

Response from the Regional Universities Network (RUN) to questions taken on notice during hearings of the House of Representatives Select Committee on Regional Development and Decentralisation in Canberra on Friday, 16 February 2018

1a. Ms MARINO: *Of the [international] students on your various campuses who are there physically, what proportion of their courses do they take online and not physically on the actual campus itself?* (Page 28)

Dr Perkins: It would vary greatly between our institutions. As you would be aware, two of our institutions in particular are predominantly online—that's the University of New England and the University of Southern Queensland. CQ University and Southern Cross also have significant numbers of online students. The Sunshine Coast and Federation Universities are largely on-campus students, although I'm sure they would take some of their courses using technology.

1b. Ms CHESTERS: I have a couple of clarification questions about some of the issues that have been raised. In regards to international students and student make up, I note that a number of your universities also have campuses in the inner city. In Melbourne there are Charles Darwin University, Charles Sturt University and Central Queensland University. Are those campuses where the international students are? That defeats our questioning of how we can encourage more international students to be in the regions. *Do you have any data or breakdown on if you do have international students predominantly in Sydney and Melbourne? I also add Federation University to that list of other universities.* It's a question around that. (Page 28)

Dr Perkins: *I will take the international students on notice. Some of our universities have campuses in metropolitan cities where there are not exclusively but largely international students. We also have significant numbers of international students at regional campuses too. I'll try and provide you the best information I can on that.*

1a and 1b. Response to issues raised by Ms Marino and Ms Chesters

The following table provides the numbers of international students studying at campuses of RUN universities in 2016 distinguishing between metropolitan and regional campuses, and mode of delivery (ie, on an external (online), internal (on campus) or multi-modal basis). For completeness, off shore students undertaking studies delivered by international partner providers are also provided (Federation and Southern Cross Universities only).

International student enrolments at RUN universities, 2016 (Extracted from the Department of Education and Training Datamart. Cells with fewer than 5 students are assigned <5.)

University	Campus	External	Internal	Multi-modal	Total
1. CQUniversity	Sydney		2,096	62	2,158
	Melbourne		1,840	67	1,907
	Brisbane	<5	725	17	743
	<i>Total metropolitan</i>	<5	4,661	146	4,808
	Rockhampton	59	63	38	160
	Other regional	13	26	11	50
	<i>Total regional</i>	72	89	49	210
	Total CQUni	73	4,750	195	5,018
2. Federation University Australia	Sydney	<5	1,659	<5	1,664
	Melbourne	<5	1,765	<5	1,769
	Adelaide	<5	364	<5	366
	<i>Total</i>	8	3,788	<5	3,799

	<i>metropolitan</i>				
	Geelong South		70		70
	Mt Helen	5	593	<5	599
	Churchill		46		46
	<i>Total regional</i>	5	709	<5	715
	<i>Off shore campuses delivered by international partners</i>	70	1,115		1,185
	Total FedUni	83	5,612	<5	5,699
3. Southern Cross University	Sydney	<5	806	32	842
	Melbourne		473	<5	474
	<i>Total metropolitan</i>	<5	1,279	33	1,316
	Coffs Harbour	<5	14	8	25
	Lismore	45	99	30	174
	Gold Coast	7	562	154	723
	<i>Total regional</i>	55	675	192	922
	<i>Off shore campuses delivered by international partners</i>	<5	538	0	540
	Total SCU	61	2,492	225	2,778
4. University of New England	Armidale	214	558	328	1,100
	<i>Total regional</i>	<i>214</i>	<i>558</i>	<i>328</i>	<i>1,100</i>
	Total UNE	214	558	328	1,100
5. University of Southern Queensland	Springfield		62	71	133
	Ipswich		12	23	35
	Toowoomba	2,289	884	472	3,645
	<i>Total regional</i>	2,289	958	566	3,813
	Total USQ	2,289	958	566	3,813
6. University of the Sunshine Coast	Sydney		157		157
	Melbourne		392		392
	South Bank		227	46	273
	<i>Total metropolitan</i>		776	46	822
	Sippy Downs	62	1,426	80	1,568
	Wide Bay		<5		<5
	<i>Total regional</i>	62	1,430	80	1,572
	Total USC	62	2,206	126	2,394
RUN	Metropolitan	13	10,504	228	10,745
	Regional	2,697	4,419	1,216	8,332
	Off shore	72	1,653		1,725
	Total	2,782	16,576	1,444	20,802

