of Research Provider Representative:** \_\_\_\_\_  
**Date Submitted:** \_\_\_\_\_

## **Part 3 – Final Report**

(The points below are to be used as a guideline when completing your final report.)

### **Background**

#### **1. Outline the background to the project.**

Australian agriculture is experiencing a labour and skills shortage, driven by an aging workforce, low attraction rates and strong competition from the resource sector. The cotton industry is challenged with attracting and retaining core staff, on-farm labour, and access to professional advisers and service providers. The problem has recently been exacerbated by expansion following years of drought, and the resources boom.

From 2009-2015 the Cotton CRC invested in an Education Officer to (i) provide educational opportunities that enabled a flexible path for developing skills across the industry; (ii) coordinate specialist short courses and training for cotton consultants, agribusinesses, cotton growers and their staff; and (iii) promote science and agriculture in schools. The CRDC project also integrated broad industry investments in education and continued to develop relationships and partnerships with external education and government agencies.

The three year project reported on herein is the continuation of that initial project directly with the CRDC, which extends the strategies developed within it that aim to attract, develop and retain skilled people in the cotton industry. The project will maintain established links with education organisations, government agencies and industry bodies to promote science and agriculture in cotton regions. It will link with other industry investments in education, development and delivery. As in her previous role as Education Officer, Trudy continued to be employed by CSIRO based at the Australian Cotton Research Institute, Narrabri. This facilitated continued direct connections with the industry, schools, universities and rural communities.

Trudy was allocated 60% to the project with the other 40% on a CRDC funded project through CSIRO.

### **Objectives**

#### **2. List the project objectives and the extent to which these have been achieved, with reference to the Milestones and Performance indicators.**

<b>Milestone</b>	<b>Achievement</b>	<b>Comments</b>
<i>Continue to lead the project Steering Committee developed in CSE1305</i>	Partially completed	In May 2018 a steering committee was established to assist in the advancement of the new project starting July 1 <sup>st</sup> 2018.
<i>Lead and manage the annual Enviro Stories competition</i>	Completed	A total of 14 student authored books were chosen from 196 entries from 238 student participants. The winning books are available at <a href="http://www.envirostories.com.au">http://www.envirostories.com.au</a>
<i>Actively maintain partnership with the PICSE programme or related initiatives</i>	Completed in 2016	The formal PICSE collaboration ended with the conclusion of that program in 2016. I continued to lead the Science Engineering and Investigation Awards component of the PICSE program until the end of this project.
<i>Running the Science and Engineering and Investigation Awards</i>	Completed	The Cotton Science and Engineering Investigation Awards (SEIA's) for 2015, 2016 and 2017 engaged 1398 participants.

<b>Milestone</b>	<b>Achievement</b>	<b>Comments</b>
<i>Represent and host education activities on behalf of the industry</i>	Completed	I represented the industry at over 130 educational activities and events from 2015 to 2018.
<i>Collaborate with the Cotton Info Team and Cotton Grower Associations (CGA) to deliver education activities</i>	Partially completed	My formal role on the Cotton Info Team ended in 2016 with a restructure that resulted in my participation no longer being required. I collaborated with local CGA's when required.
<i>Coordinate education activities with the Cotton Australia Education Coordinator.</i>	Completed	I strategically co-ordinated the delivery of education activities with the new CA Education Co-ordinator.
<i>Support the CSIRO and CRDC Summer Scholarship and PhD programmes.</i>	Completed	I assisted when and where necessary to provide advice and mentorship to students.
<i>Support the Horizon Scholarship.</i>	Completed	I attended the Horizon summits and forums and assisted students with placement options and mentorship.
<i>Liaise with cotton Industry Agribusinesses to set up a student organisation network.</i>	Partially completed	I intended to run a camp to showcase various agribusiness possibilities to students but could not get buy-in from enough partners for it to work. I did however develop a student organisational network which is currently at over 150 students. I used this list to advertise potential job vacancies, training opportunities, etc.
<i>Collate data since 2009 and use statistical models to evaluate the relative performance of adopted approaches in terms of employment.</i>	Partially completed	We were unable to access the data required to develop the proposed models. Instead we give examples of the career pathways of students that interacted directly with several of our initiatives. We also tracked the impact of our programs at local high schools in the region directly through subject choices taken by year 10 students for their year 11 curriculum.

