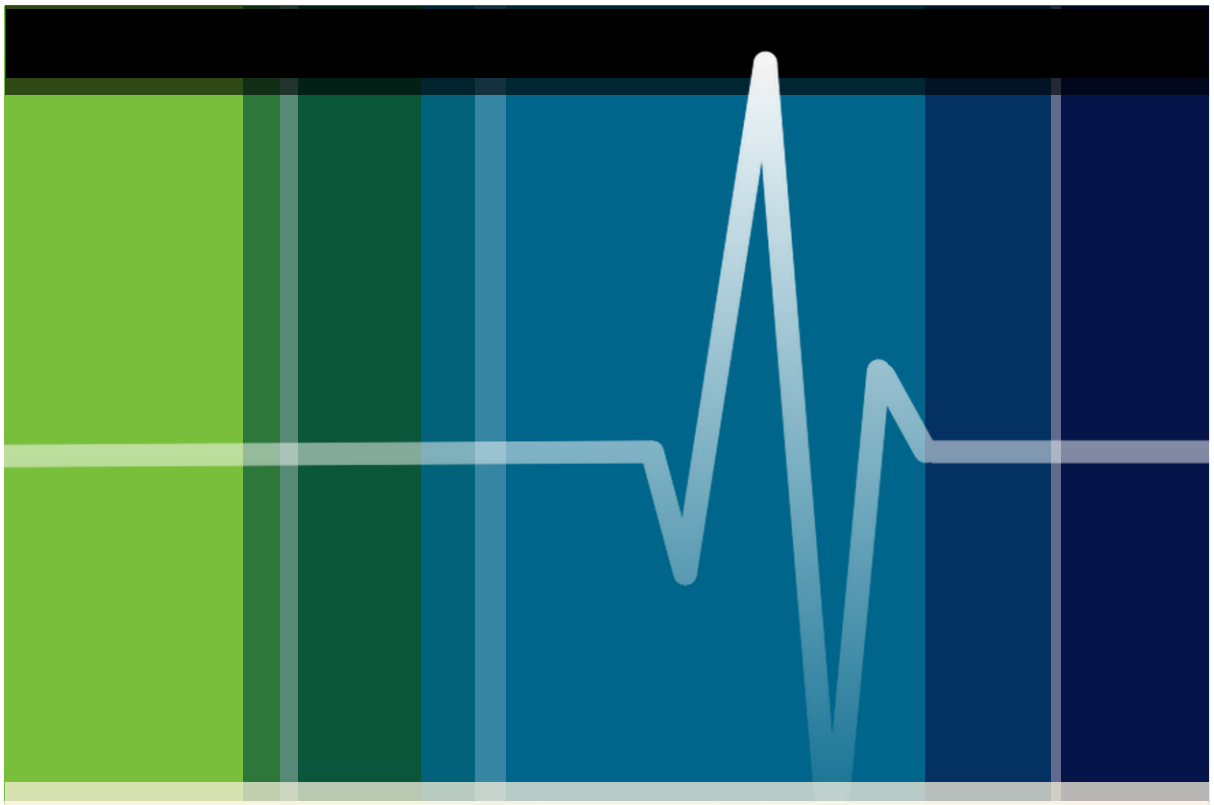

MONITORING & EVALUATION

ANNUAL REPORT

Drought and Climate Adaptation Program (DCAP) Phase 2

Coutts J&R / **July 2019**

COUTTS J&R
MANAGING AND EVALUATING CHANGE

Queensland Government

ACKNOWLEDGEMENTS

This M&E annual report draws on the milestone data from projects and interviews with stakeholders, project teams, the Steering Committee and project management. Without people willing to participate in this process, the richness of the data collected and the emerging stories of the projects from different points of view would not be possible. The time given has been much appreciated and valued.

This report reflects the very positive and enthusiastic responses received through interviews and indicates that the program and its projects are in a healthy state at this stage of the project.

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July 2019

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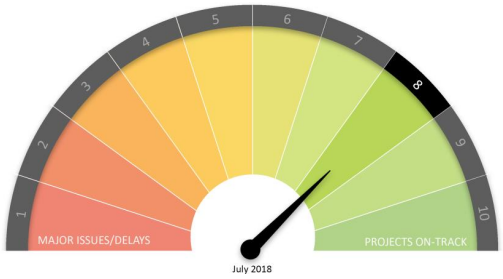
SUMMARY

About this Report

This 2019 mid-term M&E annual progress report provides a program and project level update of The Drought and Climate Adaptation Program (DCAP) Phase Two M&E activities.

Program Status



DCAP remains strong and on-track at this stage of the program to deliver on the objectives at a program and project level – despite challenges of drought, floods and distance. The program has made good progress on developing the underpinning information and specific tools to assist in forecasting and decision-making on property or farm – or protection in the case of insurance products being developed. In particular, projects have been exemplars of involving users in the development and testing of products.

There have been a number of significant early gains and contributions across the program in terms of improved understanding, tools, information, presentation and engagement that have demonstrated the potential to support decision-making and improved outcomes – in the grazing and horticultural areas. This includes forecasting, modelling, economics and insurance opportunities.

About DCAP

DCAP is the Queensland Government's $17.5 million initiative to improve drought preparedness and resilience for Queensland producers. The program began in 2016 with Phase One ending June 2017. Phase Two runs to June 2021 and at this stage consists of nine projects *managed and funded through a series of partnerships with government and industry partners.*

Program Management

The program governance arrangements are in place and seen to be operating very effectively. Program management, project leaders and team members, partners, and Steering Committee members rate the progress of the program as a whole to date strongly. This is in spite of the challenges of a worsening drought and floods over the period. The Queensland Drought Program Review Committee were very positive about what they heard and endorsed the program.

All projects have met their milestones and are seen to be on track by project teams and aware stakeholders. There are also some very good examples of cross-project collaboration and some degree of integration across outputs – with scope for further integration.

The Project Team meetings and webinars are rated highly as providing updates and providing opportunity to be informed about other projects and facilitating interaction. It is noted that there have been no face to face team meetings this calendar year to date.

There have been a number of opportunities taken for program staff to be involved in related forums, programs and activities, expanding the awareness and understanding of DCAP. The DCAP website is located within the Long Paddock web site and provides information and resources about the program and two newsletters have been distributed to date (in 2018). There remains a concern that communication and awareness of DCAP and its projects (outputs and benefits) needs to be increased to realise its potential.

Issues

A key issue emerging is accuracy and trust and understanding the science and its implications by producers – and there is more work needed here over the remaining years of the program.

There is a limitation in the program itself in terms of how much penetration can be made across such a large geographical region. This highlights that it is timely to further develop impact pathways for the remainder of the project and beyond – and to further expand the targeted communication about the program and its products.

There is also a need to build on the economic modelling and document examples of change and benefits arising through impact narratives and case studies to better ground-truth benefit expectations from the use of the DCAP products.

Recommendations

1. DCAP should be recognised for the strong progress that has been made as it continues to meet milestones and product development in challenging circumstances.

2. The program should be commended on the high level of user-engagement at this early stage in ensuring outputs are relevant, user-friendly and beneficial. This is an example of best practice in applied research and development.

3. Efforts should be made to map and further integrate the different outputs and products from across the projects to show from a user perspective where they best fit in the decision-making process.

4. Impact pathways for evolving products should be further developed around increasing awareness, extension and support. This will enable users to better access and use these products during and beyond the life of the program.

5. Contributions to the capacity and skill development of consultants/advisers in northern Australia needs ongoing attention. Encouraging and supporting producers in the use of products to improve decision-making and management is a broader issue extending beyond the program and is also for governments and industry to address.

6. Building on the previous recommendation, governments and organisations involved in supporting agricultural and pastoral industry in northern Australia need to take a long term view with DCAP to ensure that key decision-supporting work continues to be developed and sustained into the future.

7. The communication/awareness activities of DCAP need to increase with targeted key messages about the program, its progress, products, its contribution to date and what is expected by the end of the program. This includes further encouraging project leaders/team members to identify and develop communication opportunities with the program communications team. This will help to stimulate interest, information seeking and broader use of the products as they are ready.

8. Project leaders should be asked to capture more ‘impact narratives’ (as per the examples in this report) and case studies to track and demonstrate the cause-effect of project activities and the use of information and outputs to stimulate change and benefits.

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Summary of Findings

A summary of the findings against the Monitoring and Evaluation Log Frame (provided in the appendices) is provided below. The body of the report provides details around these different levels and the project contributions. ***Note that a full summary with 'traffic lights' of progress against individual projects against milestones is included in the appendices***.

END OF PROGRAM OBJECTIVES

DCAP	**Increased: scientific capacity and tools; awareness, understanding, skills and capacity; Increased uptake and application by industry, producers and their advisors; benefits arising from use and practice changes made by industries and producers.**
Progress to date	At this stage of the program, all projects are on track to deliver on their research and development activities with a number of new and improved tools, information products and engagement and testing with producers already completed. This has been despite the ongoing challenge of an extended drought and the flood events that occurred in early 2019. There has been very positive feedback from informed stakeholders about the quality and value of the tools, frameworks and information being developed and their ability to assist with informed decision-making. There remains further work in ground-truthing, testing with producers, engaging and communicating. Through the tools, information products extension and engagement developed and undertaken to date across the projects in the DCAP program, **approximately 570 producers across Northern Australia (representing a minimum of 840,000 head of cattle and 97,000 head of sheep) have been recorded as directly indicating an intention to use the information or product in their business**. To date, **272 producers (representing a minimum of 209,000 head of cattle and 13,300 head of sheep) have directly been recorded as making a change in their decision-making/management approach and/or use of tools**. DAF 8 (GrazingFutures) found in a follow-up survey (May 2018) of 59 graziers who had been engaged in GrazingFutures that, as a result of their experience**,** 49% (58) were: making drought decisions sooner; making changes they believe will be profitable to their animal production systems; making changes they believe will be profitable to their grazing land management practices; and making changes to other business practices. A horticultural business implementing forecasting management tools to fine tune plantings ensuring the irrigation was not over capacity for the extreme conditions, indicated an increased $23,000 in turnover as a result. The mid-term benchmark web survey for the program (245 respondents, 71 who recalled participating in the original survey in 2017) rated their **confidence in their preparedness to meet future climate variability as 6.6/10 (6.2/10 in 2017)** with **30% being in the process of implementing a documented plan (19% in 2017**). More than on third (36%) had used the Long Paddock Website in 2019 compared to 26% in 2017) with increases also seen in use of Australian CliMate and Will it Rain booklet.

COMMUNICATION AND EXTENSION

DCAP	Overall Program Communication Activities
Progress to date	The DCAP web page has been established and is included on the Queensland Government *Long Paddock* site: https://www.longpaddock.qld.gov.au/dcap/. Three DCAP program newsletters have been distributed to date (September and December 2018 and May 2019) and are available on the website – along with 10 media articles. Project reports, case studies, webinars and videos are also available through the website. It is interesting to note that the benchmarking survey shows that over a third of respondents (35%) indicated that they were more aware of DCAP than they were two years ago. This was mostly through involvement in project activities and events (e.g. FutureBeef), the DCAP newsletter, the LongPaddock website and talking to people.
	Specific Project Extension Activities
Planned Activities	**Originally planned activities through the life of the program:** • **DES 2:** Electronic quarterly update Newsletter; Bi-annual workshops; Annual forum; National workshop in Year 3 • **USQ 4:** Climate Mates provide regionally-based engagement with producers. Four hundred individual engagements to date is expected to result in 10% of these utilising the information and tools in decision making. There was a personnel and resource limitation in meeting growing demand and engaging with greater numbers – with need to explore future options • **USQ 5:** Facilitated discussions between farm businesses and insurance industry • **DAF 6:** 7 x 2-day workshop in each region with a 1-day follow up • **DAF 7:** Active engagement and two-way communication with supply chain participants through targeted workshops; Recommendations to BoM
Progress to date	There have been strong extension activities across northern Australia over the last 12 month period. Project activities have included: 105 workshops; 27 field days/farm walks; 66 forums/ seminars; 175 one-on-one property visits; 22 webinars and 67 stakeholder meetings. These activities recorded engaging: 3,766 producers (potential overlap) representing a minimum 842,000 head of cattle, 96,600 head of sheep and covering 48 million hectares of land. Climate Mates (USQ 4) were reported to have made significant progress in engaging producers in the north and raising awareness with nearly 400 individual engagements. The estimate is that about 10% of these will be changing practices in terms of decision making. Grazing Futures (DAF 8) also led or partnered with other organisations a large number of workshops or training events across northern Australia.

PRODUCTS AND TOOLS

DCAP	Key products and tools for supporting extension and producer use developed to date include:
Progress to date	• **DES 1:** Forage Pasture Growth Alert; Forage safe carrying capacity reports (under testing) + Updates to GRASP; FORAGE; and AussieGRASS • **DES 2**: Website: paleoclimate.com.au; database • **DES 3**: Draft Report *Towards greater drought preparedness in Queensland grazing" Lessons from qualitative interviews and discourse analysis*; Understanding and Applying Behavioural and Social Science insights for change; database of behavioural related resources. • **USQ 4:** Literature Review on latest climate research in Northern Australia; 8 joint papers + significant development formulating a drought index. • **USQ 5:** Cyclone insurance product; Insurance products for 4 industries; Concept notes for livestock, horticulture and wheat + Modelling on experimental insurance products. • **DAF 6:** 3 Comprehensive regional analysis reports; scientific paper • **DAF 7:** Experimental forecasts (Horticulture); Heatwave advisory notices; Ground-truthed 19 long lead time forecasts. • **DAF 8**: Grazing Futures database and recording system (under trial); videos; case study + Modelling of typical grazing operations • **DAF 9:** Forecasts made available • **Joint:** Animation video explaining percentiles

RESEARCH AND DEVELOPMENT

DES 1	The inside edge for graziers to master Qld's drought prone climate
Progress to date	The focus is on undertaking research and developing information and tools around carrying capacity in the face of climate impacts on pasture growth. The project is seen to be making good progress, collaborating well with other DCAP projects and producing very useful information and services for producers. It is reported that 2,000 requests per month are coming in for access to reports. The FORAGE Pasture Growth Alert has been released and a framework for property level forage reports has been further developed and a number completed - with stakeholders rating their value highly. The project has also updated and improved the Long Paddock website and related models. Further communication and extension has been suggested with accompanying support for interpreting reports. Case studies would help capture the extent of benefit to be gained.

DES 2	**Using palaeoclimate data to prepare for extreme events and floods in Qld**
Progress to date	The project has made up for earlier delays and is seen as on track to deliver. Early work on developing the website and database has been completed with positive results and analysis showing the potential value of the data. There are good connections and collaboration evident with others in this field. There is more analytical work to be done as well as developing the application of that analysis and how to effectively communicate and engage with stakeholders.
DES 3	**Drought resilience and adaptation: A program of social research and knowledge support**
Progress to date	This project is focused on better understanding the behavioural influences that impact on decision-making so that it can inform and guide communication and extension activities to be targeted and effective. The project has completed its data collection and almost completed its analysis. Draft reports have been developed and circulated/about to be circulated to the other projects.
USQ 4	**Northern Australia Climate Program**
Progress to date	This project combines a strong research component around forecasting and implications (e.g. flash drought; floods; multi-year predictability; seasonal forecasts; pasture variability) with a strong engagement program (Climate Mates) that provides regionally-based engagement with producers. It is seen as having made excellent progress and its collaboration with the BOM, UK (and other DCAP projects) has been seen to be resulting in more useful forecasts and user-friendly information. Four hundred individual engagements are expected to result in 10% of these utilising the information and tools in decision making. There were personnel and resource limitations in meeting growing demand and engaging with greater numbers – with a need to explore future options.
USQ 5	**Crop insurance**
Progress to date	This project has made good headway (ahead of plans) into its research and developing insurance understanding and products. It has developed reports, concept notes and potential products across a range of industries as well as modelling potential innovative pathways for roll-out. Collaboration was strong with organisations, agencies and other projects. Despite the good engagement and strong interest to date, there is some way to go to gain government buy-in and commercialise the products.
DAF 6	**Delivering integrated production and economic knowledge and skills to improve drought management outcomes for grazing systems**
Progress to date	This project is seen to be progressing very strongly with very useful products – including 3 comprehensive regional reports - being developed with good financial and economic analysis. Integration with extension is seen to be going very well. Good collaboration with Grazing Futures (DAF 8) is reported with strong interest from using a similar approach in WA and information already being used in university courses. The framework and analyses were seen to be excellent support for DCAP outcomes - demonstrating practical whole of business economic approach to becoming drought resilient – with great potential for regional planning and policy.

DAF 7	**Use of BoM multi-week and seasonal forecasts to improve management decisions in Queensland's vegetable industry**
Progress to date	This project is seen as being on-track and engaging well to ground-truth forecasts and predicted outcomes. There as strong interest by consultants and growers in the use and potential benefits of the forecasts, pointing to the potential to improve grower decision making/ increase productivity/decrease water use. There was good collaboration with USQ 5 (insurance) – noting that the project is horticultural-based and so less directly relevant to grazing focused projects. The heatwave advice has been received well with a number of examples of production and profit benefits resulting from changes made.
DAF 8	**GrazingFutures: Promoting a resilient grazing industry**
Progress to date	This project is on track with positive feedback on progress and focus on producer needs. A database, grazing framework, modelling and case studies have been developed. Strong collaboration and partnering was reported including the joint-running of information sessions and workshops across western Queensland – underpinned by active professional development. The project has reported strong engagement, good attendance at events, high ratings of value and intentions to use information in management with a 2018 follow up survey showing that 50% acted on those intentions.
DAF 9	**Forewarned is forearmed: Proactively managing the impacts of extreme climate events**
Progress to date	The project is on track with stakeholders closely aligned with the project positive about the forecasting accuracy, reports, presentation and opportunity to use the information to be proactive with management. There was good collaboration with DAF 7 (forecasts for horticulture). There is still some way to go to demonstrate and provide confidence in accuracy, useability and in raising awareness and engagement.