2. Ms MARINO: I have one other question. We had CSIRO in here earlier on. They talked about their collaborations in research. They go where the research needs to be done and the collaborators are. *How many of your institutions collaborate with CSIRO physically in the regional location?*

Professor Shoemaker: With CSIRO—and also other government instrumentalities, but let's talk about that major research—absolutely. I can speak for this place that, in the areas of plant science, for example, Southern Cross University was the first place in the country to develop a very sophisticated approach to plant science and they pioneered fragrant rice, which is exported all over the world. CSIRO, UNE and I know number of the others do that. It's very much based upon crop types or export types. We're now seeing developments, as I said before, in things like medicinal cannabis, which is a good example. For instance, in Casino in New South Wales a major Canadian company has been setting up called Solaris Nutraceuticals. It's talking about medicinal cannabis for veterinary purposes as well as human purposes. All of the testing and, if you like, soil science and mechanics of that are going to be taking place at Southern Cross University, which is just 20 kilometres away. Of course, CSIRO and others are heavily involved in the export and quality assurance sides of that industry and will be more so in the future. I would suggest taking it by industry segment and opportunity. It's been quite developed.

Ms MARINO: *Could you take on notice providing to the committee the numbers of how many of your universities have that form of collaboration with CSIRO and where they are located?*

Professor Shoemaker: Certainly.

2. Response to issue raised by Ms Marino

All RUN universities are involved in substantial research collaborations with CSIRO. Examples of current and recently completed projects are provided below.

Research collaborations between RUN universities and CSIRO in recent years

1. CQUniversity

2014-15	Piloting of social, cultural and economic indicators for the Gladstone Healthy Harbour Partnership Report Card Dr Jill Windle (CQU), Dr Sean Pascoe, Dr Toni Carnnard (CSIRO)
2014-16	Carbon smart fertilizer 'Green Chicken' Prof Kerry Walsh, Dr Surya Bhattarai, Prof David Midmore (CQU), Dr Lynne Macdonald (CSIRO Land and Water, Sustainable Agriculture Flagship)
2015	Reef Trust Tender - Wet Tropics: Further Development and application of mechanism Prof John Rolfe (CQU), Dr Stuart Whitten (CSIRO) (CQUni responsible for Stream 1 and providing expert advice to Stream 2)
2017	Numerical modelling of desiccant wheel enhanced evaporative cooling system for humid climates Dr Ramadas Narayanan, Dr Prasad Gutimetla (CQU), Dr Stephen White (CSIRO Energy Centre)

2. Southern Cross University

- SCU is in the process of finalising a project with ACIAR on the honeybee industry in the Pacific, in which CSIRO is one of our project partners (Our ID: 4999/6073)
- SCU has also had several HDR students on APA/RTP scholarships who have received top-up scholarships from CSIRO (Our IDs: 5098, 3914, 3832)
- SCU and CSIRO were collaborative partners on a 2017 ARC LIEF, led by Edith Cowan University: LE170100219 - A multi-institutional environmental radioactivity research centre (Our ID: 5090)
- SCU has collaborated with CSIRO on several projects relating to National Acid Sulfate Soils guidance manuals and acid sulfate soils assessments (Our ID: 4665, 1490, 732, 1213, 1214, 735)
- CSIRO was a collaborative partner on an ARC Linkage project led by SCU: LP130100498 - Water, Carbon and Economics: Resolving complex linkages for river health (Our ref: 2974, 3580)
- SCU was a collaborative partner on a CSIRO 'Marine and Coastal Carbon Biogeochemistry Flagship Cluster' project (Our ID: 2629)
- SCU has worked with CSIRO on developing sequencing for a genome analyser in relation to plant genetics (Our ID: 1786)
- SCU and CSIRO were collaborative partners on the following CRCs:
 - CRC for Remote Economic Participation (Our ID: 1489)
 - CRC for Sugar Industry Innovation through Biotechnology (Our ID: 1148)
 - CRC for Forestry (Our ID: 1110)

3. University of New England

UNE has been involved in many collaborations with CSIRO. An example of a major current project in which CSIRO and UNE are partners is the Livestock Productivity Partnership (LPP) which is an initiative of the Meat and Livestock Australia Donor Company and the NSW Department of Primary Industries. The LPP is a major collaborative research partnership aimed at lifting the productivity of Australia's livestock industry and has the potential to support up to \$50 million worth of projects over the next five years. <https://www.mla.com.au/news-and-events/industry-news/livestock-productivity-partnership-to-be-expanded/>

Among other past and ongoing collaborations with CSIRO researchers are projects at the Chiswick research station near Armidale focussing on pasture systems, livestock genetics, animal welfare, parasites, wool production, virtual fences technology, etc. There have also been many UNE-CSIRO PhD projects conducted at Chiswick on a range of topics, including soil and pasture science and livestock production.