*For more detail for each milestone please see the results.*

### **Methods**

#### **3. Detail the methodology and justify the methodology used. Include any discoveries in methods that may benefit other related research.**

To effectively deliver this project, a number of approaches were used. The framework and methodology for delivery included:

- Act as an industry contact point for education related matters
- Coordinate visits to industry facilities and other centres
- Facilitate interactions with schools and universities in cotton communities
- Support the development of education resources
- Arrange events that promote education activities to the industry and community
- Support the establishment of other industry education projects
- Work collaboratively with other industry educational initiatives and staff

Primary, secondary and tertiary students were targeted and engaged with the ultimate aim to encourage them into science and agricultural careers, especially the cotton industry which offers a wide range of career opportunities. By offering them an awareness of the opportunities, they then can further their career via two pathways either through the academic line to university and then hopefully onto post graduate studies if they are interested in being a researcher or they can choose a path via traineeships and apprenticeships.

### **Results**

#### 4. Detail and discuss the results for each objective including their statistical analysis.

##### *Continue to lead the project Steering Committee developed in CSE1305.*

Initially a steering committee was not established, as it was difficult due to the location and availability of key members; for instance, for a significant period the role of Education Co-ordinator for Cotton Australia (CA) was vacant. In the absence of a formal committee I nevertheless worked closely and in conjunction with representatives from CRDC, CA, and CSIRO to coordinate project events.

In May 2018 I organised a formal steering committee to establish a collaborative working plan with CA to increase capability within the cotton industry, and advance a new project starting July 1<sup>st</sup> 2018. A meeting was held in Sydney at the CA's offices. The attendees included Sharon Downes (CSIRO), Rachel Holloway (CRDC), Ali Briggs (CA), Angela Bradburn (CA), Chris Larsen (CA) and I. Information on current projects and activities undertaken by CRDC and CA were exchanged, gaps in knowledge and targeted activities were identified, and a set of strategic initiatives were tabled to collaboratively address the opportunities and align with the CRDC and the CA strategic plans. Meetings were tabled for every 6 months and will be reported on against the new project.

##### *Lead and manage the annual Enviro Stories competition.*

The Enviro Stories competition run in conjunction with Peek designs and the CRDC is a program designed for students to write a story on an environmental theme and have the opportunity to have it published. It works on the pedagogy of kids teaching kids.

Table 1 summarises the participation data in this program from 2008 to 2017. Students can enter an individual story or a class story; hence the number of entries may differ from the number of actual participants.

The three year competition from 2015 to 2017 saw a total of 252 stories entered from 294 participant authors. There were a consistently higher percentage of participants submitting entries during the life of this 3 year project compared to previous years (see “% impact” in Table 1). This may reflect the momentum gained by this popular competition which covers not only literacy but also science, technology and mathematics and schools. Since this competition was initiated many schools have included it in their curriculum program. The Enviro Stories competition continues to be an efficient way to interact with schools across cotton and non-cotton communities.

The Enviro Stories student books have been made available on line and through the App store: <http://www.envirostories.com.au/media-farming-families-stories/>

**Table 1: Participation in the Enviro Stories competition from 2008 to 2017.**

Year	Theme	Entries	Students	% impact	Catchments	NSW schools	QLD schools
2008	Bugs, Beetles, Bats & Birds	83	128	65	4	3	2
2009	Creepy Crawlies	300	355	85	5	14	4
2010	Fur & Fins, Feet & Beaks	244	353	69	4	7	5
2011	An Aussie Bush Tale	226	343	66	7	9	5
2012	Our Farmers, Our Future	196	236	83	8	14	4
2013	Save Our Species	114	150	76	5	6	1
2014	Farming Families	162	193	84	4	8	1
2015	Feral Animals	56	56	100	1	1	0
2016	Water in Rural communities	118	139	85	5	5	1
2017	Sensational Soils	78	99	79	2	4	0
<b>Totals</b>		<b>1577</b>	<b>2052</b>	<b>79</b>	<b>45</b>	<b>71</b>	<b>23</b>

##### *Actively maintain partnership with the PICSE programme or related initiatives.*

The PICSE program was ceased in February 2016. This concluded my involvement with the PICSE program activities and my collaboration with the PICSE Director Mrs Kay Lembo. The final PICSE Industry Camp held in Toowoomba in December 2015 involved the participation of 23 students from 10 schools across NSW and QLD. I participated in the final PICSE Forum held in Sydney in December 2015 and the final PICSE Cotton presentation at the Brisbane Conasta Conference in July 2016. The workshop had over 30 participants who undertook hands-on cotton activities.