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1. INTRODUCTION

1.1 Purpose of this Report

Phase Two of the Drought and Climate Adaptation Program (DCAP) is now at its mid-term point. This is the second annual monitoring and evaluation report for DCAP and provides a summary of project and program level activities over the last year, outputs and outcomes to date as well as identifying any emerging issues that may need addressing.

1.2 Background

DCAP is the Queensland Government's $17.5 million initiative to improve drought preparedness and resilience for Queensland producers. It aims to do this *by delivering a range of research, development and extension projects, improve seasonal forecasting and provide tools and systems that will support producers in their decision-making*[1].

Phase Two runs to June 2021 and consists of nine projects *managed and funded through a series of partnerships with government and industry partners*[1]. Phase One (July 2016 - June 2017) included 18 projects managed between the University of Southern Queensland (USQ) and the Department of Environment and Science (DES).

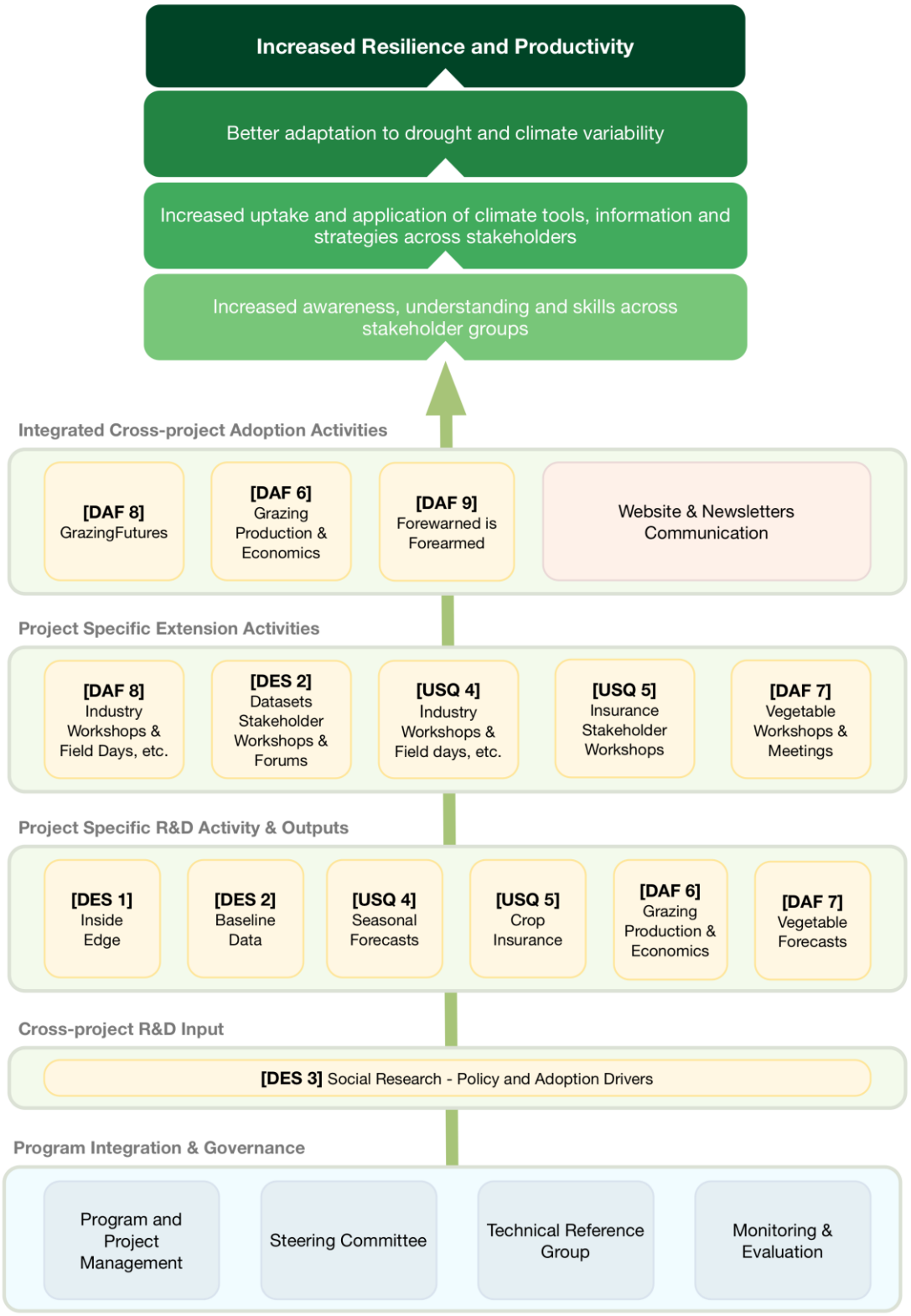
Other partnerships within DCAP Phase Two, including Meat and Livestock Australia (MLA) and the Bureau of Meteorology (BoM), will lead research into drought resilience, weather and seasonal forecasts, and mentoring programs. The GrazingFutures project is another major element of DCAP which aims to help Western Queensland graziers build resilience in their businesses and recover from drought as quickly as possible.

1.2.1 DCAP round two projects

The DCAP program is made up of a number of separate, but related, projects each contributing to the overall goal of improving outcomes for producers in the face of climate related challenges. The following diagram captures some of these relationships between projects and their roles in contributing to the program objectives.

[1] https://www.daf.qld.gov.au/environment/drought/dcap/about-dcap

Figure 1: DCAP impact flow diagram



In order to monitor and evaluate these combined contributions, a *Monitoring and Evaluation Log Frame* was developed which describes the activities, process, outputs and outcomes of the program and the performance measures associated with these. The complete log frame is provided in the appendices. The project descriptors are described in the summaries below.

DES 1	**The inside edge for graziers to master Qld's drought prone climate**
	• Innovative research will be converted into information systems and processes to support Queensland graziers to manage drought and climate challenges more effectively. • DES's research will give Queensland graziers the "inside edge" to master our drought-prone climate, enabling proactive climate responsive business decisions. This project will yield climate-savvy graziers that will continuously adapt to Queensland's variable and changing climate.
DES 2	**Using palaeoclimate data to prepare for extreme events and floods in Qld**
	• The project will use paleoclimate data to produce a 1000-year rainfall record for Queensland which better describes the risk of extreme droughts and floods. • The Queensland agriculture sector will be supported in better understanding and preparing for extreme climate events with the extended short instrumental climate record going back over 1000 years.
DES 3	**Drought resilience and adaptation: A program of social research and knowledge support**
	• Better understanding of the barriers to managing climate risk and preparing for drought will be used to improve information products and tools to support better decision making in the grazing industry. • This applied research project will engage directly with Queensland graziers, extension officers and scientists to identify barriers to drought preparedness, and strategies to assist the grazing industry to improve business resilience and adaptation to drought.
USQ 4	**Northern Australia Climate Program**
	• Rainfall forecasts will be improved across northern Australia to help graziers make more informed management decisions. New forecasts will be introduced into grazier networks to allow ease of use and application of the information into management of grazing businesses. • Queensland graziers will be directly supported through improved seasonal climate forecasts, development of information products for grazier decision making and integration of this information into existing and new extension activities.
USQ 5	**Crop insurance**
	• Improving climate risk insurance products for agriculture will support Queensland primary producers to independently manage climate risk more effectively. • Recommendations will be developed for agricultural industries and the insurance industry on how more affordable insurance products and viable markets for agricultural insurance products can be established and maintained for Queensland rural industries.
DAF 6	**Delivering integrated production and economic knowledge and skills to improve drought management outcomes for grazing systems**
	• The economic impacts of grazing management decisions will be analysed to improve the capacity of businesses to manage the productivity and profitability challenges of droughts in Queensland. • The skills and knowledge of managers of Queensland grazing businesses will then be developed and supported to assess the economic implications of on-farm drought management decisions.

DAF 7	**Use of BoM multi-week and seasonal forecasts to improve management decisions in Queensland's vegetable industry**
	• Improved temperature forecasts will be developed and customised to enhance farm management decision making in the Queensland vegetable industry and improve the capacity of the horticulture industry to manage climate variability and adapt to a changing climate.
DAF 8	**GrazingFutures: Promoting a resilient grazing industry**
	• Supporting western Queensland grazing businesses to prosper and grow based on best management practice, science and industry experience. • Grazing businesses across western Queensland will identify and implement changes on-farm which improve business resilience to drought and climate extremes and deliver enhanced community and economic development outcomes.
DAF 9	**Forewarned is forearmed: Proactively managing the impacts of extreme climate events**
	• Improving and customising forecasts of extreme rainfall and temperature events will be developed to help primary producers to make more informed short and medium-term management decisions to improve farm profitability in Queensland's grazing and sugar industries.

1.3 About the Evaluation Process

The ongoing evaluation process over the life of DCAP's second phase includes the following:

1. Managing the monitoring and evaluation process in conjunction with the DCAP Program Manager;
2. Providing ongoing YourDATA management;
3. Developing feedback sheets and survey instruments/questionnaires and supporting training of project leaders at the sub project level;
4. Undertaking annual interviews with project staff and project leaders;
5. Undertaking surveys of informed persons including producers and industry personnel engaged with DCAP projects;
6. Facilitating independent expert panel/critical friends bi-annual review of program impact; and
7. Assisting the Program Manager in annual reporting requirements, including regular progress reports on M&E; activities and summaries of data available on YourDATA; and an annual report against the DCAP logframe and objectives.

A full summary of the M&E activities contributing to this report is included in the appendices.

1.3.1 Benchmarking Survey

The benchmarking web-survey that was undertaken in 2017 was repeated with some minor additions (e.g. tools that weren't available or included in the original survey). The survey was forwarded out through similar producer networks and email lists explaining its purpose and seeking responses. An option was provided for people to receive free rainfall posters if they responded.

A total of 245 completed the 2019 survey – compared to 285 in 2017. There were 71 who specifically recalled also filling out the original survey.

Note this is not a randomised survey and hence care needs to be taken with the results and comparisons. There is an argument that respondents could be those with a greater awareness of the issues and opportunities – although the results do have a reasonable spread of indicators showing different levels of awareness and use of tools. The survey, however, is very useful in providing a window into the awareness and use of information and tools by this group of producers and others who were aware of the survey and were prompted to complete it.

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2. FINDINGS

2.1 Overall Evaluation Statement

Based on the findings in this two-year review, DCAP remains strong and on-track at this stage to deliver the objectives at a program and project level. It has made good progress on developing the underpinning information and specific tools to assist in forecasting and decision-making on property or farm – or protection in the case of insurance products being developed.

There has been targeted engagement with producers in the developing and testing of specific tools and products to guide the relevance, user-friendliness and value of project outputs. Having a behavioural science project also adds to this understanding and a provides a basis for rolling products out to the broader industry. A key issue emerging is accuracy and trust and understanding the science and its implications by producers – and there is more work needed here over the remaining years of the program.

Climate Mates and other extension support have demonstrated that producers can be engaged, develop understanding and be motivated to use the information and tools in their decision-making. However, there is a limitation in the program itself in terms of how much penetration can be made across such a large geographical region and with the limited extension resources – especially when one-on-one support appears so important in assisting effective uptake and use on individual farms and properties. This highlights that it is timely to further develop impact pathways for the remainder of the project and beyond – and to further expand the targeted communication about the program and its products.

There is also a need to build on the economic modelling and document examples of change and benefits arising through impact narratives and case studies to better ground-truth benefit expectations from the use of the DCAP products.

This is a complex suite of projects addressing a complex issue across a large area, different industries, organisations and disciplines. At this stage of the project there is a good deal of confidence in what has emerged to date and the benefits that will emerge.

2.2 Overall Program

- The program governance arrangements are in place and seen to be operating very effectively. Program management, project leaders and team members, partners, and Steering Committee members rate the progress of the program as a whole to date strongly (8+/10). This is in spite of the challenges of a worsening drought and floods over the period. The Drought Committee were very positive about what they heard and endorsed the program.
- All projects have met their milestones and are seen to be on track by project teams and aware stakeholders. There are also some very good examples of cross-project collaboration and some degree of integration across outputs.
- The Project Team meetings and webinars are rated highly (8.8 and 7.6/10 respectively) as providing updates and providing opportunity to be informed about other projects and facilitating interaction. It is noted that there have been no face to face team meetings this calendar year to date.
- There have been a number of opportunities taken for program staff to be involved in related forums, programs and activities, expanding the awareness and understanding of DCAP. The DCAP website is located within the Long Paddock web site and provides information and resources about the program and two newsletters have been distributed to date (in 2018). There remains a concern that communication and awareness of DCAP, the projects and their outputs and the benefits needs to be increased to realise its potential.
- The program is still mainly in the early research and development phase and there were a number of comments at program and some at project level about the limitations around the level of penetration the program can be expected to have given the large geographical area being covered, climatic challenges, and limited extension resources on the ground.
- There have been a number of significant early gains and contributions across the program in terms of improved understanding, tools, information, presentation and engagement that have demonstrated the potential to support decision-making and improved outcomes – in the grazing and horticultural areas. This includes forecasting, modelling, economics and insurance opportunities.

2.2.1 Progress

Program participants at the November 2018 workshop rated program progress as strong (8.5/10). In the interviews in June 2019, all projects indicated that they were on track to achieve their objectives and stakeholders were generally comfortable with progress made to date in the projects of which they were aware.

The members present at the April 2019 Steering Committee were very satisfied with the progress of the program to date (8.2/10 – compared to 7.7 and 7.4/10 at the previous 2 meetings - with a comment made to make it clearer how projects were tracking.

2.2.2 Management and Governance

Internal Communication and Engagement

Program Workshop

Project leaders reported good value from DCAP update meetings and seeing the progress of the different projects – with a comment about the huge amount of effort made to communicate to the wider team. It was noted that there had been no leaders meeting this year to date.

Feedback from project teams from the November 2018 workshop showed that they saw it as very useful (8.8/10) in updating participants on projects and forward DCAP planning, with those presenting highly satisfied with the opportunity to share project progress and the associated discussion. Comments highlighted the value of focused and concise presentations that effectively communicated project progress and outputs – for example: *great to have concise focussed presentations with objectives and outputs to date shared amongst the program team; first time hearing what others are doing - very useful for potential integration; good to see the outputs starting to come out of the projects; and good targeted presentations and effective in catching up on progress* and *implications for wider drought reforms.*

Workshop participants were quite satisfied (7.5/10) at that stage with the level of integration across DCAP projects. Comments suggested that there was *lots of room for improvement* and while *integration seems to be occurring to some extent*, *it is unclear whether all opportunities are being taken advantage of.* One respondent believed the program was *under-selling and under-reporting the amount of integration that is already happening*. A Steering Committee member had also noted that there was a need for better integration across projects.

Webinars

Webinars were seen quite useful (7.6/10) in terms of (better) understanding DCAP program progress. *Good to keep up with what other projects are doing and get Steering Committee feedback.* An August 2018 webinar was seen to have provided new insights and understanding that resulted from the webinar included: *cross-project work through the vast grazing industry; BoM making advances in providing information and making ACCESS-S available;* and *insight into other DCAP projects and the overlap between them.*

DCAP Innovation Funding

Funding was provided and proposals sought for innovation activities. One project leader noted that they had not yet heard the outcome of the proposals.

Other activities

The DCAP program and project leaders presented to the Queensland Drought Program Review Committee – with a positive response from the Committee members. A Climate change impact/adaptation planning session was held at the Reef Catchments Soils Symposium in Mackay.

Facilitated discussions around ADOPT (DES 1 and DES 3 staff with Jeff Coutts) were held to better understand implications for industry adoption. There was also participation in BOM organised Multi-year drought workshop with DES 1, DES 2 and USQ4 giving presentations and attending of an FWFA project leaders meeting and a GrazingFutures Steering Committee.

It was also reported that DCAP Management:

- Supported and organised widespread distribution of DCAP benchmarking survey and the stakeholder interview process for Program M&E processes.
- Facilitated a session at the *Stanthorpe Farmers for Climate Action* climate change conference.
- Participated in AMOS conference and associated NACP project technical and extension workshops.
- Facilitated development of Queensland Government/K-water MOU supporting potential involvement of the QDMC in the establishment of an International Drought Mitigation Centre.
- Participated in Natural Capital Summit as part of Queensland Climate Week.
- Participated in AFI Farming in a Risky Climate conference.
- Showcased DCAP as an innovative example of program governance and collaborative partnership development at the DAF Innovation Showcase conference.

Steering Committee

Project Steering Committee meetings were held on July 2018; October 2018; and April 2019. Participants rated them highly useful (7.9, 8.2, 8.3/10 respectively). They were very satisfied with their roles and opportunities to provide input into the program (8.7, 8.6, 8.3/10). As a result of the meetings, participants described improving their knowledge of the overall DCAP program and better understanding project progress and outputs – including increasing confidence in the *work being undertaken* and that *proponents are suitably skilled to deliver good outcomes.* One respondent at the April 2019 meeting commented that the presentations were *very welcome* and *report summaries effective.*

Some Steering Committee members highlighted the importance of continuing to (better) communicate project progress – including benefits and outcomes with comments including: *Researchers need to take more responsibility for communicating what they are up to; A focus on communicating benefits and outcomes was identified and needs re-emphasising.*

The feedback from project leaders about the Steering Committee was that it was seen to be positive in providing another perspective and generally useful. It was suggested by a project leader that more advice around expectations of impact would be handy. *A comment was made in the June 2019 interviews about the lack of feedback to project leaders on the Steering Committee outcomes.* A concern was mentioned in the June interviews about lack of hearing about the result of the projects to be funded from contingency funds.

Monitoring and Evaluation

There was high level of comfort (8.2/10) with project and program M&E activities from the November 2018 program workshop participants. One respondent described being more comfortable now given the indication that the research elements appear on track.