4. University of Southern Queensland

1. Agricultural Production Systems SIMulator (APSIM) Initiative (<http://www.apsim.info/>)

USQ is a partner (along with CSIRO) in the APSIM Initiative which is internationally recognised as a highly advanced simulator of agricultural systems. It contains a suite of modules which enable the simulation of systems that cover a range of plant, animal, soil, climate and management interactions. Its development and maintenance is underpinned by rigorous science and software engineering standards. The APSIM Initiative has been established to promote the development and use of the science modules and infrastructure software of APSIM.

2. CSIRO ON Prime (<http://oninnovation.com.au/Programs/ON-Prime>)

USQ has participated in the CSIRO ON Prime program through the provision of mentors and support for USQ teams. ON Prime is an entry level, part-time pre-accelerator that helps research teams validate their research and discover a real world application for it. The program provides an opportunity to test paths for IP, know-how or tech through a process of customer discovery and market validation.

3. GRDC Future Farm Project (CSIRO Lead on Theme 1)

The NCEA is working with the Grains and Cotton Industries to address key production issues challenging these industries through the introduction of automation and robotic technologies. The objective of utilising autonomous and robotic systems in agriculture is to optimise operations more tightly, and at finer scales, than ever before. In particular, these technologies will include continuous sensing, real time decision support systems, data science and automation.

4. CSIRO funded / DAWR Soil Sense

Development of innovative systems to provide information on soil water status to help farmers make better management decisions (e.g. cropping options, timing of inputs). This information will complement existing information sources such as the Apsoil and ASRIS data bases. The system will be designed to work with

cropping systems models such as APSIM, and will be incorporated into delivery platforms such as SoilWaterApp and Yield Prophet. Farmers will be able to better investigate cropping options and understand the trade-offs between management alternatives.

5. CSIRO funded Soil Compaction Work in Cotton

This work involves attendance and participation in workshops and soil pit days in conjunction with CottonInfo team. The final report will detail the consultation with industry in identifying strategies used by growers to manage soil compaction and on-going research and development needs.

6. Origin / CSIRO funded CSG Work (phase 2)

The project is to provide scientific input to the reassessment of the current Origin Energy risk strategy relating to soil management from CSG (Coal Seam Gas) to LNG (Liquified Natural Gas) development activities. This second phase is field-based and involves observation of the outcomes from soil management from previously completed works. This will identify practical improvements to soil management, which may reduce construction costs and improve environmental outcomes.

7. CSIRO funded / Cotton RDC Fibre Quality

The project will identify opportunities (and the associated sensor and data collection requirements) to improve both the overall quality and consistency of Australian cotton through an improved ability to assess (predict and model) and manage crop and cotton quality development.

8. CSD (Cotton Seed Distributors) / CSIRO Trial Cotton Picker

This proposal is to develop a new automated trial picker with on-board packaging of seed cotton into parcels that can be handled using the same equipment as those bales produced by JD7760/CP690 pickers. The NCEA will develop a concept by sourcing Cotton Picker componentry and technology sold World Wide to customise a solution for CSIRO/CSD. Phase 1 is the Concept Development.

9. R&D for P and CRDC Smart Irrigation. (CSIRO have a subcontract for some of the thermal sensing work)

This three year research project aims to deliver, demonstrate and evaluate smart automated, precision irrigation systems for the cotton (pivot and furrow), dairy (centre pivot) and sugar (furrow) industries. Engagement with commercial suppliers will allow use of 'off the shelf' technology where available and provide development of a pathway for future commercialisation. Regardless of the industry general improvements to irrigation performance should result in enhanced profitability of agricultural production which will improve the general economy of the region.