The PICSE program allowed the cotton industry to engage with primary, secondary and tertiary students across 7 of Australia's states and territories. The activities of visiting schools, camps, placements, and the Science and Engineering Investigation Awards (SEIA's) have been valuable tools in achieving science and agricultural engagement and awareness for cotton in areas that do not grow cotton. I continued to maintain the activities of visiting schools and conducting the SEIA's since the conclusion of PICSE (see below "*Represent and host education activities on behalf of the industry*").

### ***Running the Science and Engineering and Investigation Awards.***

The Science and Engineering Investigation Awards (SEIA's) give students an opportunity to participate in science investigation experiments that are presented to the local science community for judging and the possibility of winning monetary prizes. Students from primary schools conduct in-class experiments and compile their results into one entry. A representative from each class attends the judging day to explain their project to a pair of judges. High School students have the opportunity to work in a group or as individuals and present their findings as a group or individuals.

Table 2 summarises the participation data in this program from 2009 to 2017. Students can enter an individual experiment or a class experiment; hence the number of entries may differ from the number of actual participants.

Over the three years of this project (2015-17) there were 177 entries from 3 primary school classes and individual entries from 2 high schools totalling 1,398 student participants. As a sign of the importance of this initiative for our community, I was able to secure \$7,670 in sponsorship from 46 local businesses and individuals. The Association of Australian Cotton Scientists helped co-ordinate this funding. Engagement was significantly higher than in previous years due to the momentum of the competition which resulted in the inclusion of more schools, especially those in the region that are remote.

Since the 2009 inception of this activity, 425 entries have been received and judged by local science community people, over 3,616 students have participated and over \$15,895 prize money has been awarded to schools and individuals.

This project continues to gain momentum and engagement from the local schools and community. The schools have expressed an interest in continuing to support this event and many have factored it into their curriculum. This activity meets the Education Department's focus on Science, Technology, Engineering and Math (STEM). Also the Narrabri community developed a new science initiative to oversee future STEM activities (Future EDU Inc) into which the SEIA's will fit as a community based event. To continue the SEIA's beyond this project, I have solicited the help of Mrs Jenny Campbell from Narrabri Shire Library who will run it in 2018.

**Table 2: Science and Engineering Investigation Awards since inception in 2009.**

Year	No. of Entries	No. of Participants	No. Schools		Awards \$
			Primary	High	
2009	23	313	2	0	Donated prizes
2010	25	207	1	1	Donated prizes
2011	27	345	1	2	1,250
2012	35	371	2	2	1,650
2013	62	484	2	2	2,050
2014	76	498	3	2	3,275
2015	51	527	3	2	2,880
2016	57	455	3	2	2,200
2017	69	416	2	2	2,590
<b>Totals</b>	<b>425</b>	<b>3,616</b>	<b>19</b>	<b>15</b>	<b>\$15,895</b>

***Represent and host education activities on behalf of the industry***

My representation of the industry in educational activities ranged from attending relevant meetings, conferences, forums, workshops, schools, and universities. I also hosted a number of school and university tours, visits and workshops.

**Table 3: Summary of educational activities since July 2013.**

Summary of Events	2013-14	2014-15	2015-16	2016-17	2017-18	Total
Conference/Forums	6	6	10	3	6	<b>31</b>
Career Expos Secondary/University	2	3	4	3	7	<b>19</b>
Work Experience/Placements/Internships	11	26	17	10	3	<b>67</b>
School Visit/Workshops	14	18	18	10	11	<b>71</b>
Tours of ACRI	9	8	9	12	9	<b>47</b>
			<b>58</b>	<b>38</b>	<b>34</b>	<b>235</b>
No. of attendees at these activities			<b>4,400</b>	<b>7,959</b>	<b>6,621</b>	<b>18,980</b>

In three years I have facilitated the exposure of the cotton industry to over 20,000 people and actively engaged with over 18,694 people. From July 2015 to June 2018 I collated over 2196 hours of in-kind support from colleagues, the community and other government, science and agricultural organisations.

From the start of this project I have collated the number of events and the number of students and people actively engaged in the activities. Table 3 summaries the number of events for each year starting from July 2013 and the number of people actively engaged in these events from July 2015. In the year 2015 to 2016 over 4,400 people were actively engaged in a cotton related event, 2016 to 2017 saw 7,959, whilst in the year 2017 to 2018, 6,621 people were actively engaged, giving a total over the three years of 18,980 people

In each year of the project I facilitated and participated in 4 Career expos at the University of New England (UNE) Farming Futures, Charles Sturt University (CSU) Approaching Ag Day, Tamworth Careers Expo and Coonabarabran High School's Ag Skilled Day. I collaborated with cotton businesses such as Cotton Growers Services (CGS), Auscott Ltd, CA, Cotton Info, Crop Consultants Australia (CCA), and Industry Agronomists to participate in promoting the cotton industry.