There were a range of views about the M&E side of the program from project leader interviewees from '*good, thorough and supportive'* and '*really good process set up'* to not being sure what is happening. A comment was that they felt less pressure as the program progressed – while others referred to the extra time it took. There continues to be comments about the difficulty in fitting research projects into the impact aspects of the YourDATA platform – hence limiting capacity to report adequately. Another reported the value of having surveys on-line on the platform and collating the results.

One project leader noted they were happy with *progress but always anxious about evaluation and comms activities to promote DCAP and projects and demonstrate impact.*

2.2.3 Collaboration and Integration

It was noted by project leaders that the program managers were very encouraging and remind them to work together…*been good, there is a positive vibe across all the different projects*. The following summarises specifically reported cross-project collaboration.

- **DES 1** noted collaboration with DAF 8.
- **USQ 4** reported specific collaboration with DES 1 (inside edge) describing a joint webinar between Climate Mate and Grazing Futures (14 December 2018). Damien O'Sullivan (DAF) works on both NACP (Climate Mate training, workshops, product support) and the Forewarned is Forearmed project, including product testing and providing feedback to the BOM. Jo Owens of Grazing Futures is moving into the building at USQ where NACP employees are located. Grant Stone with Inside Edge and Jason Barnetson (USQ employee working at DES) provided a seminar updating products developed as part of Forage (5 December). NACP working with Jeff Coutts on evaluation planning.
- **USQ 5** noted specific collaboration with DAF 7, explaining that they were working with them to investigate heatwave insurance options for sweetcorn and lettuce.
- **DAF 6** highlighted collaboration with DAF 8, noting In addition to Collaborating with Grazing Futures teams to conduct extension activities in the North and West, we have collaborated with the central Queensland Grazing BMP team in reef catchments.
- **DAF 7** noted strong engagement with USQ 5 (crop insurance), explaining that they have provided insurance project staff with details of Critical Threshold temperatures and documents to support the insurance teams work. Sweet Corn, Lettuce, Green Beans and Lettuce information. In addition, Peter Deuter went to USQ and met with Shahbaz and Jarrod and provided further feedback on a recently developed (as a result of DCAP 7 information) Insurance risk/ payout spread sheet. We will continue to work with USQ 5 in order to see if a commercially focused affordable prototype insurance risk offering can be developed for a nominated vegetable crop.
- **DAF 8** described collaboration with DAF 6, noting that project staff had travelled to Julia Creek and Longreach.

2.2.4 Outputs and Communication

Program level communication

The DCAP web page has been established and is included on the Queensland Government *Long Paddock* site: https://www.Long Paddock.qld.gov.au/dcap/. Three DCAP program e-newsletters have been distributed to date (September and December 2018, May 2019) and available on the website – along with 10 media articles. Project reports, case studies, webinars and videos are also available through the website. It is interesting to note that the benchmarking survey shows that over a third of respondents (35%) indicated that they were more aware of DCAP than they were two years ago. This was mostly through involvement in project activities and events (e.g. FutureBeef), the DCAP newsletter, the LongPaddock website and talking to people.

A summary of program level communications from the communication reports over the last year include:

Activity	Details	Reactions	Comments
DCAP communication plan reviewed and updated	• July-Sept 2018 • Individual project communication plans customised		
DCAP quarterly newsletters (up to 3,000+ recipients through Qld Ag news subscribers)	• 3 editions (Sept 18, Dec 18, April 19)	• All newsletters had open rates of between 46% and 48% and click through rates between 15% and 22%. These are high compared to industry averages.	• Climate Mates most popular article (Sept 18) • Inside Edge and long Paddock link most popular article (Dec 18) • The Fitzroy Management report, DCAP at the 'Farmers for climate action' conference and the understand percentiles in climate data video conference were the three most popular articles. (Apr 19)
Social media	• 15 social media posts were shared July-September 2018 across six of the DCAP projects and. • 17 DCAP social media posts Oct 2018-Mar 2019 • 7 DCAP social media posts Apr-Jun 2019	• Reached 9,862 people (Jul-Sep 2018) • Reached 37,502 people (Oct 2018 – Mar 2019) • Reached 25,470 people (from Apr – Jun 2019)	• Note that reach figures are cumulative and do not take cross readership into consideration, or the same people/bots accessing different posts • Most popular posts were paid boosted posts
Media coverage	• Jul-Sept 2018 included 2 crop insurance articles (Insurance Business Magazine and 9 News Wide Bay) • Oct 18-Mar 19 saw 41 news articles. • Apr-Jun 2019 saw 29 mentions of DCAP with DAF staff prioritising the flood disaster the previous quarter.	• (Oct18-Mar19) Isentia automated sentiment analysis showed all positive for DCAP clips. This is not definitive as not analysed by a human for context, tone and nuance.	• No further detail on articles generated by the DCAP (July-Sept 2018)
DCAP webpages on Long Paddock	• Updated regularly with reports and information.	• Almost 7,000 views of DCAP pages between Sept 2018 and June 2019	

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Project level

There is a strong focus on research and the development of outputs and products that improve understanding and decision making around climate variability. Details of the outputs are included in the individual project summaries with key products noted in the Log Frame summary. The projects reported the types of outputs they had produced on a quarterly basis. The type of outputs and the numbers reported over 2018/19 are shown below:

Research Output	Number Reported 2018/19
Benchmarking	10
Bioeconomic and system modelling	18
Business analysis	17
Knowledge support	95
Options analysis	7
Research Interviews	90
Spatial analyses	5,372

Information materials developed from the research outputs were also reported. These are listed below:

Information Material	Number Reported 2018/19
Conference papers	18
Conference posters	17
eBulletin articles	27
Journal articles	15
Newsletter articles	20
Web pages	20
Technical fact sheets	10
Videos/podcasts	16
PR Media – interviews	24
Media releases	7
Social media posts	76

2.2.5 Stakeholder Engagement Activities

In the 12 months to June 2019, projects across the DCAP program reported the following numbers and types of communication and engagement activities:

Engagement Activities	Number Reported 2018/19

Workshops	105
Field Days	27
Forums/Seminars	66
One-one property visits	175
Webinars	22

67 other engagement activities were recorded – including meetings with stakeholders and presentations at events.

Through this engagement, projects reported the following engagement and impacts on those engaged. **Note:** these figures will include some degree of overlap - i.e. the same producer/ stakeholder may have been counted more than once – capturing cumulative numbers at separate activities over the year and across different projects. Also, not all activities were able to capture details on herd or flock sizes and area – so these maybe be understated.

Engagement Metric	Number Reported 2018/19
Producers	3,766
% intending to change	569
Businesses	1,386
Number head cattle	841,765
Number head of sheep	96,655
Hectares	48,295,312
Non-producers	1,405

2.2.6 Practice Change Recorded To Date

The program is only half-way through, and a number of projects were very research focused. Change also often takes time after exposure to new ideas. The main projects actively engaging projects to encourage practice change were USQ 4 (NACP), DAF 7 (Horticulture) and DAF 8 (Grazing Futures). Where practice change was observed or captured, projects were asked to include details in the quarterly reports. Herd, flock numbers and hectares affected were not always able to be recorded and hence not captured. Recorded incidents of practice change reported in quarterly reports over the year were as follows:

Practice Change Metric	Number Reported 2018/19
Producers making a change	272
Businesses represented	117
Head of Cattle affected	209,351
Head of sheep affected	13,300
Hectares of land affected	2,741,002

As noted, these are likely to be under-reported and there are more who indicated their intentions to make a change – as per the earlier table. The following comments from project teams accompanied the reported figures:

- **USQ 4** [Oct-Dec 2018] Category A goals have been met with 14% of Category B goals met. Follow up from Category B goals provides the foundation for reaching Category C goals (practice change). The Climate Mates are tasked with helping to achieve Category A, B, and C targets. The purpose of Category A targets is to raise awareness of the NACP and examples include presenting information on NACP on TV and radio programs, media releases, blogs, and meeting with local industry to raise awareness about NACP. Category B addresses improving knowledge, aspirations, skills, and attitudes regarding NACP's goal of improving the use of seasonal climate forecasts by producers. Examples of Category B include providing Climate Workshops, one-on-one meetings to install climate apps and explain use, and reaching out to other extension specialists to provide them with climate information to include in their toolbox. Category C targets address practice change. Practice change occurs when a producer decides to incorporate seasonal climate information into their business plan and when other extension officers include climate information into their workshops, etc. [Jan-Mar 2019] Narratives and Climate Mates Quarterly Report Summary were noted to have specific details on Practice Change. In summary, 15 producers indicated to the Climate Mates that they were going to make changes or had already made changes to their business as a response to information provided by NACP and the Climate Mates. These decisions included but are not limited to destocking and diversifying. April-June 2019] Practice change documented both in Climate Mate in an activities spreadsheet.
- **DAF 6** [April-June 2019] We have not attempted to capture and document practice change due to the limited resources within our project. The DAF extension teams coordinate the extension activities and we rely on their support for this. Of producers surveyed at two dedicated project workshops (Julia Creek and Biloela) 100% indicated that they intended to make a change to their business as a result of attending the workshop. It is anticipated that, in particular, the individualised economic analyses conducted with producers would be resulting in substantial practice change.
- **DAF 7** [April-June 2019] Weather extremes affects horticultural crops in many ways, including influencing the timing and reliability of plant growth, flowering, fruit growth and maturation/ripening as well as marketable yield and product quality. During the most recent collaborator meeting we ran a small group exercise, asking the collaborators present to think about and write down management decision they would consider taking based on local real weather data which they experienced in 2019. [Jan-Mar 2018] Growers and supply chain participants do make changes when presented with targeted information from a Bureau of Meteorology operational product (Heat Wave Service in this instance) when delivered in a useable format from a trusted local DCAP source. [Oct-Dec 2018] Our collaborating businesses are reviewing and analysing the DCAP Experimental Forecast and taking general trends into consideration. [July-Sept 2018] Six Granite Belt growers, 10 Lockyer Valley growers, a large multilocation Bowen grower and two supply chain production co-ordinators are now aware of the BoM heatwave service and will utilise the site in the upcoming summer season. All Lockyer Valley, Granite Belt, and Bowen collaborating industry members and three nationally significant supply chain co-ordinator businesses have multi - month forward experimental forecasts for their production locations.
- **DAF 8** [Oct-Dec 2018] Pregnancy Testing workshops - with most intending to cull non-pregnant animals sooner and identify pregnant cattle to preferentially feed and select for future breeding. These numbers include one narrative on Salli Thomas who organised these workshops after attending a Grazing BMP in Injune, June 2018. She intends to use her pregnancy testing skills on their own and their family cattle to routinely remove unproductive stock at their weaning in May as well as identify their best breeders and which ones to cull first if they ever need to destock.

2.2.7 Narratives – Theory of Change in Action

Narratives are a mechanism for capturing change in action – resulting from interaction with information or activities from a project or program. The aim is to capture and record these as the project teams become aware of the change made – rather than (only) through a survey. Each instance is an actual case of change and it tracks the logic of how activities and outputs trigger, speed-up and/or support changes made.

A number of impact narratives were captured by **USQ 4** - Northern Australian Climate Program.

USQ 4 Narrative Example	
Actor	*John and Joy owned a Mitchell / flinders grass downs property of 12200 ha running the equivalent of approximately 7000 DSE as a safe carrying capacity in average years.*
Engagement activity	*In early-mid February 2018 their property had been in drought for 4 years and was down to 30% of normal stock numbers. They had received little rain during the current summer, stock were losing condition and many people in the district were selling stock in the belief that it was not going to rain. Consequently, there was a lot of stock on the market and prices were down. At the time, the seasonal forecast was for above average rainfall and the MJO was due in early to mid-March. John, like many producers in the region, was going to sell more stock. We advised him to wait until the next passage of the MJO which can be a good trigger for rainfall at this time of year. He took the advice and received 150 mm of rain with the passage of the MJO. This rain produced a good pasture response and he avoided selling stock on what was a depressed market in February.*
Reactions and actions	*John avoided selling lighter stock into a depressed market and having to buy back into a more buoyant market after the rain.*
Benefits	*This decision to hold stock based on the seasonal forecast and the imminent passage of the MJO increased annual profit.*
Reflection	*John would not have made this decision without the advice of a trusted climate adviser. Climate [Information Used: SOI rising rapidly in Feb, MJO Strong in Feb, SOI / BoM seasonal forecast for MAM was average to above average]*

Other impact narratives from this project included:

- Producer positively taking CimateARM On-line tool analysis of his two properties on board as an improved gauge of how SOI (and IOD) translates for rainfall likelihood on the properties as a result of a workshop followed by one-one session.
- Producer selling off a significant number of head of cattle influenced by provision of a climate outlook with a local supplement including pasture growth outlooks followed by a one-one session – allowing his pasture to at least hold condition and possibly gain with autumn rains and the expected extended warm period.

DAF 7 was the other project that provided a number of impact narratives. The example provided in full also includes economic benefits from changes made.

DAF 7 Narrative Example	
Actor	*Taylor Family Produce is a family owned and operated business providing 12 months continual supply to major chain stores, markets, cruise liners and overseas suppliers. Their brand is known Taylor Family Produce grow five lines of vegetables in the Granite Belt and Redland Bay regions of southern Queensland, Australia. The brand is known Australia wide and is recognised as a quality product. The main vegetables they grow and market include, Iceberg lettuce, Wombok (Chinese cabbage), Silverbeet, Celery and Broccoli.*
Engagement activity	*After attending the May 2019 DCAP experimental forecast end of season meeting, the project team member asked Ray Taylor in an email in early June if he considered the DCAP bi-monthly forecasts were of use when making management and marketing decisions.*
Reactions and actions	*Our planting schedules were reduced by 30% due to the above average temperature forecasting being predicted and the lower monthly rain fall prediction. So, this has led to us planning our planting schedules around these forecasts, which means that our infrastructure capabilities were able to cope for these abnormal weather systems, so we could predict and manage the best outcome for our quality and quantity of crops planted. For a longer growing and sustainable season.*
Benefits	*By implementing these management tools this allowed us to command a better pricing at market level.* *We estimate that the lettuce price was around $2 - $ 4 per unit more. We could fine tune our plantings and because of this our irrigation was not over capacity for the extreme conditions. That works out on 10 semitrailer loads as about an extra $3 on 7920 cartons or about $23,000.00 in turnover for us.*

Other impact narratives from this project centred around responses to heatwave alerts and included:

- Following an emailed heatwave alert, a Lockyer Valley grower and contract supermarket supplier brought forward their scheduled harvesting dates for their pumpkins by 5-7 days to avoid the predicted heat (which would have burnt off all of the leaves and caused the mature fruit to unburn): *We are currently yielding 18 T / ha so expect Jap to return $9000 / ha and Butternut yielding 19 T / ha so $ 20900 ha. Early harvest due to advanced weather warning potentially save a 10% loss so $900 per hectare saved for Jap crop and saved $ 2000 per hectare saved for Butternut pumpkin crop by harvesting early to avoid extreme heat.*
- *A grower-owned large specialised glasshouse who received a heatwave advisory alert responded to the warning and planned ahead and modified the management of the hydroponic complex – adjusting fertigation mix to one more suited to extreme heat to maximise yield of their capsicum plants, keep picking to supply the supermarket and use staff efficiently.*

These examples show that the program outputs and activities as described can lead to practice change. Interestingly, these impact narratives all involve individual sessions. This does not imply this must always be the case – but it does highlight the need and value of having trained advisers available to support use of the tools and information and assist in interpretation and implications for a specific situation.

2.3 Mid-term Benchmark Survey

2.3.1 245 Respondents Completed the 2019 Survey

- **Region:** 89% of respondents were from Queensland (11% NT/WA or unknown) – the five most common regions were: Central Qld (40 respondents), Darling Downs (34), Mackay (34), Wide Bay Burnett (30), and SE Qld (26).
- **Role:** 66% Producers and 34% Service Provider/Other respondents.
- **Industry:** Respondents were grouped into three unique groups: 54% Livestock only (including beef, dairy, sheep, and goats); 32% Other Industries (including sugar, cropping, horticulture, and 'other'); and 14% Livestock and Other Industries.
- Just under a third of respondents had participated in the previous 2017 benchmark survey (71 respondents).
- 35% of respondents indicated they were more aware of DCAP compared to two years ago, while 17% had not increased their awareness as they already knew about DCAP – 45% of respondents still didn't know anything about DCAP.

2.3.2 Documented Plan

The majority of respondents (61%) did not have a documented plan (or process to use with clients) for managing a variable climate, with 41% of total respondents indicating decisions are made as needed.

- **Comparison to 2017:** +11% increase in respondents who were in the process of implementing a plan (-10% decrease in respondents without plans)

2.3.3 Confidence

Overall, respondents were moderately confident in their preparedness to meet future climate variability (6.6 avg. n=238) and in their ability to access resources/tools/information needed to effectively make planning decisions for climate variability (6.4 avg. n=234).

- **DCAP Awareness:** Respondents who were already aware of DCAP (prior to the survey) appeared more confident in their ability to access resources/tools/information – 6.9 avg. for those aware of DCAP (n=128) compared to 5.9. avg. (+1.0) for those unaware (n=110).
- **Completed 2017 survey:** Respondents who had also participated in the 2017 survey had higher average confidence ratings – 7.2 avg. (n=71; +0.8 vs. 2017) in their preparedness to meet future climate variability and 7.0 avg. (n=71; +1.3 vs. 2017) in their ability to access resources/tools/information needed to effectively make planning decisions for climate variability (note: these respondents may provide a better indication of confidence changes as they were the same respondents surveyed in the previous benchmark.)
- **Comparison to 2017:** 2019 respondents were slightly more confident – with preparedness to meet future climate variability increasing from 6.2 avg. (n=282) in 2017 to 6.6 avg. in 2019 (+0.4) and confidence in their ability to access resources/tools/information increasing from 5.9 avg. in 2017 (n=283) to 6.4 avg. in 2019 (+0.5).