10. ACIAR (Australian Centre for International Agricultural Research) project in India/Nepal (CSIRO are contracted to undertake Bangladesh work)

This research is crucial to the long-term sustainability of small scale agriculture in the Eastern Gangetic Plains. The region must alleviate poverty and achieve food security in part through a program of improved water management and irrigation using efficient systems, which are less reliant on expensive or unreliable

electricity and diesel, and are appropriate to the needs of the marginal (owning <0.5ha) and tenant farmer majority. The project aims to improve the livelihood of woman, marginal and tenant farmers in the Eastern Gangetic Plains, through improved water use and increased dry season agricultural production.

11. CSIRO funded GISERA (Gas Industry Social and Environmental Research Alliance)

A study into potential soil damage and its management during CSG development. Disturbance during establishment, operation and removal of gas infrastructure will result in changes in the physical, chemical and structural properties of soil. Changes in the biological properties of soil are also anticipated (e.g. grass/weed seed banks). Designs for coal seam gas infrastructure should account for these risks and seek to minimise damage, both by avoiding damage and minimising it where it is unavoidable. Processes for rehabilitating unavoidable damage have yet to be fully described. This research will provide insight into these issues via literature review and on-farm case studies.

12. Coordination of Precision Agriculture in the Sugar Industry (multi-party agreement including CSIRO)

Precision Agriculture (PA) offers the potential to increase on-farm productivity and profitability by utilising new and emerging technologies that will assist in overcoming on-farm constraints through targeting inputs and operations. However, it is recognised that although various PA technologies exist and are available to growers in various forms, limited adoption has occurred. Further adoption of PA is not appropriate without technically-based skills to interpret information about in-field variability. Thus, this project will provide a “centre” of core expertise and a sound platform for industry training and extension.

13. CSIRO Post-Graduate Scholarship

Project title was *Development of a framework to quantify and manage impacts of coal seam gas (CSG) activities on the soil resource of agricultural land*. It aimed to evaluate the types of damage which occurs from CSG activities, quantify the extent of damage and develop a framework for the assessment and management of soil resource impacts.

14. Delivering Precision to Users of Precision Agriculture in the Australian Sugar Industry

A two year project exploring improved consignment / yield monitor calibration options. Research activities will translate the findings from work about to be completed by the NCEA to develop a robust yield monitoring / mapping option for commercial use.

5. University of the Sunshine Coast

Project Title	USC Chief Investigator	Nature of Collaboration	Amount	Completion
Overcoming social and institutional barriers to science impact in the coastal zone	Prof Tim Smith	CSIRO - Direct Funding Opportunities	\$462,906	2012

Climate Change Adaptation in South East Queensland	Prof Tim Smith	CSIRO Flagship Collaboration Research Fund	\$771,333	2013
Synthesis and Governance - Climate Change Adaptation in South East Queensland	Prof Tim Smith	CSIRO - Direct Funding Opportunities	\$90,000	2012
How do social representations mediate adaptation to climate change?	Ms Kate English	CSIRO - Scholarship and University of the Sunshine Coast - Scholarship	\$78,000	2013
Sensor Systems for Analysis of Aquatic Environments Collaboration Agreement - CSIRO	Prof Roland De Marco	CSIRO Flagship Collaboration Research Fund	\$369,649	2012
Modelling surface flows and river discharge in northern Australia catchments with higher temporal resolution	Prof Roy Sidle	CSIRO - Direct Funding Opportunities	\$365,000	2017
Develop approaches to improve our understanding of runoff pathways in semi-arid systems in northern Australia catchments	Prof Roy Sidle	CSIRO - Direct Funding Opportunities	\$15,000	2017
The Economic value of reducing biosecurity risk to the Australian banana industry	Dr Tyron Venn	CSIRO - Direct Funding Opportunities	\$25,000	2016
Discovery and Development of Bioactive Natural Products isolated from Queensland's Tropical Rainforests	Dr Steven Ogbourne	SIEF STEM Business Fellowship Program CSIRO - Funding	\$507,672	2020
Tissue engineered jellyfish for aquatic detoxification	Dr Nina Pollak	CSIRO Future Science Fellowships in Synthetic Biology	\$492,905	2021
Genome survey of the <i>Haliotis laevis</i> abalone genome with bioinformatics	Dr Scott Cummins	CSIRO collaboration to engage the services of BGI-Hong Kong Co LTD		2013
Wector pENTR11/OGOR-RE	Dr Scott Cummins	CSIRO Material Transfer Agreement		2013