I presented hand-on practical workshops annually at the Australian Science Teachers Association 'CONASTA' conference where delegates from across Australia convene.

I presented a 3 minute talk at the 2016 Australian Cotton Conference on the topic of “how can we attract and retain skilled workers” and at the 2017 Association of Australian Cotton Scientist (AACS) Conference on the topic of “increasing capability in cotton science”.

I collaborated with Sandra Williams (CSIRO) and Rebecca Fing (House Paddock Training and Consulting) to deliver an IPM short course to the industry in 2017. The course was delivered across 4 cotton growing areas (Moree [21 participants], Narrabri [23 including Gunnedah and Burren Junction], Warren [15] and Griffith [22]) with a total of over 70 participants. I helped facilitate the running of the daily events and activities, assisted participants with workbook activities and assessment tasks, and conducted a beat sheet insect sampling ID workshop. I assisted at the Warren in-field workshop with training and demonstrating sampling techniques and field assessment.

I have attended meetings to discuss education related events for the community, collaborating with like minded STEM (Science Technology, Engineering and Mathematics) professionals and organisations to discuss agriculture and science events including a community science hub that will create student pathways using robotics and drones, a regional training centre and a country university centre. Currently I am the secretary for the Science Hub (Future EDU) and a director of the North West Country University Centre (NWCUC).

I have conducted over 39 school visits, presentations and workshops. Some of the key events I have organised include the Narrabri Public School ‘paddock to product’ where over 100 students participated in rotating hands-on workshops at the ACRI with NSW DPI and CSIRO staff. I also organised a biannual visit from St Pauls Catholic School Kempsey to the station, arranged for Michael Braunack (CSIRO) to present a soils workshop at Narrabri High School for year 10 students, and Mitchell Whitten and Hugh Coman from NSW DPI to present a soils testing workshop at Narrabri High School for Year 9 students. I assisted with the Narrabri Rotary Science and Engineering Challenge by coordinating helpers from CSIRO, NSW DPI and The University of Sydney Plant Breeding Institute. I organised and facilitated the annual visits from Calrossy Anglican Girls School, Farrer Agricultural High School, and The Armidale School (TAS) geography tour to ACRI. I organised colleagues from the ACRI and PBI to present a number of hands on workshops to schools such as St Xavier primary school, Nurraby preschool, Attunga and Somerton public schools, Fairfax public school, and St Joeys primary school in Wee Waa. I conducted a 2 day cotton production workshop at ‘Wyadrigah’ Mungindi for over 200 students from day care to high school for the Mungindi Cotton Growers Association.

The Raise program seeks to combat the upward trends in youth anxiety and other mental health conditions by de-stigmatising ‘asking for help’. The program is a robust and evidence based mentoring program that supports the young people participating to feel comfortable learning more about their strengths and knowing how to ask for help, and whom to approach, either in the community or within their family/school networks. I have been a mentor since 2015 attending sessions at Narrabri High School in 2015 and 2017, and 2018 at Wee Waa High School.

In the life of this project I have conducting 30 tours of ACRI to schools, interstate visitors Tocal Certificate in Agriculture students, University students, Horizon Scholarship students, Ag Cap enrichment group, and other local organisations such as the Local Lands Services Biosecurity team and the Scout group.

I worked in collaboration with a number of industry people, such as Cotton Grower Services (CGS), Auscott Narrabri, Namoi Cotton, Aquatec and researchers at the ACRI, to host 30 student placements and internships.

I continued to co-coordinate a Narrabri Shire wide collaboration with the Narrabri Shire town library, Narrabri Shire Council, Local High School and Primary Schools, the New England TAFE (TAFE NE), and science and agricultural facilities around Narrabri including CRDC, Sydney University Plant Breeding institute, Santos, to facilitate a STEAM (Science, Technology, Engineering, Arts and Math) Learning Centre with planned activities in a robotics workshop.

***Collaborate with the Cotton Info Team and Cotton Grower Associations (CGA) to deliver education activities.***

In November 2016 I was advised by Mr Warwick Waters that my participation on the Cotton Info team would not be required going forward due to changes in the strategic direction of the CRDC board. This decision was not driven by my performance in the team.

I worked in collaboration with Merryn Barlow, Janelle Montgomery from Cotton Info and other industry representatives for the Mungindi Cotton Growers Association to deliver a 2 day Cotton production workshop to over 200 students from day care to high school.

I conducted a 'good bugs bad bugs' workshop for Amanda Thomas from Cotton Info and Stacey Vogel independent consultant in Warren for Cotton growers and their families.