2.3.4 Tools and Resources

The *BOM Website* (97% awareness, 89% use) was by far the most well-known and used resource when planning (or assisting clients plan) for climate variability.

- **Comparison to 2017:** The largest percentage increase in use were for the *Long Paddock Website* (+10% from 26% in 2017 to 36% in 2019), *Will it Rain booklet* (+10% from 3% in 2017 to 13% in 2019), and *Australian CliMate* (+6% from 7% in 2018 to 13% in 2019). Resource use in 2019 compared to 2017:

Rank 2019	Resource	2019 Use	2017 Use	Change
1	BOM Website	89%	87%	+2%
2	The Long Paddock website	36%	26%	+10%
3	USQ Climate Outlook and Review	22%	21%	+1%
4	Australian CliMate	13%	7%	+6%
5	Will it Rain booklet	13%	3%	+10%
6	Stocktake/Stocktake Plus	11%	15%	-4%
7	Rainman/ClimateARM	10%	13%	-3%
8	VegMachine	10%	9%	+1%
9	Climate Kelpie	9%	-	New
10	BBSAFe	4%	4%	No change
11	Insuring for weather and climate risks	3%	4%	-1%

The Long Paddock

Of the 88 respondents who used The Long Paddock website, the three most used sections were: *Climate Outlooks Weather and Fire* (66%), *SOI Phase system probabilities* (45%), and *Forage Reports* (43%).

- **Comparison to 2017:** Long Paddock use in 2019 compared to 2017:

Rank 2019	Resource	2019 Use	2017 Use	Change
1	Climate Outlooks Weather and Fire	66%	*	-
2	SOI Phase system probabilities	45%	62%	-17%
3	Forage Reports	43%	41%	+2%
4	Rainfall posters	31%	40%	-9%
5	SILO	30%	25%	+5%
6	AussieGRASS	24%	23%	+1%
7	DES climate statement	19%	26%	-7%
8	DCAP	16%	*	-
9	DES climate risk matrix assessment	11%	12%	-1%
10	SPOTA-1	**	12%	-

**option not available in 2017 survey **option removed in 2019 survey*

BOM website

Of the 219 respondents who used BOM website, the two most used sections were the *7 Day Forecast* (94%) and *Monthly Outlook* (77%).

- **Comparison to 2017:** BOM use in 2019 compared to 2017:

Rank 2019	Resource	2019 Use	2017 Use	Change
1	7 Day Forecast	94%	*	-
2	Monthly Outlook	77%	*	-
3	MetEye	39%	*	-
4	ENSO tracker	32%	58%	-26%
5	MJO - 40 day wave	30%	55%	-25%
6	POAMA	30%	*	-
7	ACCESS	8%	*	-
8	BOM Heatwave Service	5%	*	-

**option not available in 2017 survey*

2.3.5 Seasonal climate forecasts

The two most well-known were *SST: Sea Surface Temperature Map* (63% awareness, 23% use) and *IOD: Indian Ocean Dipole* (55% awareness, 24% use)

- **Comparison to 2017:** Forecast use in 2019 compared to 2017:

Rank 2019	Forecast	2019 Use	2017 Use	Change
1	IOD (Indian Ocean Dipole)	24%	19%	+5%
2	SST (Sea Surface Temperature) Maps	23%	27%	-4%
3	ECMWF (European Centre for Medium range Weather Forecasting)	16%	7%	+9%
4	SAM (Southern Annular Mode)	4%	4%	No change
5	DCAP Hort Experimental ACCESS Seasonal Forecast Information	3%	*	-
6	IRI (International Research Institute for Climate and Society)	2%	2%	No change
7	DCAP Hort Heatwave Advisory Notices	2%	*	-

**option not available in 2017 survey*

Climate forecast periods

Rolling 0-3 months (62%) was the most selected climate forecast period that respondents saw as valuable, followed by *Rolling 3-6 months* (54%), *Forthcoming Summer/Winter season* (53%), and *Annual 1-2 years* (31%).

2.3.6 Access barriers

Only a third of respondents believed there were barriers preventing them (or their clients) accessing relevant tools/resources and/or knowledge.

- **The top five barriers indicated by these 80 respondents were:** *Lack of understanding about how to use resources* (64%); *Lack of confidence in the accuracy and reliability* (61%); *Lack of understanding of technologies used in the resources* (51%) *Availability/quality of internet access* (46%*);* and *Resources not relevant enough to local conditions* (45%).
- **Comparison to 2017:** Availability/quality of internet access was a decreasing barrier in 2019 (-12%), though a lack of access/exposure to technologies (+14%) and a lack understanding about how to use resources (+8%) and the underlying technologies used (+9%) appeared to be increasing.

Rank 2019	Access Barrier	2019	2017	Change
1	Lack of understanding about how to use the tool/resource	64%	56%	+8%
2	Lack of confidence in the accuracy and reliability of the tool/resource/knowledge	61%	*	-
3	Lack of understanding of the technologies used	51%	42%	+9%
4	Availability / quality of internet access	46%	58%	-12%
5	Tool/resource is not relevant enough to local conditions	45%	*	-
6	Lack of access/exposure to relevant technology	40%	26%	+14%
7	Scepticism about usefulness of tool/resource /knowledge	34%	37%	-3%
8	Scale of the tool/resource is not relevant (i.e. too big/too small)	24%	*	-
9	Financial constraints	23%	19%	+4%
10	Difficulty accessing relevant information	19%	18%	+1%
11	Difficulty accessing specialised support for relevant technology	17%	22%	-5%
12	Other	14%	11%	+3%
13	Lack of government support to access tools/resources	12%	8%	+4%
14	Lack of private sector support to access tools/resources	10%	3%	+7%

**option not available in 2017 survey*

2.3.7 Key Management Practices

The top five key management practices used (or clients used) when planning for climate variability by industry were:

- **Beef, Dairy or Sheep (n=167):** Adjusting stocking rates according to forage amount and quality (93%); Carrying capacity (85%); Adjusting stocking rates (80%); Animal segregation, controlled joining or pregnancy testing (63%); Fencing (62%)
- **Sugar, Cropping, or Horticulture (n=99):** Planting time/season (82%); Fertilizing/spraying, weed control (68%); Irrigation (64%); Species/variety selection (57%); Harvesting and product processing/management (44%)
- **Comparison to 2017:** The top management practices remained similar in 2019 compared to 2017.

2.4 Individual Project Situations

These tables summarise the findings from interviews with project leaders and team members and nominated stakeholders – as well as quarterly report summaries for the projects. **Note a comprehensive summary of reporting against milestones is included in the appendices** and it is not intended to repeat that level of detail in these tables.

DES 1	The inside edge for graziers to master Qld's drought prone climate
Evaluation overview	*The focus for this project is on undertaking research and developing tools around carrying capacity in the face of climate impacts on pasture growth. The project is seen to be making good progress, collaborating well with other DCAP projects and producing very useful information and services for producers. It is reported that 2,000 requests per month are coming in for access to reports. The FORAGE Pasture Growth Alert has been released and a framework for property level forage reports has been further developed and a number completed with stakeholders rating their value highly. The project has also updated and improved the Long Paddock website and related models. Further communication and extension was suggested with accompanying support for interpreting reports. Case studies would help capture the extent of benefit to be gained.*
Interviews	Project leader; 3 nominated stakeholders (average awareness 7.7/10).
Progress	ON TRACK • Key **deliverables around the carrying capacity** – noted that it would be good to have more on ground numbers for comparisons and verification (some preliminary numbers to refine). • **Stakeholders were very positive about the project progress** (fantastic; great products developed; great job understanding the audience). It was noted that the project was on the right track and we need to keep plodding along and allow the scientists to do the work - current products which are good and are going to be adopted more and more.
Key Outputs to date	• **FORAGE Pasture Growth Alert** released • **FORAGE safe carrying capacity report** – under testing • Australian Rangelands **Journal paper** "Long Paddock: Climate risk and grazing information for Australian rangelands and grazing communities" • Several **property level forage reports** completed - information about pasture growth, rainfall, ground cover, erodible soils and maps. • **Joint animation video** with DES 3 explaining percentiles – accessible on Long Paddock website • **Updates to products**: GRASP (updating land type parameters); FORAGE and AussieGRASS (updates to fire scar; presentation of AussieGRASS Maps). • Two **benchmark properties** have been completed.
Highlights and New Insights	• A reported highlight was **seeing the products come together** - seeing people respond positively and using them • Stakeholders highlighted the **pasture growth alert report** (*a big win*). Another noted the value of the focus on long-term projects *directed at a very difficult R&D program*.

Collaboration	• It was noted that the team **works together with other DCAP project teams** - talking to others about what they doing and sharing data – e.g. on pasture production in particular areas or comparing models and testing ideas. Also reported beneficial interactions with those working with graziers. • A stakeholder referred to the value of putting resources together and making a difference combining skills (*has been a nice collaboration*).
Stakeholder Awareness and product use	• On-going **updates to Long Paddock website** including a high resolution 'Dashboard' and a rainfall poster and visualisation (Map App). 61,000 site visits were reported in Oct-December with 27% new visitors. • It was reported that **extension officers were providing positive feedback** - work with the FutureBeef DAF extension team, they give positive feedback about what products have been worthy. • **A Stakeholder briefing** was held in April 2019 – reported as being received well. • **Forage report monthly requests** were reported to be increasing - able to put out more reports from this project. Averaging a couple of hundred a few years ago, then up to 300-400***. Since this project we have had up to 2000 requests per month*** - *direct result of this project. Without support from this project would not have been able to improve existing and new forage reports.* • Stakeholders noted the **increased awareness of forage reports** (e.g. number of hits increased after exposure at Beef Week) as well as a need for more time to engage with staff on the ground and communicate products and interpretation to landholders. • 2 of the nominated **stakeholders noted they had used the reports**, with a mention of the pasture assessment alert (*can actually present it to landholders* for use). • **Rangelands article** was 'most read' for a 3 month period.
Challenges and Opportunities	• The project leader was **not aware of any issues** impeding the project - could be if don't get enough data to verify carrying capacity report (not explored enough to be concerned - on track) • Stakeholders emphasised the **importance of communicating project outputs** to the industry/ growers. It was noted that training and guidance was needed to effectively interpret reports (need to get advisory staff comfortable with the outputs… *and then conveying that to producers*). • A challenge was noted by a stakeholder on **how to predict biomass**.
Perceived Potential Benefits	• **Property level forage reports help farmers make informed decisions** about their position, seasonal outlooks and comparison with the areas around them and in QLD. They can get feel for what their pasture condition is, growth coming in and making informed decisions about stock numbers or moving cattle (to adjust) - really powerful tool for them to make informed decisions. • **A stakeholder noted how there was a real need for these products**. It was said that if producers can then match animals to feed it would be a huge drought management advantage for Queensland.

DES 2	**Using paleoclimate data to prepare for extreme events and floods in Qld**
Evaluation overview	*The project has made up for earlier delays and is seen as on track to deliver. Early work on developing the website and database has been completed with positive results with analysis showing the potential value of the data. There are good connections and collaboration evident with others in this field. There is more analytical work to be done and in developing the application of that analysis and how to effectively communicate and engage with producers.*

Interviews	Project leader, team member; 3 nominated stakeholders (average awareness 7.7/10)
Progress	**ON TRACK** • The project leader noted the delayed start and revised timelines with **the project now on track.** It was noted that the team had grown and was working effectively. • The team was in the process of **finalising the collation of existing relevant datasets**. • Stakeholders interviewed described **progress as very good** after the initial delay.
Key Outputs to date	• **Project website paleoclimate.com.au; database**; Existing paleoclimate data sources assembled and displayed on a map from the database and includes any details about the data and the period and the reference so people can trace it back. • **Project newsletter** (first on 20 March to 142 stakeholders). • Stakeholders referred to the website to access information about different paleoclimate records; the newsletter; and the initiating meeting – with 2 noting it was in the early stages of the project.
Highlights and New Insights	• **The website was seen to be well done** and would act as an explainer and house the results - eventually be hosted by QLD government on Long Paddock site. Will be a really good communication piece for the research, explaining the information and value of what we are doing for water security planning in the future for other stakeholders. • **Ability to share data** - easier because the partners are overseas doing the work - email has worked well and FTP for pushing large volumes of data. Have a skype meeting with them in two weeks. • It was noted that they were **waiting for correlations** to come back (hydro climate variables) - *this is when things will start to happen.* • Stakeholders referred to the **new insights into paleoclimate data** (*different statistical relationships and from different areas*).
Collaboration	• Quarterly reports refer to **expanding national collaborators** including links to the Australian Paleoclimate research community. • The project team reported **good national and international collaboration** with growing links with experts*…very research focused project and need that strength in the team and those links to enhance the science*. Collaboration with mathematics partners at a university in Dublin was mentioned. • **Collaboration with DES 1** - some of our products will be available through Long Paddock and added into longer term climate data. • **More informal collaboration** - some overlaps to drought that might be interesting to USQ work. Connected with some people at the BoM - potential to overlap that information. • It was noted that **collaboration would increase further once there are results** to share - when we have a show and tell mini conference this may open more links. • A stakeholder referred to the value of collaborative approach being used.
Stakeholder Awareness and product use	• **Established the newsletter** with dedicated communication person who will handle stakeholder relationships. • It was reported that the first **stakeholder briefing** in April 2019 was received very well. • The website and newsletter were seen to be an area of raising awareness and providing access to information. It was noted that they will send out regular emails and coordinate stakeholder briefings coming up.

Challenges and Opportunities	• **Staff changes and recruitment** were raised as the main issue faced – although it was noted that they are getting around these changes – and just the normal issues associated with research projects. • **To make the research applicable to the users -** working with John Vitkovsky to make sure he can use data to demonstrate value ongoing, making it a useable dataset for hydrologists and getting them to take it on board. It is important to have Seqwater engaged and on board. Good to have the international support. • **Could engage some high-profile hydrologists in the future** - engineering community. Also, opportunity for international community to be involved in the space. • **Getting that message across** - for some traditional engineers may be a hard sell and we will need to show value in using real data. • A stakeholder saw that there was a **lack of clarity around useable policy measures**. Another issue raised was that the risks associated with the Drought Management Plan is in its aggressive delivery - what happens when we don't reach those targets?
Perceived Potential Benefits	• It was considered a bit early - *impacts after workshop may happen (but only for management and higher up levels -currently just internal*). Once we have these proxies telling us about paleoclimate then we can send results to water utilities and government - then there will be impact. • Sourcing data around SE QLD catchment - will be using paleoclimate data in long term models for water resources in these regions. • Two of the stakeholders referred to improved understanding of historical climate data having **the potential to improve future (drought) planning/risk management**.

DES 3	**Drought resilience and adaptation: A program of social research and knowledge support**
Evaluation overview	*This project is focused on better understanding the behavioural influences that impact on decision-making so that it can inform and guide communication and extension activities to be targeted and effective. The project has completed its data collection and almost completed its analysis – with draft reports developed and circulated/about to be circulated to the other projects. There has already been input provided to other projects related to design and engagement with a challenge identified around how best to present the wealth of data captured and best communicate it.*
Interviews	Project leader; 2 team members; 4 nominated stakeholders (awareness average 8/10)
Progress	**ON TRACK** • The project team and stakeholders reported that the field work/social research was time-consuming but **on track to deliver objectives** - getting a more in depth look at the culture and mindset factors that play a role in graziers' attitudes to drought. preparedness. The analysis of interviews was on track - not for delivery till mid-July. • **Interviewed stakeholders were positive about the project**- its achieving business and drought resilience for beef and livestock producers - good level of research and extension across the board. • The generous timeframe, quality of researchers, ease of communication and project design and leadership were considered factors that have helped the project progress.
Key Outputs to date	• **Draft report "Towards greater drought preparedness in Queensland grazing" Lessons from qualitative interviews and discourse analysis"** being finalised for circulation in July

	• **First version of "Understanding and Applying Behavioural and Social Science Insights for Change"** sent to DAF Grazing Staff • **Finished an animation** with DES 1 - working on rainfall percentiles for past growth and other pasture growth tools. • **Databases of behaviour related resources** completed
Highlights and New Insights	• **Discourse analysis** - something they didn't know they could do. Articulating the media strategies around drought that can be helpful or not to graziers and around broader climate adaptation and how they plan on ground practices. • **Interviews** were seen by a team member and one of the stakeholders to have provided more nuanced accounts of the types of dilemmas graziers deal with. • **The concept itself, looking at behavioural insights is a relatively innovative approach** - there has not been before a behavioural based project with such a strong agricultural focus. • Stakeholders highlighted the usefulness of the 'percentiles animation', the importance of the scenario analysis for *repairing, managing and recovery from drought*
Collaboration	• **Knowledge support** - continue to provide feedback advice and information about behavioural change to relevant parties. • **Working with scientists on the Forage pasture growth** alert reports • **Knowledge support being received a bit better** - people are sending stuff for us to edit to improve their product useability (internal service to staff involved in DCAP). • Go to **GrazingFutures (DAF 8) workshops** and present - try to stay as connected as possible • **Looking at DES 1 decision support** tools • Surprise was reported **by a few inefficiencies in the collaboration/evaluation** - a bit of double up which could have been avoided by DAF providing more feedback on my interview questions.
Stakeholder Awareness and product use	• A stakeholder commented that there had been **limited interaction/updates to date**. A team member pointed out that there were Opportunities to increase awareness through the newsletter and e-articles - *already got a bit of interest via the last DCAP newsletter and people already asking to be on the mailing list*. • The point was made that some parts are quite aware and some are not - depends on how you term stakeholder; stakeholders involved are very aware of what the project is trying to achieve - **good shared vision across the various regions**.
Challenges and Opportunities	• There were **initial reported problems with communicating and engaging** with DAF about project needs – mostly overcome but has impacted. DAF extension officers were also taken offline for the Nth QLD disaster (DAF) - workshop planned for February was changed as a result. • **Gaining contact information for interviews** was challenging – difficult to get the full range of coping those with drought (e.g. leading and struggling). There is a challenge in defining concepts like resilient and adaptive. • There was also a reported challenge with **presenting the wealth of information in the most usable format**. A stakeholder commented that they were unsure how the knowledge component will support future product development *(e.g. collected a lot of information and analysis - unsure how insights are going to be practically used to support product development).* • Two stakeholders saw opportunity **to provide new insights** (e.g. succinct opportunities to inform and make aware what previously was not a viable insight; opportunity for some of those really interesting insights) • **A few things not taken on board** (e.g. decision support tools and insights that can be used to help adoption of tools and improve user interaction)