***Coordinate education activities with the Cotton Australia Education Coordinator.***

I established a productive working relationship with the new Education Coordinator Mrs Ali Briggs along with the new Cotton Australia Regional Representative Mr Alec Macintosh.

Ali and I have been collaborating on a number of activities and events including the Cotton Australia cotton conference scholarship program, co-presenting at the PIEFA conference in May 2018 and establishing a steering committee for the New Project 'Developing capability to service the cotton industry'. We have established a steering committee to develop a joint working plan that aligns with both CRDC and CA strategic goals. We have a table of events and activities to prioritise and identify gaps and maximise effort effectively and efficiently (see Appendix 1). We will continue to collaborate on education and workforce capability activities sharing resources and knowledge.

***Support the CSIRO and CRDC Summer Scholarship and PhD programmes.***

I assisted when and where necessary with students with advice and help, e.g., in connecting with researchers and industry people to answer specific questions, accommodation enquiries, insect and pest identification. I conducted tours for local summer scholarship students of the ACRI facility and assisted with introductions and networking opportunities.

***Support the Horizon Scholarship.***

I continue to offer support and guidance to the CRDC sponsored Horizon scholars by assisting the Agri Futures team when possible. I assist them with their placement options and connect them to the industry and help establish new networks. I attend their annual summit and organised their participation at the biannual Australian Cotton Conference.



Horizon students attending the 2016 Australian Cotton Conference. *Names in picture L to R back* Bruce Finney, Felicity Taylor, Alana Martin, Grace Scott, Jessica Kirkpatrick, Alana Johnson, Emily Miller, and Ian Taylor *Front L to R* Sam Johnston, Sam Knight, Scott Nevison, Michael Wellington, absent Camilla a' Becket and Paul Sanderson.

***Liaise with cotton Industry Agribusinesses to set up a student organisation network.***

I intended to run a camp to showcase various agribusiness possibilities to students but could not get buy-in from enough partners for it to work. I did however develop a student organisational network which is currently at over 150 students. The network list is a collection of interested students collected from attending the UNE Farming Futures Careers day and the CSU Approaching Ag Careers day. I send the students emails of career opportunities from agribusiness across the cotton growing regions. This year the list has assisted in notifying students of agronomy positions available with Landmark, Hugo Weissen Consulting, farm worker position with Rob Tuck (a grower from Warren), and technical roles with CSIRO and NSW DPI at the Australian Cotton Research Institute.

***Collate data since 2009 and use statistical models to evaluate the relative performance of adopted approaches in terms of employment.***

We planned to engage with a social scientist in CSIRO to develop models to measure the relative impact of the various events and activities undertaken through the life of the current and previous versions of this project. To this end we developed a database of all of the interactions that we had with primary and high school students during these initiatives with the intention of tracking their subject choices in subsequent years and comparing this to students that did not participate in our programs. Having not worked with these types of data previously, we were unaware of the strict privacy laws in place which meant that schools were unable to provide us with the information that we required on individual students. We sought advice from CRDC on how to proceed which instigated contact with a social scientist, Dr Jennifer Moffett, to talk through potential solutions and explore opportunities to collaborate.

Dr Moffett confirmed that it would be difficult to obtain the data that we envisaged. We contacted the schools directly to explore ways around the privacy issues by not identifying individual students in datasets and instead tracking their science pathways as a cohort. The schools were able to provide data on the number of students selecting science subjects in each

year however since individual identity was unknown it was impossible to test whether a student's experiences with our programs influenced their subject choices. That is, the information was unable to distinguish between those that have participated versus those who have not participated and the corresponding influence on subject selection.

We note that Dr Moffett recently completed a longitudinal assessment of the cotton industries 'people' investment as part of project CDRC1710. We determined that 25 and 7 of the students that we interacted with for the young cotton professional activities such as PICSE, Horizon Scholarships and Summer Scholarships undertook Dr Moffett's 'survey 1' and 'survey 2' respectively. Thus, the broad findings from Dr Moffett's work are likely to reflect in part the impact of some of the initiatives of our project.

Please see "Outcomes" below for an alternative analysis of the impact from the work in this project.

## **5. Outcomes**

**Describe how the project's outputs will contribute to the planned outcomes identified in the project application. Describe the planned outcomes achieved to date.**

This project made an important contribution to the industry and rural communities as it worked towards defining career pathways for potential cotton industry employees. The industry and community benefits may not be immediately apparent but will develop in the years to come. The outcome of this project is that it will make a significant contribution to the continued supply of educated, highly qualified, skilled and passionate workers to the industry and a more science and agriculturally aware community. It will be a building block for human capacity for the cotton industry.