	• **The main issue with knowledge component suggested by a team member will be how well we continue to be received** - any behavioural change group may struggle with how to maintain traction within delivery areas even when evidence shows it is working and improving - leap of faith. Depends on building relationships and trust. Critiquing others work is challenging. • An opportunity (and challenge) was seen to continue **closely engaging with producers to build resilient businesses** (e.g. to build a resilient business is a very complex to achieve it means the opportunities are closely engage with the livestock producers)
Perceived Potential Benefits	• A stakeholder considered that the project was playing important role in building drought resilience (e.g. option analysis very important for industry and Grazing Futures program a very important initiative) • Two stakeholders agreed that the project has potential, but were unsure how it will look/be used when completed (e.g. results are tentative at the moment - can see potential of the project but unsure about how it will look; there is potential from a lot of programs - how it will actually be used and how that might happen) • Another saw enormous potential in multiple areas (e.g. R&D which is critical around climate tools, decision making behind drought management, and engaging with producers with economics and refining other whole of business practices) • Another benefit was seen through informing/assisting extension providers/producers (e.g. potential to inform extension providers - and products when available to assist rural producers)

USQ 4	Northern Australia Climate Program
Evaluation overview	*This project combines a strong research component around forecasting and implications (e.g. flash drought; floods; multi-year predictability; seasonal forecasts; pasture variability) with a strong engagement program – Climate Mates – that provides regionally-based engagement with producers. It is seen as having made excellent progress and its collaboration with the BOM, UK (and other DCAP projects) has been seen to be resulting in more useful forecasts and user-friendly information. Four hundred individual engagements is expected to result in 10% of these utilising the information and tools in decision making. There were personnel and resource limitations in meeting growing demand and engaging with greater numbers – with a need to explore future options.*
Interviews	Project leader, UK collaborator and 5 stakeholders (average awareness 6.8/10)
Progress	**ON TRACK** • **Project team members and stakeholders considered that the project was overall on track** – excellent progress…gone well in WA… scope for more progress in identifying potential products that the bureau could be working on for pastoral industry. • **Strong support from UK collaborator** who reported that UQ post positions were working closely together progressing the delivery of global modelling improvements for operational NWP and seasonal/decadal predictions and used by farmers via the NACP project product delivery. • **Multiyear research work done by BOM** - significant progress in terms of being able to forecast beyond seasonal scale (1 to 2 years - 60 months) • **Significant progress into wet season work** - bureau will be releasing a new forecast for the start and end of wet season on 30 June (partly funded by USQ4)

Key Outputs to date	• **Literature Review** completed of the latest in climate research in Northern Australia • **8 papers being prepared/submitted** through R&D with BOM, USQ and UKMO (including topics of flash drought; floods; multi-year predictability; seasonal forecasts; pasture variability) • **Release of the Forecast system** (partly funded by DCAP) was seen to be a lot better than in the past. Helping our project in that producers have a more skilful forecast to use • **Significant development formulating a drought index** - completed analysis of a range of drought indices and used this to combine into drought index CDI.
Highlights and New Insights	• **Climate Mates was reported to be embedded in the regions working well** - recruited based on their networks in the region, their communication skills and where they lived. *Have eight really good people in those regions*. Some stakeholders referred to the value of Climate Mates *(e.g. commitment from the climate mates - very worthwhile, their local knowledge has contributed significantly).* • Two stakeholders noted that **the project is producing easy to understand and relevant climate information** (e.g. access to information about climate that's in lay persons' terms - they are really good at tailoring it to the relevant people in our industry) • Two mentioned the **impact of El Niño on Western Australian weather** (e.g. El Niño actually has a minor impact on the western coastline *and it has never dawned on me*; the amount of influence there is on the El Niño southern oscillation has on the Western Australia weather) • **Importance of researching managing climate at a regional level** was raised as an insight (e.g. good that they are talking about managing climate, it's good that someone is focusing on that in the regional level)
Collaboration	• **Collaboration with BOM and UK met office and DAF QLD was seen as working well** - large project held in June (AMOS conference), where all key players will be at that meeting to review what we have done and to plan next 12 months. Collaboration is going well. A collaborator from UK Met Office who attended the NACP Workshop at Darwin referred to it as having *been a great opportunity to network with DCAP, BoM and USQ scientists and especially with the "Climate mates" to get their user perspective on our research and key priorities for them. The coordination and communication with BoM and USQ is good and we are clear on our role and future direction for the work.* • **It was noted that project staff collaborated regularly with DES projects** - used percentile video and drought information from Long Paddock information regularly. Also use Forage products regularly. Have regular catchup with them and they reciprocate and come here to talk to our team about their products. • It was noted that **Climate Mates in the regions know who relevant DCAP leaders** are - engage to collaborate when organising activities.
Stakeholder Awareness and product use	• A **NACP website** is currently being developed. • **Climate Mates training** included demonstrating prototype products to test with producers. • **Climate Mates were reported to have made significant progress in engaging producers in the north** and raising awareness - nearly 400 individual engagements. Estimate about 10% will be changing practices in terms of decision making. • Stakeholders referred **to information shared by Climate Mates online** or at workshops/roadshows - outlooks, forecasting tools, historical information. The CliMate App was mentioned as being really popular. • Some stakeholders interviewed considered that **many have good awareness of project** although the comment was made that this is variable. Keeping up communication and having more property visits to better understand needs were points raised.

Challenges and Opportunities	• **People wanting to engage more readily with Climate Mates in those regions** – they are seen as important contacts in those regions. They are only employed one day a week so we have to knock back a lot of requests to engage, they just don't have the time to do extra work. People are seeing them as useful ways to collaborate and connect with industry - unfortunately we haven't been able to accept a lot of contact. It was noted that they are looking to increase their activity and get more funds to have them working more. • Getting requests to **engage with other projects and organisations** - could be opportunities if there are funds to support • **Huge opportunity in engaging more with BOM and organisations leading climate (UK Met office)** - access to those skills and resources has been a fantastic opportunity. Could make more use of that. • **UK collaborator consider that there are huge opportunities** for the two embedded USQ posts *to leverage a large amount of related research that is ongoing in the Met Office & UK Universities around global model development to potential benefit of NACP project outcomes (difficult to quantify but with HPC, existing model runs and staff expertise (10-15+ over a number of years to develop diagnostic techniques/model) probably amounts to millions of pounds/AUSD*. • Having **agencies such as DAF and DEPIRD and Dept Ag and Resources** on the ground and on board has been good. • There was frustration that the on-line YourDATA system was not adequate for research projects **- difficult to report adequately**. Mentioned many times without satisfactory outcome. • Stakeholders considered there was potential - but **gaps in forecasting** need to be resolved (e.g. will have a big impact if they could resolve some things - significant gaps in some of the forecasting tools and also the skills of the forecast) • **Concern with the low skill levels**/lack of information in northern regions (e.g. majority of pastures we work with across the North, there is a very low skill level due to the lack of information). • A comment was made that **the project would benefit from more time** (e.g. wish there was more time so things can be done properly which makes it easier for all).
Perceived Potential Benefits	• **People are recognising the impact of the Climate Mates -** internal project evaluation data is showing (potential) practice change in about 10% of those engaged. Climate mates have only been working on this project since Aug 2018 - to have that sort of indicator that high after only 9 months is good. • Stakeholders were of the view that the **project is raising awareness** of climate variability and the tools/information available (e.g. really good program to raise awareness about climate variability and what tools are actually out there - just getting that information out there). • Potential was seen for **Climate Mates to influence adoption** (e.g. climate mates have got huge potential to influence adoption of new climate information). • A UK collaborator noted that *the initial results from the new CoMorph convection parametrisation look promising at addressing some key model biases in tropical convection that hopefully will improve some of the key climate drivers/teleconnections to N. Australia (Sally). The global coupled model developments from GC2,3 to 4 are already showing key improvements in Australian rainfall (Matt). We will build on this to develop CoMorph and other science developments targeted at improving predictions of N. Australian climate variability in the GC5 coupled model now undergoing active development and due to be frozen in 2020*.

USQ 5 *Crop insurance*

Evaluation Overview	*This project has made good headway (ahead of plans) into its research and developing insurance understanding and products. It has developed reports, concept notes and potential products across a range of industries as well as modelling potential innovative pathways for roll-out. Collaboration was strong with organisations, agencies and other projects (although the focus of the products has been on crops rather than the main DCAP focus on grazing). Despite the good engagement and strong interest to date, there is a way to go to gain government buy-in and commercialise the products.*
Interviews	Project leader; 3 team members; 3 nominated stakeholders (average awareness 9.7/10)
Progress	**ON TRACK** • The project team reported that milestones were being met and contracted outputs delivered – *doing more than actually required*. The main goal described was achieving a potential product that will be usable by the industry.
Key Outputs to date	• **Cyclone Insurance product** report for Queensland agricultural producers. • **Insurance products for four industries** - sugarcane, cotton, macadamias and wheat. • **Concept notes** for livestock; horticulture and broadacre crops. • **Modelling on experimental insurance products** that examine the potential for innovative pathways to roll out 'market ready insurance' products.
Highlights and New Insights	• Collaboration on products.
Collaboration	• **Very good collaboration was reported** across the team members and across industry - continue to work with sugar and insurance. • Closely **collaborating with BOM and UNE** in scoping a national level index based insurance program on residual risk, insurance vehicles and role of predictive platforms in Agribusiness. • Worked with CANEGROWERS to collect data to begin a pilot study on the then proposed cyclone mutual fund. • **Good collaboration was reported with other DCAP projects,** with DAF 7, 8 & 9 specifically mentioned (helping DAF 7 to develop insurance for sweet corn and chilli) • **It was mentioned that collaboration was quite hard because of how focused DCAP is on beef and sheep work** - this project is not, so they are operating in two very distinct different areas. It was also noted that, although collaboration across projects was encouraged, milestones and resources were not set up for this. The team workshops were seen useful in this regard. One stakeholder referred to the willingness of all departments to collaborate and assist.
Stakeholder Awareness and use of products	• It was reported that there was a large amount of interest in the general publication that they have done - QFF will help us to communicate wider and build our creditability with the farmers. • **It was noted that they were not envisioning it would attract so much media attention** – *asked many other industries if they want to be part of this project but unfortunately with limited resources, we can't entertain many industries but in a way we have already included some more*. • **A number of farmers were reported to be engaged** – thinking about and providing feedback about cyclone insurance. There have been many reported enquiries about the potential insurance product. *About 800 farmers have already visited our website and ~120 are accessing and reading the document. From enquiries we are developing*

	case studies and if somebody is interested, we are happy to release commercial insurance and they could have access to insurance even at this stage. • **Strong interests from gov dept and different industry sectors was also evident** - working quite closely with them has had an impact into education and awareness about the work we are doing. An interviewee noted that the project wanted to invite industry and stakeholders to a major workshop run at USQ and meet with the high-level policy makers and the minister - *so in terms of communication we are reaching to high level political people.* • **It was mentioned that a Mutual Fund offering has been well received** - excited because industry reps talked to are very much in support of the concept.
Challenges and Opportunities	• **Data access was reported to have been tricky** - hit a few hurdles getting data out of government departments. Still able to do stuff and get some data but collaboration has been disappointing. The nature the data is of commercial confidence so some industries are reluctant to share their financial data with us. • **Potential challenges to the broadness of what we are trying to achieve** - to be able offer the same sort of product across the other industries will need a lot more working and gathering data and meeting with stakeholders from the industry. We are looking at insurance products for many crop type industries like sugarcane and we are very close to being able to offer something there. • **It was noted that the Sheep CRC people are very keen to do research on linking insurance with the sheep** industry - putting in a couple of projects with Sheep CRC and UNE that will also help us with product impact. • Opportunities were described **for different industries** to offer our products particularly across other crop types, bananas, tropical fruits, mangoes • **It was considered that a lot more work could be done with regards to this project** - a lot of work we are not resourced to do so we have to prioritise. In the end it is going be a successful project in regards to what we need to deliver but potentially the project could do a lot more if there were more resources. • **Challenges were described in reaching out to the government officials and policy makers** - opportunities for governments to think about insurance and mutual and as potential options. • **Biggest opportunity raised was setting up the discretionary fund** - could be a really big game changer for insurance within Queensland. If we continue tracking with that particularly in the next 6 to 9 months that could be a really significant outcome and exceeding everyone's expectation
Perceived Potential Benefits	• **A stakeholder pointed out that it was very hard to have impact at this stage** - we are educating the growers about the potential of insurance and managing our climate change • Benefits were seen as having **increased understanding in insurance** and the use of it as a management tool within the stakeholders' network.

DAF 6	**Delivering integrated production and economic knowledge and skills to improve drought management outcomes for grazing systems**
Evaluation Overview	*This project is seen to be progressing very strongly with very useful products – including 3 comprehensive regional reports - being developed with good financial and economic analysis. Integration with extension is seen to be going very well. Good collaboration with Grazing Futures (DAF 8) is reported with strong interest from using a similar approach in WA and information already being used in university courses. The framework and analyses were seen to be excellent support for DCAP outcomes - demonstrating practical whole of*

	business economic approach to becoming drought resilient – with great potential for regional planning and policy.
Interviews	Project leader; 7 nominated stakeholders (average awareness 8/10)
Progress	**ON TRACK** • **The way the project was structured was seen to have continued to success to date** - engaging with regional DAF teams was seen to have been key to success**.** *Instead of coming in and doing independent work and presenting it we have engaged these teams as we developed the reports. They have input and ownership of results. We have tapped into their experience and insights in addition to including the scientific data. The teams know what it's about and are invested. This has been key to effective extension of that work: involved people as partners in the work*. • **Stakeholders also considered there was good progress with good outputs -** project seems to be doing a very good task of putting together technical packages of information that is projecting rigorous economic and financial analysis; progressing well in the Fitzroy areas - producers very interested and appreciative of the work; making excellent progress in a very difficult area.
Key Outputs to date	• **Produced three (of five) comprehensive regional analysis and reports** - one officially released and review of the others underway – positive feedback from reviewers. • **Stakeholders were aware of the reports** and very positive about their value in assisting extension work - helping to engage/assist producers. • **Scientific paper** accepted for publication in journal 'Animal Production Science'.
Highlights and New Insights	• A key insight reported **as highlighting of the importance of effective drought management components: preparation, responding and recovery** - *all should be considered in economic or situational analysis for beef and grazing businesses. Building a drought resilient business prior to drought and spending a lot of time assessing a range of options and strategies to build resilience prior to market shocks and drought, then information to guide decisions to manage and handle drought (e.g. destocking). Then understanding how to recover cash flow and get business on track. So important to understand it is not just about recovery: need to look at preparation and response phases.* • **Stakeholders considered that the project was providing quality /accurate/ relevant data** - rigour/evidence to support consistent economic messages *(e.g. models are really showing what was already expected to be profitable options - information works in with in other teams and means we are selling the same message to producers; graziers will have unbiased but particularly relevant data sets; project is producing these really good 30 year long term economics analysis by an economist who is an excellent professional in the area; having that knowledge from the project - principles are very good and can be adapted to other areas; very important to have carefully analysed both from a bio-physical point of view and real data from farmers)* • **In-depth case studies** were also highlighted by stakeholders as particularly useful
Collaboration	• **It was reported that they have had invitations from WA Ag dept to help them to replicate the approach** – Team member (economist) was invited to deliver five-day training to beef and economist team in WA to roll out in their extension program in WA. This was received well. • **Collaboration with GrazingFutures team (DAF 8) is happening as part of regional analyses** - going to regions where their team is working and running associated events. First was a reef catchment (Fitzroy), then Northern gulf and Central West- all areas where the Grazing Futures team is in operation. Working with same teams makes it really seamless and easy to value add, collaborate and deliver useful information to graziers.

	• It was noted that it was easy to facilitate interactions as we are all DAF employees - know what all are doing and aware of programs
Stakeholder Awareness and use of products	• **Analyses have produced valuable information** - received excellent feedback from industry stakeholders we have engaged with. They are picking up information and using it: Northern Beef industry, universities, bankers and producers who we have engaged with one-on-one. • **Lots of extension to industry** through conferences, workshops with producers, webinars, media articles was reported - hard to know how that has been valued by industry. 100% of 2 workshops with feedback sheets indicated that they intended to make a change to their business as a result of what they heard. • Stakeholders interviewed considered that there was **good awareness of the project** and interest with some consultants and research institutions incorporating findings into their work for communication to students and others. More extension and communication was seen as needed to further increase awareness and understanding. - • **Several aspects of the project were presented at the International Leucaena conference** - our work was recognised as being unique and difficult to access and we were highlighted as adding value to industry. Pleasing to see work valued that way. • **There were 1500 recorded views of webinars on YouTube** - evidence people are finding it valuable and wanted to listen to key outcomes from reports. Stakeholders also commented on the value of these in getting information out. • **Extending results to producers in the region by promoting individual analysis** - have a regional economist as part of DAF team - been excellent uptake of that. Not been able to service that demand yet but it has demonstrated value seen by producers. Hard to capture that. • **Two different UQ lecturers contacted the project and are using the work (webinars) in their teaching program -** another professor wants to refer to results in new industry book been commissioned to write by MLA for Leucaena. More great evidence. • An example was also given of a **banker who attended workshop using results** and messages from QLD report to guide their recommendations • **It was also reported that the beef extension team constantly looking to incorporate results into their work** - puts an economic figure or outcome to BMP (e.g. supplementing cattle with phosphorous to improve economic performance and being able to put a dollar value to it). • Four of the interviewed stakeholders reported **changes they had made in their work with clients** and confidence in advice given.
Challenges and Opportunities	• **Very protracted review process of our work was raised as a challenge** - pushing back and adjusting milestones making it difficult to deliver everything we had hoped to. • **Other challenges raised by stakeholders included:** size of the project and amount of work involved; large distances involved to engage with producers; internal resistance to disseminate unexpected results; limited awareness amongst scientists to review; concern from some environmental groups about aspects. • **Major flood event in north was reported to have delayed some work with team and producers -** hope to still deliver and complete effectively despite that delay. A lot of information about drought recovery is relevant to flood recovery - restocking, returning businesses to profitability as soon as possible, cash flow. Just been waiting for right time to engage. • **It was noted that they were getting good M&E and saw the value from doing it** - it is a balancing act for a small team, we have to take time away to do comms and M&E work.

	• **Project has established a research framework** that can be used by others (e.g. process used to gather the information and analyse and report it can be used for other projects going forward) • **An opportunity was seen to continue communicating messages/engaging and upskilling the industry** (e.g. continuing on the path that they are going - people wouldn't have considered it if it wasn't presented the way it was; education of client and qualified nutritionists like myself and how to provide a better service and make sure we are doing things properly; wonderful information and experience and now we need to get it out there) • An opportunity was raised to be a**n important landmark project** (e.g. very ambitious to be doing that in all five regions - set some landmarks for the next decade about how technologies which are available in this decade are applied to cattle businesses across Queensland) • **It was pointed out that there was potential for project work to guide future policy developments** (e.g. converted anecdotal information which can then be used to develop policy - would like to see policy developments and enhance government support for the outcomes of their work)
Perceived Potential Benefits	• The project was considered to have really provided some **valuable information to prepare and respond and recove**r from drought. • It was noted that it would be good to get **more specific and target practice change** M&E - this would require more resources than what we have. • Benefits were seen as coming because **industry now has unbiased information** - assists decision making/increase business resilience/profitability *(e.g. whole industry can utilise this information to make sound judgments and decisions and change what they are doing to be more profitable)* • **Stakeholders considered that there are huge potential/impacts and some have already been contributed** - demonstrating practical whole of business economic approach to becoming drought resilient *(e.g. project is looking at how to build wealth and be more resilient - best defence going into drought because wealth means there are more options to make decisions; whole of business approach highlighted that its resilience is about being economically prepared; huge potential to increase knowledge skills and practices of graziers to manage drought - about the whole production system and how it can manage drought; providing the framework of the injecting of numbers which is what managers should be doing - a format and logical sequence and makes the process easier to understand and deal with objectively; good down to earth information that people can use focusing on the needs of production and sustainability; the economical side of it and it is going to be huge for the graziers).* • A stakeholder considered that there are graziers wanting to change practices on-farm and it will line up with practices that the DCAP project is advocating*. I would argue that change was really happening beforehand, but with **DCAP work will accelerate that into the future**. The economic data is there and is pretty clear to see - the forward-thinking graziers are already thinking about these concepts as we speak and are definitely more profitable.*

DAF 7 — Use of BoM multi-week and seasonal forecasts to improve management decisions in Queensland's vegetable industry

Evaluation overview	*This project is seen as being on-track and engaging well to ground-truth forecasts and predicted outcomes. There are strong interest by consultants and growers in the use and potential benefits of the forecasts, pointing to the potential to improve grower decision making/ increase productivity/decrease water use. There was good collaboration with USQ 5 (insurance) and the BOM – noting that the project is horticultural-based and so less directly relevant to grazing focused projects. The heatwave advice has been received well with a*

	number of examples of production and profit benefits resulting from changes made.
Interviews	Project leader and 6 nominated stakeholders (average awareness 7/10)
Progress	**ON TRACK** • **Good engaging meetings with growers in both areas (Granite Belt and Stanthorpe)** was seen as contributing to progress – ground-truthed predicted outcomes with actual outcomes. • **Stakeholder feedback was positive** about the project progress and its value.
Key Outputs to date	• **Ground-truthed 19 long lead-time forecasts** against BOM readings – presented and discussed with business managers. • **Experimental forecasts issued** (Lockyer; Granite Belt, Bowen) to collaborators. • **Heatwave advisory notices** issued (Lockyer; Granite Belt) • Stakeholders referred to the **monthly emails and forecasts/heatwave advice** – and the link to the BOM website.
Highlights and New Insights	• A reported highlight was reported as **working closely with a couple of big producers in sweetcorn and green beans** to analyse economic impacts of extreme temps on production. • Interviewed Stakeholders referred to the **project providing quality/accurate/ relevant data** - improved knowledge of historical temperatures/trends *(e.g. long term accurate data are improving and that's our ultimate goal; having the data there to show that the climate is actually changing - provides information you need to backup what you think is happening; interesting to see the maximum temperatures going up and minimum going up as well; can clearly see the temperatures going up; more aware of how much more heat we are generating each year for longer period)* • **Increased understanding of how to interpret rainfall forecasts** (e.g. details about current tools and how to interpret it - last one was about the rainfall prediction)
Collaboration	• Spent a day discussing ACCESS-S issues with BOM. • **Provided a lot to insurance program USQ 5** - meetings and provided information to help work through examples with horticulture growers • Helped to work on a graphic presentation of data for DAF 9 • Collaborations with DES and Long Paddock • Collaborations with grain and grazing are less as we are in a section of vegetable production • It was noted that they do regular surveys of collaborations at meetings - we then have access to the graphs - all useful.
Stakeholder Awareness and use of products	• Lockyer Valley **DCAP Experimental Forecast Forum –** described as well attended and successful. • It was reported **that 47 Queensland based vegetable businesses and supply chain managers are actively involved** in experimental long lead-time project work – these have been influenced by extra experimental forecasting. • Growers surveyed at meetings reported that have learnt something, are interested and **taking forecasts into account in their management planning**. • A web survey at the end of 2018 indicated that engaged growers had benefited from engagement to date.

	• Stakeholders referred to how well information is getting out, the regularity of updates, emails and engagement with groups – (*interestingly enough not all growers are involved but these growers are talking to their neighbours so they receive information*) – although it was emphasized that it was uncertain how many outside of engaged groups were aware. • Three stakeholders reported that project information and forecasts had increased understanding and was helping decision-making - *(e.g. predictions were so accurate and very specific to our area and we used that information with our farm practices; done my planting schedule around variety selections and times with the data they gave me - getting more heat units and changed my programs around that data).* • An adviser noted that *I print out the heatwave forecast and take it out to my growers and tell them this is what is predicted and then they have been able to spray on sunscreen type products and harvesting early and the need to have a water regime*. • Example given: *A multi-location grower who plants in Summer in the GB then moves crop to the LV for winter, planted longer than usual this year in the GB so as to avoid the forecast excessive Autumn heat that occurred in the Lockyer, "we planted a bit later and longer in the GB before coming to plant in Lockyer (3 week extension to GB season) to avoid the extreme Autumn LV heat".*
Challenges and Opportunities	• **No real issues were seen with the project -** visited BOM head office to reiterate and discuss how to best display forecasts on website (was a potential issue) • A challenge was seen to get **an operational product out of BOM** at end of the project (within ours and DCAP project overall). • There was an **opportunity seen to get more accurate long lead time forecast** (temps two months in advance). • There was seen to be a **long lead time forecasting (rainfall) which is applicable to all industries** - all would benefit from long lead time forecasts (rainfall and temps). • Stakeholders referred to **ensuring accuracy/reliability of the forecasts/data** (e.g. BOM's accuracy will be the most important issue; if it doesn't have a certain level of reliability then no one is going to pay attention to it; ability to see 10 days forward - for us that is very important) • Reference was also made to the **challenge (continuing) of communicating/ promoting information** (e.g. getting the promotional information out to the growers - actually knowing where to get that information can be hard for a lot of growers; guys that have done that work put a lot of letters out to the growers)
Perceived Potential Benefits	• **Changed the way BOM displays weather forecasts** - more easily understood by growers with mean monthly temps • **Improved BOM understanding of the importance of temp from a horticulture and cropping perspective** (horticulture is a high-income producer in Australia, second only to cattle, beat out wine and grain and cotton) • **Raised awareness of QLD growers** relating to BOM heatwave forecast - been beneficial • All stakeholders pointed to the potential to **improve grower decision making/ increase productivity/decrease water use** - if project can (further) improve forecasts range/accuracy/region *(e.g. huge potential for the grower - will be used to mitigate their water and decide what they are going to plant in the future for upcoming seasons; another tool that we can use to improve our water usage or lack of water; if the forecast could be 2 or 3 months ahead it would be brilliant; getting better with the accuracy of the forecasting - useful to the farmers and to myself in my job; as long as they can get a relatively reliable forecast for this region; if we keep gathering data will give us some modelling to what we can do in our business)*

DAF 8	GrazingFutures: Promoting a resilient grazing industry
Evaluation overview	*This project is on track with positive feedback on progress and focus on producer needs. A database, grazing framework, modelling and case studies have been undertaken. Strong collaboration and partnering was reported including in joint-running of information sessions and workshops across Western Queensland – underpinned by active professional development. The project has reported strong engagement, good attendance at events, high ratings of value and intentions to use information in management with a follow up survey in 2018 showing that 50% acted on those intentions.*
Interviews	3 Project team and 4 nominated stakeholders (average awareness 8.8/10)
Progress	**ON TRACK** • There were generally positive comments about the project and its progress (e.g. *done quite well against all our targets - building a network of producers and getting the name out there)* with one person noting that it took time to establish where everyone fits in the project and another mentioning how well the team has worked together.
Key Outputs to date	• New GF **database and recording system** being trialled • Modelling of typical operation in the Northern Downs with DAF partners • Mention was made of **grazing framework** - *it's promising and useful* • Reference was made to having completed **some videos** • Grazing Futures **Case Stud**y + 7 narratives'
Highlights and New Insights	• The project was seen to have **a key role in identifying relevant/timely topics** (e.g. slightly change it to what the graziers or landholders are needing at the time; broad enough for us to identify particular topics that are relevant to the producers)
Collaboration	• Collaboration was reported with DES 1, DES 3, USQ 4, DAF 6 & DAF 9. • Examples were given of where the **team facilitated collaboration** between partners (e.g. collaboration within all the agencies and partners involved - network and helping each other and seeing what other people are doing and what they are offering to their producers; top of the tree for me is the collaboration across western Queensland - people have an ownership of delivering some outputs and achieving outcomes to bring people to work together closer) • **Regional partnerships** were reported as continuing with AgForce post Grazing BMP with joint presentations at AgForce led One Stop Shops. • **33 professional development activities** were undertaken for project team members and partners (April-June 19).
Stakeholder Awareness and use of products	• A number of **industry training events and activities were led or partnered** by the team: A number of events in July-September 18 (54 graziers made a practice change – 44 businesses, 52k cattle, 11k sheep, 755k ha). 18 events in Oct-Dec 18 (224 producers, 107 grazing businesses, 230k cattle, 13k sheep, 2.3m ha – 37% of producers reported to have made a practice change in period); 15 events Jan-March 19 (113 producers; 72 grazing businesses; 28 stakeholders; 120 other stakeholders – 41% graziers indicated indicating they would make a change); 29 events in April-June 19, representing 385 grazing businesses plus 130 other stakeholders (April-June 2019). • A follow up survey in May 2018 of 59 graziers who had been engaged in GrazingFutures found that, as a result of their experience**, 49% (58) were: making drought decisions sooner;** making changes they believe will be profitable to their

	animal production systems; making changes they believe will be profitable to their grazing land management practices; and making changes to other business practices. • The team reported **working collaboratively within regions to deliver information/workshops** – including: 'Climate, Forage and Finance days; "Yarn at the Yards" (value rating of 8+/10; 17% of attendees rating their likelihood of change at 7/7) – follow up is planned; co-delivery of a BreedCow/Dynama workshop; Partnership with e-Beef Smart Farm project on selected properties and open days (33 attendees at Hughenden; Field day Dalmore 70 producers and stakeholders). • The project reported partnering with others to drive 2 Beef-up forums in 2018. • It was reported that **the project was engaging/reaching new people** (e.g. people who may not have had assistance before have actually come out and are willing to listen and learn). • It was reported that a constant flow of inquiries on various topics have been coming in and are being serviced. • Two interviewees noted **limited use of outputs as they considered that service providers/consultants were not the project's target audience** *(e.g. outputs are very much targeted at grazing businesses rather than the likes of a consultant; haven't seen or used many tools or outputs but as I am not a producer).* • There were comments made about **the importance of the project continuing/being refunded** (e.g. would be great if we got refunded to go again; program should continue because people have started using it, coming to workshops, listening to information and seeking more assistance). • **Lack of branding was seen as potentially impacting on awareness** (e.g. for graziers we also don't have a branding - something for us to work on for brand recognition a very good awareness for the project)
Challenges and Opportunities	• **External factors were reported as creating challenges** (e.g. last six months has been terribly challenging - continued drought and the flooding up North and the breakdown of relationships between Ag Force, DAF and Grazing BMP arena) • **There was a need seen for more one-on-one follow up** (e.g. more one to one follow up with producers; longitudinal studies) • Challenges were raised of such **a large area to cover** - small number/inexperienced staff (e.g. staff is a big challenge, when you have got such a big area with just a few of us; small and new team that is the biggest thing trying to get out to a such a large area; a lot of junior or limited experienced staff that are in very far flung geographically isolated places). • **Difficulties getting people to attend events** - distances and time – were highlighted (e.g. getting people to come to events - isolation and add large areas to cover; challenge is providing high quality in a busy landscape - getting the producers time and attention) • **Heavy workloads were seen by some as causing communication issues** (e.g. all snowed under - so it is a bit of a communication issue and trying to squeeze all those commitments in with our other projects) • **Room was seen to improve/innovate extension processes** (e.g. don't believe that they have looked at their extension processes as effectively - could we do it better or take a different approach) • There was concern with **lack of consultants/expertise** (e.g. don't have enough consultants in the south west - struggled with the expertise in drought management) • Because of the data deletion by AgForce, it was noted that Grazing BMP are no longer integral to the project – although partnerships continue with AgForce.
Perceived Potential Benefits	• There were **optimistic comments about the project potential** (e.g. by the end of the projects I would like to think there are outputs that would be a value to industry managing climate going forward; has huge potential and really good thing for the west

	- will take a while and capacity building within our team and they are certainly developing very good skills and a very good network) • Importance of project in **building resilience was seen** as a key benefit (e.g. all about resilience so the broader approach to that - even the mental health aspect)

DAF 9	Forewarned is forearmed: Proactively managing the impacts of extreme climate events
Evaluation overview	*The project is on track with stakeholders closely aligned with the project positive about the forecasting accuracy, reports, presentation and opportunity to use the information to be proactive with management. There was good collaboration with DAF 7 (forecasts for Horticulture). There is still some way to go to demonstrate and provide confidence in accuracy, useability and in raising awareness and engagement.*
Interviews	Project leaders and 7 nominated stakeholders (average awareness 4.9/10)
Progress	**ON TRACK** • The project leader referred to the value of key meetings to discuss the project which were beneficial in keeping it on track. It was suggested that more communication could have been undertaken with producers to better manage expectations. • Stakeholders were positive about the value of the project and its progress – while noting it was still in the development phase. *(e.g. has been great and how there have been resources around; just happy with the project - glad someone is working of the weather for the benefit of the people on the land).*
Key Outputs to date	• Forecasts have been made available to producers
Highlights and New Insights	• **Long term forecasts from the BOM were mentioned** - to see the work coming out and how they are trying to get as accurate as possible and useable has been interesting. • Nearly all stakeholders referred to now **having Improved confidence in forecast accuracy - enhances decision making capability** (e.g. *another tool available to be able to allow for planning activities and prioritising certain activities that the weather dictates; more confidence that you could make a decision and weather will do with that prediction; long term forecasting definitely; very quick - the picture tells what it is the bar the pie graph without having to understand particular stats; forecasting- so far relatively accurate that is quite exciting for us*) • **The value of the visual/graphical presentation of data was also mentioned** (e.g. potential for the way it is presented it has different options - visually captures one's attention)
Collaboration	• **Good collaboration was reported with the Horticulture project (DAF 7)** - discussed a bit with the other leaders what outputs they are getting and how getting them to their users (that sort of dialogue), because they have similar outputs. • It was noted that there were **opportunities for more collaboration with the other groups** - now we have got more realistic expectations people can use what is being presented (*(e.g. potential for it to go to link with other extension programs and newsletters - like FutureBeef).*