We have selected two approaches to detail more specific outcomes. The first is summarised in Table 4 which gives examples of the career pathways of students that have interacted directly with several initiatives in the ongoing schools project. For example Kate Lumber was involved with the PICSE camp and internship programs, received a Cotton Australia Cotton Conference scholarship and a final year project scholarship and has secured work with Auscott as an agronomist. Another example is Ethan Towns who was a high school student from Wee Waa who participated in the PICSE SEIA's and is currently undertaking an indigenous cadetship with the CSIRO Agriculture and Food's Resistance Evolution Team at ACRI.

**Table 4: Student Pathways**

Student	Order of engagement and type							
	First	Second	Third	Fourth	Fifth	Sixth	Seventh	Eighth
Kate Lumber	PICSE SEIA's	PICSE Industry Placement	PICSE Ambassador	CA Conference Scholar	PICSE Undergrad Internship	CA Final Project	Trainee Agronomist	<b>Agronomist (Auscott)</b>
Kirsty McCormack	PICSE SEIA's	PICSE Industry Placement	PICSE Ambassador	CRDC Horizon Scholar	Young Farming Champion	CRDC Conference Scholar	CRDC Conference Scholar	
Johanna Nielsen	PICSE SEIA's	PICSE Industry Placement	PICSE Undergrad Internship	CA Conference Scholar	CRDC Summer Scholar	PICSE Undergrad Internship		
Grace Scott	PICSE SEIA's	PICSE Industry Placement	CRDC Horizon Scholar	CRDC Conference Scholar	Delegate at Australian Association Cotton Research Scientists	CRDC Conference Scholar		
Alana Johnson	PICSE SEIA's	PICSE Industry Placement	PICSE Ambassador	CRDC Horizon Scholar	<b>Cotton Agronomist</b>			
Sharna Holman	CA Conference Scholar	CRDC Summer Scholar	PICSE Undergrad Internship	<b>Cotton Info Biosecurity and Disease Technical Lead (QDAFF)</b>				
Ethan Towns	PICSE SEIA's	Work Experience	CSIRO AES Trainee	<b>Cadetship (CSIRO)</b>				
Dylan Verrier	PICSE Camp	PICSE Work Placement	<b>Seasonal agronomist whilst at University (Auscott)</b>					
Amy Larsen	PICSE Camp	PICSE Work Placement	<b>Casual Technical Assistant (CSIRO)</b>					
Billy Browning	CRDC Horizon Scholar	CRDC Conference Scholar	<b>Cotton Grower (Macquarie Valley)</b>					
Ned Skehan	PICSE Undergrad Internship	<b>Working for Precision Crop Technologies</b>						
Alexandra Trinder	CA Conference Scholar	<b>Agronomist (HMag Moree)</b>						
Mathew Foley	CA Conference Scholar	<b>Agronomist (Mike Stone)</b>						

A second approach is to try and track the impact of our programs at local high schools in the region directly through subject choices taken by year 10 students for their year 11 curriculum. Table 5 shows data from Narrabri High School from 2009 to 2018 in terms of the number of students in year 10 choosing year 11 science subjects. In order to go on and do a degree at University students must engage in biology, chemistry and/or physics, rather than senior (general) science.

At Narrabri High School 2010 was the first year that a science interaction was conducted through the PICSE SEIA's which targeted year 10 science students; since 2011 there has been a marked increase (average across years of 20%) in the proportion of students selecting science relative to before our interactions with the schools. This increase largely reflects a marked increase in the proportion of students selecting biology since our interactions began.

**Table: 5 Narrabri High School Science subject selections.**

Year	Total Students	% Students taking particular subjects				Total % taking Science
		Biology	Chemistry	Physics	Senior Science	
2009	93	13	16	12	10	51
2010	90	12	14	7	20	56
2011	93	24	16	15	16	72
2012	84	25	25	11	14	78
2013	100	14	18	7	25	64
2014	90	24	22	19	16	83
2015	93	18	17	17	23	77
2016	100	25	18	10	20	73
2017	83	16	22	11	17	69
2018	87	36	15	18	0	69

**Please describe any:-**

**a) technical advances achieved (eg commercially significant developments, patents applied for or granted licenses, etc.);**

There were no technical advances achieved.

**b) other information developed from research (eg discoveries in methodology, equipment design, etc.); and**

There were no discoveries in methodology.

**c) required changes to the Intellectual Property register.**

No changes required.

### **Conclusion**

**6. Provide an assessment of the likely impact of the results and conclusions of the research project for the cotton industry. What are the take home messages?**

The three key activities listed below are integral in the impact that the project had on benefiting the industry by securing access to better educated, professional and loyal employees for the future, and by creating local communities who better understand one of the key industries that underpin their economies. The Enviro Stories competition is the main event that introduces primary aged students to science, agriculture and the environment in a fun interactive way, whilst the PICSE program ceased in February 2016 it had a major influence on high school students by offering and insight into career opportunities in science

and agriculture. The young cotton professional program will establish a network for university students to gain valuable skills and knowledge and links with industry that will benefit the industry as a whole with the availability of high quality, engaged, and skilled professionals.

### **Key activities.**

**Enviro stories:** We believe that this is an efficient way to impact primary schools (public & private) across cotton regions and areas close to cotton growing areas. The competition is curriculum based with education kits and information packs available online. Many schools continue to contribute and factor it into their yearly school plan. This activity is a stepping stone in introducing science and agricultural related concepts and is moving into the digital era with books available online.

**SEIA's:** The science engineering and investigation awards activity engaged students and teachers to participate in science and agriculture areas with a 'hands on' approach and gives them a solid background in what careers are available within the agricultural and science sectors along with gaining interactions with people in those fields.

**Young Cotton Professionals:** This component was designed to establish better links with Cotton Agribusinesses and match them with suitable undergrad students for work placement experiences. Importantly, this project provided a database of potential students for the cotton industry to seek out high quality, skilled and passionate young people.

### ***Extension Opportunities***

#### **7. Detail a plan for the activities or other steps that may be taken:**

**(a) to further develop or to exploit the project technology. N/A**

**(b) for the future presentation and dissemination of the project outcomes.**

The high impact components of this project will go forward in an extension until 2021 and will be added to and disseminated as appropriate as part of that new project.

**(c) for future research.**

A new project which started in July 2018 will build on the previous projects and aims to capitalise on the initiatives to date: support the continued development of existing industry education initiatives; support undergraduate and post graduate programmes; another aim is to attract, develop and retain skilled people in the cotton industry. The project will maintain established links with education organisations, government agencies and industry bodies to promote science and agriculture in cotton regions. It will link with other industry investments in education, development and delivery.

#### **9. A. List the publications arising from the research project and/or a publication plan. (NB: Where possible, please provide a copy of any publication/s)**

Wee Waa High School Newsletter 15<sup>th</sup> September 2015

Border news 'Primary Science Tackles Science' with Ruth Redfern 17<sup>th</sup> September 2015

Oral presentation "Developing Education Capacity in Australian Agriculture" at the Association of Australian Cotton Researchers Conference in Toowoomba September 2015.

Monday mail article "CSIRO grows future cotton scientists"

Staines T, Downes S, 2015, Developing education capacity in cotton: from primary school to PhDs. Australian Cotton Grower Year Book

Narrabri Courier Article published 5<sup>th</sup> May 2016 “Narrabri student authors to investigate 'water in cotton communities'”

13<sup>th</sup> May 2016 Calrossy Girls School Secondary Girls Newsletter ‘A CALROSSY COTTON INDUSTRY EXPERIENCE’

<http://calrossy.cfmnet.predelegation.com/files/uploaded/file/Newsletter/2016/Girls/2016SecondaryGirlsTerm2Week3B.pdf>

Wee Waa High School Newsletter issue 12 13<sup>th</sup> September 2016 ‘CSIRO’s Science, Engineering & Investigation Awards’

[http://www.weewaa-h.schools.nsw.edu.au/cmsresources/wee-waa-high-school/misc//2016/9/wwhs\\_issue\\_12\\_1473739967868.pdf](http://www.weewaa-h.schools.nsw.edu.au/cmsresources/wee-waa-high-school/misc//2016/9/wwhs_issue_12_1473739967868.pdf)

Wee Waa High School Newsletter issue 13 24<sup>th</sup> October 2016 ‘WWHS scoops the pool in CSIRO’s Science, Engineering & Investigation Awards’

[http://www.weewaa-h.schools.nsw.edu.au/cmsresources/wee-waa-high-school/misc//2016/10/wwhs\\_issue\\_13\\_2016\\_1477279687978.pdf](http://www.weewaa-h.schools.nsw.edu.au/cmsresources/wee-waa-high-school/misc//2016/10/wwhs_issue_13_2016_1477279687978.pdf)