Stakeholder Awareness and use of products	• It was reported that a lot of participants have gone back and reviewed their priorities in terms of receiving information - *allowed people to distil what's important to them.* • There was a view among a number of stakeholders that there was still **limited industry awareness**/not well communicated (e.g. don't think it has been very well communicated - SRA and industry doesn't seem to be aware of it although it is not really released yet; not really; not highly known - different parts of our business haven't really heard too much about it; don't think anyone is aware of it; not too aware of other stakeholders) • Some stakeholders referred to the **usefulness of project outputs/tools** (e.g. *great planning tool seems to be very accurate - being able to see forward and plan your activities you can get them done before you get the real downpour is very beneficial; support it 100 per cent because we are in such a variable weather pattern in Charters Towers - it can make such a big difference in our grazing*) • **Value of reports in assisting extension work was also raised** - helping to engage/inform producers(e.g. *forwarded emails onto clients regarding what is actually happening with the BOM and La Nina or El Niño; seen some of the early prediction maps that have been developed - seeing how they could be useful particularly for the sugar industry and if we were to be making some certain decisions with the farmers*) • **There was feedback on utilising forecast data** (e.g. *one with the green bar graph that is pretty much all I have been using - targeted in this area it has been very accurate; long term forecasting you can get a feel on what it happening*).
Challenges and Opportunities	• It was noted that it was difficult to **distil the plethora of information** down to the most important outputs that we can get adopted for people in the long term - to make into practical useable products. • Some stakeholders had a desire for **more accurate forecasts** (e.g. would like to see the weather forecasting more accurate; greater accuracy would be better because of the dangers of long term forecast one year out) • Some referred to the need for **more assistance interpreting forecasts** (e.g. the stuff that Neil showed me was really clever when you had time to sit and really interpret it and get an idea then it makes more sense - it would be good if when people first see it they understand what it really is - growers need quick and easy like the app on my phone will say, rain on Wednesday, Thursday and Friday and there is a picture of rain). • The challenge/opportunity **communicating Information in easy to understand and accessible** ways was also raised (e.g. making it easier and more understandable for growers - people don't like to get to technical; opportunity for maybe a bit more video links and instructions on how to read and interpret the information for the average lay person; engaging those people who aren't either computer savvy or computer confident.) • There were **potentially negative messages** (e.g. If adopted by industry it is a negative message that goes to producers regarding abnormal rainfall - which is no one's fault) • There was a suggestion that there was a **need for more trialling/testing** (e.g. not having enough people on the ground and enough guinea pigs to look at it and ask questions - needs to be trialled run on at this stage and I think their responses need to be known and worked on) • There was a common view that **increased/continued communication** of project progress was needed (e.g. more spreading of the word in actual industry networks; one page project update that could get through networks really quickly - let people who have participated where the project is at; have missed out in staying in contact - something we could read just when we are able to would be good like a short update). • Other opportunities raised were: **Wind forecasts** (e.g. predicting wind in for spraying); **Trial forecasts** with more people (e.g. could be trialled with more people - made public in draft views and get feedback); Get **more involvement from industry** bodies *(e.g. someone from QSS that can get on board and really start pushing more involvement); and* Need for good people resourced well *(e.g. you don't need a lot of people - need good people resourced well).*

Perceived Potential Benefits	• Half of the stakeholders referred to the benefits through **improved understanding/interpretation of forecasts - improved decision making** *(e.g. allows further forward planning - good compared to the other things and easy to read for anyone; real bonus for the farmers in having a bit more certainty in what might be ahead - maps and things look excellent and the visual been good; would help in the decisions in long term budgeting)* • **Potential to guide nitrogen applications** were also raised - environmental/reef benefits (e.g. potential is massive and I am thinking about climate with nitrogen applications - more accurately predict what is coming has huge potential especially in application of chemicals and fertiliser) • Importance of **communicating in terms growers can understand** (e.g. as long as it is in the language that the farmers will relate to a bit more it will be usable)

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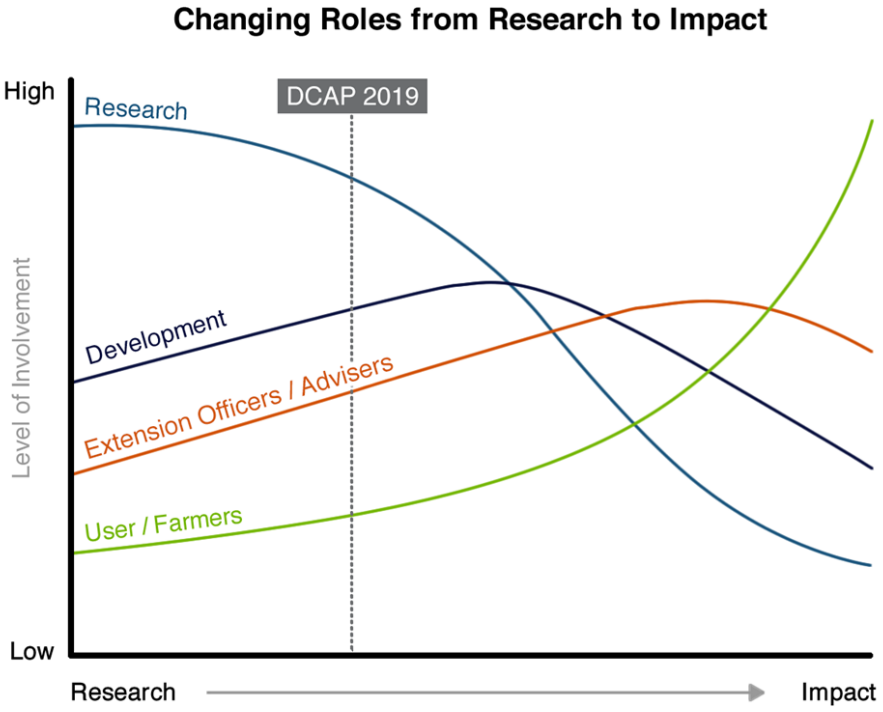
3. DISCUSSION AND RECOMMENDATIONS

3.1 Stage of the Program and Implications

This M&E report comes two years into the DCAP program. It is a complex program involving nine distinct projects across three lead organisations and many partners – including international collaborators. It also includes horticulture as well as grazing and disciplines from social to climate science. Each project focuses on specific parts of the puzzle with scope for cross-collaboration and developing synergies which is the expected value of being part of a broader program.

The diagram below highlights the overall stage of the program (some difference between projects depending on their focus on research versus extension).

Figure 2: Changing roles from research to impact



The diagram highlights the need to be realistic about expectations in terms of change in the course of a long R&D program – as well as highlighting the need to engage with users and their advisors in the planning, development and testing of research and its outputs.

DCAP and its projects have shown a strong ethos of engaging users in guiding and testing the development process and resulting outputs. Having a project dedicated to better understanding the social and behavioural factors behind change is a demonstration of this commitment. Similarly, most other projects have a strong engagement with producers to test products – examples include: the

property level Forage reports; the insurance products; the economic models; and testing the reliability and use of forecasting tools.

There is also good evidence of some cross-project cooperation, collaboration and joint development pf products. For example, providing information for the insurance product development; providing behavioural implication input to extension programs; providing data into models developed by other projects.

Given this stage of the program and the projects, however, there is a need and scope to ramp up the cross-project information sharing and potential collaboration and cross-integration of products. Although face-to-face team meetings have provided opportunities for brief updates on projects, longer in-depth presentations appear to be needed. This could be done by a series of webinars by the individual projects followed by specific highlighting of opportunities to (even) more cooperation/ alignment to the benefit of the user. It remains difficult to see exactly where all of the puzzle pieces fit.

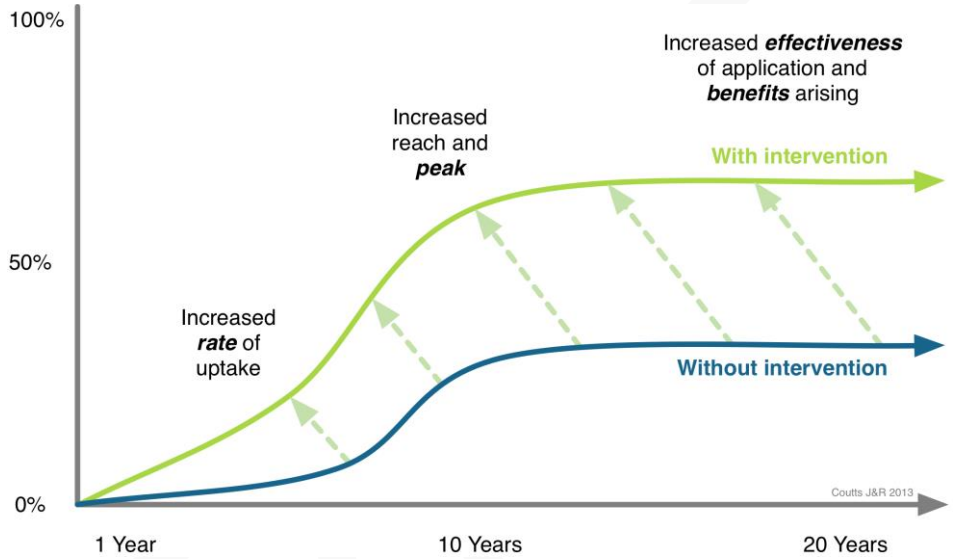
The other aspect is the need to consider the impact pathways for the rest of the program and beyond. Climate Mates has highlighted the demand and requests against their inability to service these. Others have raised similar concerns. It is noted that the impact narratives all involved one-one support. This points to the need to consider and support the ongoing capacity of the consultant/ adviser sector in supporting use of program outputs in an on-going property level way.

Recommendation 1	DCAP should be recognised for the strong progress that has been made as it continues to meet milestones and product development in challenging circumstances.
Recommendation 2	The program should be commended on the high level of user-engagement at this early stage in ensuring outputs are relevant, user-friendly and beneficial. This is an example of best practice in applied research and development
Recommendation 3	Efforts should be made to map and further integrate the different outputs and products from across the projects to show from a user perspective where they best fit in the decision-making process.
Recommendation 4	Impact pathways for evolving products should be further developed around increasing awareness, extension and support. This will enable users to better access and use these products during and beyond the life of the program.

3.2 Measuring Impact

The reason for investment in programs such as DCAP is to speed up the research and development process and its effective utilisation in practice. Proactive investment and a well-managed program allows gaps to be filled, research outputs relevant and user-friendly to producers and their advisers and for targeted communication and engagement to occur with potential users of the outputs. The notion is that over time, gains occur without such investment, but with the investment, the rate of gain is greater, across a greater proportion of beneficiaries and quality of outputs and the effectiveness of their use is better than it might have been otherwise. The diagram below shows this logic:

Figure 3: Impact of intervention



The earlier diagram depicting the stage of the program demonstrates that it is still early days, but there are already good indicators of where the science has been filling gaps, improving current models and tools and building new ones. There is also evidence that producers are being more engaged about decision-making and improving their management in a variable climate. Where feedback sheets are used and in the case of where these were supported by a follow-up survey, there is some good evidence that engagement around this information and tools is resulting in changed thinking and use of tools – in about 50% of those engaged and supported one-one.

The revisited benchmark web survey – even with its limitations – does show gains in some of the key indicators such as small gains on confidence and great consideration of a written management plan – however, the project to date has been only able to directly engage a relatively small group of producers and expecting a greater change in awareness and use in a broader population of producers cannot be expected at this stage. There is still development and testing being undertaken and there is a limit to the staff and resources directed at extension. One-on-one support justifiable in the early development and testing phase is not supportable within the wider program.

There is very limited data to date about the economic benefits to be expected from use of the information and tools being developed – although there is modelling occurring on this with promising results. There are some specific examples of gains in horticulture from adapting to forecasts.

Looking ahead to a potential Benefit Cost Analysis, these factors need to be taken into account. Those undertaking such a study across projects will need to rely on case studies and modelling (economic and episodic) to come up with a level of reasonable assumptions about the benefits to cost over the next 20-30 years (the usual projection for a benefit cost analysis).

Recommendation 5	Contributions to the capacity and skill development of consultants/advisers in northern Australia needs ongoing attention. Encouraging and supporting producers in the use of products to improve decision-making and management is a broader issue extending beyond the program and is also for governments and industry to address.
Recommendation 6	Building on the previous recommendation, governments and organisations involved in supporting agricultural and pastoral industry in northern Australia need to take a long term view with DCAP to ensure that key decision-supporting work continues to be developed and sustained into the future.
Recommendation 7	The communication/awareness activities of DCAP need to increase with targeted key messages about the program, its progress, products, its contribution to date and what is expected by the end of the program. This includes further encouraging project leaders/team members to identify and develop communication opportunities with the program communications team. This will help to stimulate interest, information seeking and broader use of the products as they are ready.
Recommendation 8	Project leaders should be asked to capture more 'impact narratives' (as per the examples in this report) and case studies to track and demonstrate the cause-effect of project activities and the use of information and outputs to stimulate change and benefits.

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APPENDIX 1: DCAP LOGFRAME

Program Level M&E Log Frame

Program levels	Program Projects, Activities & levels	Performance Measures	M&E Methods
Long Term Goal	More resilient and productive primary production able to better plan, adapt and manage drought and climate variability.	Trends in rural industry performance over time in relation to previous performance – especially in the face of extended challenging conditions: • Numbers of enterprises • Productivity • Profitability • Social indicators • Environmental indicators	• ABARES • Other industry statistics • Case studies
End of program Objectives	• Increased scientific capacity and tools to monitor, predict, advise and plan for climate variability. • Increased awareness, understanding, skills and capacity of industries and producers to make most effective use of tools and information supporting their management of drought and climate variability. • Increased uptake and application by industry, producers and their advisors of available tools, information, practices and strategies to more effectively manage and be productive and profitable in a variable climate context. • Benefits arising from use and practice changes made by industries and producers.	• Extent of increased scientific capacity and tools available for purpose across the projects – numbers, types, access, reliability, gains in skills and knowledge by researchers. • Extent of gains in awareness, understanding, skills, confidence, access and the extent of use of tools and knowledge, actions within the target industries and producer communities (type, size, locations affected). • Actual or indicative costs and benefits arising from use of information and tools. • Barriers and issues emerging through program and projects.	• Collated M&E impact data from across participating projects provided in a consistent format and metrics. • Survey/interviews with informed persons and industry representatives re project engagement and impact. • Selected narratives and case studies showing impact of tools, information, training and/or extension on changes made and their benefits. • Benchmarking promoted web-survey of producers in the program/project target zone in relation to their awareness and use of tools and practices – at commencement of project and at intervals/completion.]

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Program levels	Program Projects, Activities & levels	Performance Measures	M&E Methods
Communication & extension projects and activities	**Overall Program Communication Activities:** • Website • Newsletter **Specific Project Extension Activities:** *Proactive engagement with end-users* **DAF 6:** • 7 x 2-day workshop in each region with a 1-day follow up **DES 2:** • Electronic quarterly update Newsletter, • Bi-annual workshops for the investigators • An annual forum for partners and regional stakeholders • A national workshop in Year 3 *On-going industry engagement* **USQ 5:** • Facilitated discussions (workshops) between farm businesses and insurance industry **DAF 7:** • Active engagement and two-way communication with supply chain participants through targeted workshops • Recommend to BoM the development of Operational Products from these experimental forecasts, which will improve the capacity of primary producers to manage climate variability *Underpinning support for all projects* **DES 3:** • Provide on-going social scientific knowledge and expertise to support the responsive, user-friendly design and implementation of drought-related decision support tools, and increase their adoption in targeted groups **USQ 4:** • Integrate and embed climate forecast information into northern Australia grazing industry - Grazing BMP,	• Appropriateness, quality, reach, engagement, access and reactions from participants engaged in extension and communication activities across projects. • Value that underpinning support provided in the extension and communication process.	• Collated M&E engagement and feedback data from across participating projects provided in a consistent format and metrics. • Questions in other survey/interview cross-project activities. • [Annual] Interviews/surveys with project leaders •

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Program levels	Program Projects, Activities & levels	Performance Measures	M&E Methods
	Business Mentoring for the Australian Meat and Livestock Sector, GLM Edge, and PGS.		
Products and Tools	**Products for understanding underlying science:** **DES 2**: • A time series application-ready online database • High-resolution long-term datasets from selected sites • Identification of new or improved flood management **DES 3**: • report for consultation containing recommendations regarding the policy drivers that can best enable stakeholders to work together to negotiate the 'cultural' transition to drought resilience and adaptiveness • [Potential] literature reviews, research syntheses, and extension material **USQ 4**: • 'flash drought' prototype forecast • improved seasonal forecast prototype products **USQ 5**: • Matured 'market ready' insurance products for sugarcane and cotton industries – • Tailored climate information systems and seasonal forecasting systems • Detailed affordability analysis with farmers/farmers' organisations • Clear recommendations on maintaining sustainable insurance • Policy documents indicating success of different government support options. • User friendly decision support tool **Tools for extension and training:** **DAF 6:** • Herd/flock models and case studies; Synthesis report **DAF 7:** • Documented management decisions • Enhancement of the POAMA Experimental product	• Number, type, purpose, appropriateness, accuracy, rigour, quality, user-friendliness and accessibility of products and tools developed.	• Reports from projects. • Evidence of peer and user review and testing • Feedback from questions on surveys, interviews or feedback forms • [Annual] Interviews/surveys with project leaders

DRAFT

Program levels	Program Projects, Activities & levels	Performance Measures	M&E Methods
	General project and program products and outputs: • Milestone and final reports • Papers, chapters and books		
Research & Development projects and activities	**DES1**: The Inside Edge for graziers to master Qld's drought prone climate **DES 2:** Baseline – using paleoclimatic data to plan and prepare for extreme events and floods in Qld • Analysis of 2-3000 yr data in 3 regions. **DES3:** Enabling drought resilience and adaptation: A program of social research and knowledge support • Engage directly with drought-affected graziers through social research exploring the cultural contexts of drought vulnerability and resilience, and the socially acceptable changes that can be made **USQ 4:** Northern Australia Climate Program – seasonal forecasts • Fundamental climate research and deliver major advances in multi-week, seasonal and longer-term climate forecasting. • New and advanced products for use in drought monitoring, planning and prediction for producers and policy makers. **USQ 5:** Producing enhanced crop insurance systems and associated financial decision support tools – Phase 2 • investigate how re/insurance companies, agricultural industries and government can establish and maintain a liquid and viable market for agricultural insurance in Queensland, and Australia. **DAF 6**: Delivering integrated production and economic knowledge and skills to improve drought management outcomes for grazing systems • Synthesis of scientific knowledge on the effect of drought management strategies on pasture resilience and quality, animal nutrition and productivity.	• Type, purpose and extent of R&D as per plans – completion of trials, demos, and reports results. • Rigour and reliability • Extent of involvement of end-users in research planning. • Issues, barriers and learning emerging from the process	• Collated data from across the projects • Evidence of peer review of results • [annual] Interviews/surveys with project leaders