Narrabri High School Newsletter 15<sup>th</sup> September 2016

[http://www.narrabri-h.schools.nsw.edu.au/cmsresources/narrabri-high-school/misc/2016/9/september\\_2016\\_pdf\\_1473900731543.pdf](http://www.narrabri-h.schools.nsw.edu.au/cmsresources/narrabri-high-school/misc/2016/9/september_2016_pdf_1473900731543.pdf) page 4

Narrabri Public School Newsletter week 7 term 3 2<sup>nd</sup> of September 2016

[http://www.narrabri-p.schools.nsw.edu.au/cmsresources/narrabri-public-school/misc/2016/9/week7term32016\\_1472791672677.pdf](http://www.narrabri-p.schools.nsw.edu.au/cmsresources/narrabri-public-school/misc/2016/9/week7term32016_1472791672677.pdf)

Spotlight Magazine

[http://www.crdc.com.au/sites/default/files/pdf/SpotSpring16\\_sc2.pdf](http://www.crdc.com.au/sites/default/files/pdf/SpotSpring16_sc2.pdf) page 12

Staines T, 2016, Cotton Info education Highlights in 2016. Australian Cotton Grower Year Book Vol 37 No.6 pp108-109

Narrabri Public School Newsletter week 6 term 4 14<sup>th</sup> November 2016

[http://www.narrabri-p.schools.nsw.edu.au/cmsresources/narrabri-public-school/misc//2016/11/week6term42016\\_1479194559974.pdf](http://www.narrabri-p.schools.nsw.edu.au/cmsresources/narrabri-public-school/misc//2016/11/week6term42016_1479194559974.pdf)

Fairfax Public School Newsletter Term 2 Week 7 June 2017

Fairfax Public School Newsletter Term 3 Week 8 September 2017

Fairfax Public School Newsletter Term 4 Week 3 October 2017

Wee Waa High School Newsletter Issue 10 August 14<sup>th</sup> 2017

Narrabri Public School Newsletter Term 3 week 8 13<sup>th</sup> September 2017

Narrabri High School Newsletter September 2017

Tamworth Careers Expo website & event manual

Universality of New England’s Farming Futures Careers Fair website, Facebook & event manual

Charles Sturt University Approaching Ag Career Day event publications

Staines T, and Downes S, 2017, Increasing Capability in Cotton Science.

Presentation at the Association of Australian Cotton Scientist Conference in Canberra

St Joseph’s School Mungindi Newsletter Term 1 week 11 11<sup>th</sup> April 2018

**B. Have you developed any online resources and what is the website address? N/A**

## ***Part 4 – Final Report Executive Summary***

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In 2008 the Cotton CRC invested in an Education Officer, Trudy Staines, for 7 years to promote science and agriculture in schools. The schools program was developed to enhance and expand the science and environmental management syllabus in primary and high schools by providing relevant cotton information and opportunities for practical on-farm activities. The strategy proposed by the Cotton CRC was the promotion of science and agriculture in schools to encourage school students into careers in science and agriculture, specifically the cotton industry through collaborations with school teachers, scientists, the cotton extension teams, industry, catchment and government education agencies, to encourage primary and secondary school students to develop resources and implement science and agricultural based activities that engage students and ultimately promote the cotton industry as an employee's career of choice. The three year project reported on herein is the continuation of that initial project directly with the CRDC.

All of the main objectives of this project were met: to (1) become the central point of contact for industry education; (2) initiate and develop programmes that support newcomers to the industry, including PhD students, summer scholarships, visitors etc.; (3) facilitate interactions between schools, industry and rural communities that develop future workforce capacity for the industry; and (4) evaluate the relative performance of the approach used to develop education capacity in the cotton industry.

Notable achievements included: (1) delivering the “Enviro stories” competition which is curriculum based with education kits and information packs available online. This activity is a stepping stone in introducing science and agricultural related concepts and is moving into the digital era with books available online; (2) the science engineering and investigation awards (SEIA) activity engaged students and teachers to participate in science and agriculture areas with a ‘hands on’ approach and gives them a solid background in what careers are available within the agricultural and science sectors along with gaining interactions with people in those fields; and (3) establishing better links with Cotton Agribusinesses and matching them with suitable undergraduate students for work placement experiences. Importantly, this project provided a proactive methodology for the cotton industry to seek out high quality, skilled and passionate young people.

This project made an important contribution to the industry and rural communities as it worked towards defining career pathways for potential cotton industry employees. The industry and community benefits may not be immediately apparent but will develop in the years to come. The outcome of this project is that it will make a significant contribution to the continued supply of educated, highly qualified, skilled and passionate workers to the industry and a more science and agriculturally aware community.

## Appendix 1: Network list of students

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