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Program levels	Program Projects, Activities & levels	Performance Measures	M&E Methods
	DAF 7: Use of BOM multi-week and seasonal forecasts to facilitate improved management decisions in Qld's vegetable industry • Ground-truth ACCESS-S1 multi-week and seasonal forecasts • Document management decisions which can be significantly improved **DAF 8**: GrazingFutures: Promoting a resilient grazing industry – BMP **DAF 9**: Forewarned is Forearmed: Equipping Farmers and agricultural value chains to proactively manage impacts of extreme climate events		
Underpinning structures, processes and management	• Organisational involvement • Overall Management and coordination. • Advisory and management committees • Budget • External factors impacting on program and projects	• Extent of partner and project leader satisfaction with the management processes and support • Extent of satisfaction by management and advisory group members of their role and input • The meeting of program reporting requirements and budget management • Issues and barriers impacting on program management	

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APPENDIX 2: M&E ACTIVITIES

The following table summarises the M&E activities underpinning this report

M&E activity	Details
Report writing	Reports are based on data collected through M&E activities and align with the DCAP M&E logframe developed at the beginning of Phase Two. • 2 annual reports • 2 mid-term reports • 2 industry benchmarking reports
Annual stakeholder survey	Project leaders and the DCAP management team were asked to provide contact details of stakeholders who could provide feedback about their project. As a result of feedback from the 2018 surveys, Coutts J&R redesigned the survey questions and flow for both stakeholders and project team members. Interviewees included: • 21 Project leaders/team members - (2) DES 1, (1) DES 2, (1), DES 3, (3) USQ 4, (2) DAF 6, (3) DAF 7, (1) DAF 9 • 19 Stakeholders - (1) DES 2, (1) DES 3, (1) USQ 4, (1) USQ 5, (4) DAF 6, (1) DAF 7, (4) DAF 8, (6) DAF 9 • 13 Project Participants - (2) DES 1, (1) DES 2, (1) DES 3, (3) USQ 4, (2) DAF 6, (3), DAF 7, (1) DAF 9 • 7 Others - 2 (Overall), (1) DES 2, (1) USQ 5, (2) DAF 7, (1) DAF 8 • 6 Steering Committee Members
YourDATA development and management	• Development of 'Data Snapshot' report showing tables and charts of data captured in the database (e.g. total activities by type, total outputs by type, milestones progress by project) – see screenshots in Figures 1 & 2 below. • Updated overall design and layout – improved mobile responsiveness and overall performance. • Climate Mates section added for USQ 4 – allows Climate Mates to login and input Quarterly Reporting Data and Narratives. • DCAP Management Project added to allow Neil and Damien to enter Quarterly Reporting Data for DCAP activities outside of the projects. • Updated Milestones for various projects. • Added an overall 'Milestone Update Report' which provides an overview of all progress updates recorded for each milestone.

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M&E activity	Details
	• Modified popup behaviour to disable closing of the window when accidently clicking outside of the form – this should help prevent accidental data loss. • Added a files section so uploaded files can quickly be found – updated later so files are grouped by project. • Added/modified some data fields based on project feedback (e.g. research interviews) • Added new users as required • Added new feedback sheets as required • Provided technical support to Project Manager and Project Leaders as required – all issues successfully resolved.
Supporting project leaders	This includes participating in team meetings as well as consulting with individual projects (e.g. NACP)
Supporting documents	Coutts J&R produced documents include: • Second M&E Progress Report (Feb 2019) • *Measuring the Impact and Benefit Cost of the Program* discussion paper (Aug 2018) • *Evaluating DCAP media coverage and communication activities* discussion paper (Nov 2018)
Technical Reference Panel	Panel members have been involved with email discussions and reviewing project outputs and activities in the second half of 2018. Panel members are: • Facilitator – Jeff Coutts (Coutts J&R, Toowoomba) (DCAP M&E service provider) • Member – Mark Howden (ANU, Canberra) • Member – Scott Power (BoM, Melbourne) • Member – Graeme Anderson (DEDJTR, Geelong) *Technical Reference Panel support staff* • Land Management Unit Director – Vern Rudwick (DAF, Brisbane) • DCAP program management – Neil Cliffe (DAF, Mackay) • DCAP program support – Damien O'Sullivan (DAF, Kingaroy)

APPENDIX 3: PROJECT MILESTONE UPDATES

Current Status Key:

Achieved **On-track** **Delayed**

Note: Up to date as of 17th July 2019

Milestone	Due Date	Milestone Description	Updates	Current Status
DES 1	**The inside edge for graziers to master Qld's drought prone climate (waiting on milestone updates)**			
1	31/08/2017	Collaborative agreement signed	**Achieved (29/03/2018)** All collaborative research agreements have been signed.	
2	31/12/2017	Deliver training on science products and applications to DAF Climate Risk extension officers (2-day workshop) and Western Best Management Practice extension officers (2 x 1-day workshops). Provide product support, and acquire feedback on tools	**Achieved (26/03/2018)** The Inside Edge team has achieved this milestone through the delivery of workshops in Longreach, Brisbane and Quilpie in August and October 2017.	
3	30/04/2018	Develop an extension training package for DSITI's FORAGE Pasture Growth Alert report and deliver it through the DAF extension network and promote through the Long Paddock and Future Beef websites to complement existing extension training packages for FORAGE reports	**Achieved (15/07/2019)** The release of the FORAGE Pasture Growth Alert in late May 2019 has been actively promoted on social media and FutureBeef and DAF eBulletins. DAF extension officers, consultants and climate mates are aware of the Pasture Growth Alert, and promoting it, together with the efforts by DES officers at workshops, meetings, webinars, face-to-face and conferences. An awareness video is being finalised. **Delayed (28/09/2018)** Grant Stone and the DAF Future Beef team are developing an extension package for FORAGE and the Pasture Growth Alert report and it will include a number of short webinars, simple videos accessed through the User Guide, professional videos and promotion through the FutureBeef Update eBulletin and social media.	

Milestone	Due Date	Milestone Description	Updates	Current Status
			Delayed (28/06/2018) Grant Stone and Baisen Zhang have continued to work one on one with extension staff such as David Phelps, Jill Alexander to road-test and refine the Pasture Growth Alert in preparation for its public release. This will be followed by the release of instructional videos and a webinar in conjunction with DAF to help support extension staff to use the report confidently with producers. In consultation with DAF Future Beef team the development of the "extension" package for Pasture Alert report has commenced and will include a number of short webinars, "simple" YouTube videos accessed through the User Guide, professional videos and promotion through the FutureBeef Update eBulletin and social media.	
			Delayed (25/03/2018) The development of an extension training package for the FORAGE Pasture Growth Alert report, now renamed the Pasture Growth Risk report, has been delayed as we still working with DAF extension staff and scientists as well as rural consultants. The preparations for the extension package are on track with the planning of a user guide, series of instructional videos and webinar planned.	
4	31/12/2018	Work with both DAF sorghum cropping and beef extension officers, producers and consultants to learn from the successful approaches used in cropping to develop simple rules of thumb in response to seasonal forecasts i.e. selecting seasonally and regionally suitable hybrid cultivars and management agronomy for sorghum cropping. Similarly, for grazing systems we propose to test and convey simple rules of thumb, if possible, for moving/selling/buying/agisting livestock numbers and pasture management techniques including paddock spelling and the use of fire	**Achieved (15/07/2019)** Rules of thumbs have been developed for the grazing industry, based on past, existing and future conditions. The Pasture Growth Alert is based on these. Assessments for sorghum cropping have been developed as well.	
			On track (26/03/2018) Grant Stone, Principal Extension Scientist, Science Division, DES is working with beef extension officers and consultants to learn from the successful approaches to develop simple rules of thumb for the grazing industry and include them in our FORAGE reports.	
5	31/05/2018	FORAGE Pasture Growth Alert report available for general users to subscribe to on the Long Paddock website	**Achieved (15/07/2019)** The prototype FORAGE Pasture Growth Alert was released and made available on the Long Paddock website in late May 2019. Users are able to subscribe for a monthly, 2-monthly or 3-monthly update in their email. It has been actively promoted on DAF and FutureBeef social media, and eBulletins, and will be further promoted in speaking slots at NBRUC and Australian Rangelands Conference.	
			Delayed (28/09/2018) Unfortunately, the public release of the Pasture Growth Alert has been delayed again due to a delay is receiving up-to-date remotely sensed data. The current 3-month (seasonal) image featured in the report is adequate. The DES Remote Sensing Centre will provide a single date Landsat ground cover image that can be used in the FORAGE ground cover report. The new data will hopefully be available in the next couple of months so that we should be able to release the Pasture Growth Alert before the end of the year.	
			Delayed (25/03/2018) The FORAGE Pasture Growth Alert report, now renamed the Pasture Growth Risk report has generated a lot of interest from extension officers and rural consultants and the engagement process to improve and finalised the report for release is	

Milestone	Due Date	Milestone Description	Updates	Current Status
			taking longer than anticipated. This means that the Pasture Growth Risk report is unlikely to be able to be released to the general public in May, however, would be in accessible to DAF extension officers and rural consultants and by request.	
6	30/11/2018	Complete the first stage of quality control and quality assurance of GRASP calculator with enhanced parameterisation and validation from grazing trials and satellite-derived data	**Achieved (15/07/2019)** The first stage of quality control and improvements to the GRASP model have been completed. These include green cover analysis - comparing satellite-derived green cover with modelled green cover, using flux tower and other measurements to correct evapotranspiration calculations, updating land type parameters, and comparison of carrying capacity values with APS spatial records for the property owners' estimates of potential maximum livestock numbers.	
			On track (26/03/2018) The GRASP modelling team from USQ, DAF, NT DPI and DES is assembled and working together well. One of the most innovative ways we are for improving GRASP land type parameters for Queensland is "green cover analysis" which involves comparing the satellite-derived green cover to modelled green cover.	
7	31/05/2019	Evaluation (e.g. liveweight gain, soil loss, potentially financial measures) of climate responsive stocking rate decisions including evaluating the utility of ACCESS-S and other forecast technology combined with an assessment of current antecedent conditions for grazing applications	**Achieved (15/07/2019)** The use of Access-S in crop and pasture modelling has been compared with existing seasonal forecasting options (POAMA, SOI, SOI phase and IRI forecasts). Access-S did not improve the outputs from crop or pasture models over existing seasonal forecasts. Access-S showed lower levels of skill to predict sorghum grain yield than POAMA. The skill to predict sorghum yields was affected by crop management practices such as soil water content at sowing, planting date and hybrid choice. Modelled pasture growth is better predicted using SOI or SOI phase, but the latter can result in sudden changes in outlook when there is a phase change. IRI forecasts are the most consistent, but not quite the skill of SOI or SOI phase. Use of Access-S resulted in good skill for some situations, but often predicted high growth when there was in fact very low growth.	
8	31/05/2019	Develop an extension training package for the FORAGE Safe Carrying Capacity report and deliver it through the DAF extension network and promote through the Long Paddock and Future Beef websites to complement existing extension training packages	**Delayed (25/03/2018)** The safe carrying capacity report is still being tested against benchmark properties, delaying the development of an extension training package.	
9	31/05/2019	Further enhance the safe carrying capacity report to enable users a “what-if” evaluation of changing property layouts to assess management decisions and climate change impacts	**Delayed (25/03/2018)** A draft web interface has been developed to allow producers to alter paddock layouts, watering points and pasture species, and add legumes and then to create what-if scenarios. However, it needs many improvements before further testing. It is estimated that this tool will be available by the end of 2019.	
10	31/07/2019	FORAGE Enhanced Safe Carrying Capacity report available on the Long Paddock Website	**Delayed (25/03/2018)** The safe carrying capacity report needs to be updated with the land type parameters for different regions. In addition, it has been tested against benchmark properties for some regions, but key regions are missing. The DES1 team are looking at options to test the report against observed data for the missing regions (primarily Fitzroy,	

Milestone	Due Date	Milestone Description	Updates	Current Status
			Burdekin and Mary-Burnett). Once tested and improvements have been completed, the report will be able to be placed on the Long Paddock.	
DES 2	**Do we really know our baseline climate? Using palaeoclimate data to plan and prepare for extreme events and floods in Qld**			
1	31/08/2017	Collaborative agreement signed	**Achieved (29/01/2019)** Progress: • Collaborative Research Agreement between DES and Seqwater was an extended process but was fully executed October 2018. • Contract with Dr Jacky Croke, Catchment Connections, Centre for Catchment and Flood Management, was signed in October 2018. • Formalisation of additional collaborators, University College Dublin and the Victorian Department of Environment, Land, Water and Planning (see attached letter of support from DELWP). • Recruitment process for Research Assistant commenced November 2018 and Sahar Mozhdehi was appointed December 2018. • Project website planned and commissioned – draft site completed 1/12/2018 with an estimated go-live date of January 2019. • Project newsletter planning – stakeholder mapping in consultation with funding partners and collaborators. • First edition of the project newsletter planned to be distributed February 2019.	
			Delayed (25/03/2018) Unfortunately after a 7 month application we were unsuccessful in securing additional funding through the Australian Research Council (ARC). Co-funders Seqwater were still keen for the project to continue and have increased their funding to match the DCAP contribution of $100,000 per year. Approval was sought and granted by the DCAP steering committee to: • Approve the commencement of the project to achieve the main project aims, but only including one case study example applying the paleo-dataset in a water security risk assessment in SEQ only and no longer include the Callide. Also, the paleo-dataset will no longer be made available online but will be available upon request. • Approve the variations to original milestones delivery dates due to the delayed start of the project, however the completion date would remain as June 2021 (see attachment 2).	
2	31/07/2019	Collate all proxy meta-data to produce a time series dataset showing the variability of rainfall, floods and droughts over the last 2000-3000 years for all of Queensland	**Delayed (01/07/2019)** Sahar Mozhdehi is finalising the collation of all of the existing and relevant palaeoclimate datasets (Milestone 2) and will complete it by end of August. Current completion status is 70%. The delay of a month has been due to the challenges of integrating the different palaeoclimate proxies. However, the addition of Ben Henley to the team brings valuable prior experience and links with the Australian Palaeoclimate research community – which has bolstered Sahar's progress. She is on track to complete this milestone by the 30 August 2019.	

Milestone	Due Date	Milestone Description	Updates	Current Status
			A paper detailing the production of the data base will be presented at the 2019 meeting of the International Union for Quaternary Research (INQUA) in Dublin in July (Croke, Mozhdehi and Dalla Pozza).	
			Delayed (25/03/2018) Research assistant Sahar Mozhdehi is working on collating of all existing and relevant datasets to collate but has come up against some challenges accessing the necessary meta data to ensure the accurate interpretation of each proxy. Therefore, there may be a slight delay in achieving Milestone 2 by the due date of July 2019. To overcome this issue, Jacky Croke is now seeking expert advice and assistance from the Australian Palaeoclimate research community including Dr Ben Henley, Dr Kathy Allen and Dr Tessa Vance.	
3	31/12/2019	Statistically analyse the dataset to ensure quality assurance	On track (01/07/2019) Modified Milestone 3: Statistically analyse the dataset to ensure quality assurance; December 2019. The slight delay in achieving Milestone 2 has not delayed the start of Milestone 3. Several key analyses, which will underpin the development of the climate reconstruction are progressing well. • Statistical analysis of the relationship between instrumental rainfall and climate indices is underway (Key team members: Parnell, Cahill) with updates provided to the project team monthly. Next meeting is July 3 when the approach will be finalised and associated publication outlined. • Potential climate reconstruction methods (such as principle component regression, multiple linear regression, reduced space objective analysis) able to incorporate proxy data of variable temporal resolution are currently being reviewed (Henley, Croke, Hughes). (July 2019) • Correlation analysis between proxy record preliminary data and Queensland state-wide rainfall has begun and will be replicated for proxies collated in the database (Key team members: Vitkovsky, Mozhdehi) (September 2019). • Analysis of the variability in timing and duration of floods and droughts as recorded by the instrumental record has begun for case study areas (Key team members: Vitkovsky, Mozhdehi) (September 2019). • Statistical analysis of rainfall spatial patterns within case study area is underway and will be a key output to inform which particular rainfall records will be used in the reconstruction (Key team member: Mozhdehi) (September 2019).	
DES 3	**Enabling drought resilience and adaptation: A program of social research and knowledge support**			
1	04/08/2017	Development of contracts and initial payment – DCAP2 Round 1 agreements signed	**Achieved (21/03/2018)** A recruitment process was conducted to appoint a PO4 Social Scientist. This process was completed in November 2017 and Dr Gillian Paxton joined the team on 13 December. There was a small delay in recruiting because of DCAP2 contract delays. There were delays on establishing contracts and approvals for DCAP2 which delayed	

Milestone	Due Date	Milestone Description	Updates	Current Status
			recruitment of the Social Scientist to deliver the social research component of the program. Milestone dates have been adjusted to account for this delay.	
2	04/10/2017	On-going program of in-kind knowledge support commenced. Initial plans of knowledge support activities developed for a) the effective design and adoption of science-based drought decision support tools and b) DAF extension activities is complete	**On track (06/09/2018)** This milestone is on track. Major highlights during this reporting period include: • Presented at the DCAP Steering Committee meeting on the about the DES 3 Knowledge Support component. This presentation comprised a general overview of what Behavioural Insights (BI) is, including a couple of key concepts, and then how BI is: (i) currently (ii) in the future, being applied to DCAP2. Initial and subsequent feedback has indicated that the presentation was well received. Contact Fiona directly for a copy of the presentation. • Continued to develop a generic document entitled Understanding and Applying Behavioural Insights for Behaviour Change. It is anticipated that in the future, many parts of this document could be delivered as a series of notes for DCAP stakeholders (e.g. government, industry, NRM, consultants), in particular Grazing Futures extension staff.	
			On track (05/07/2018) This milestone is on track. Major highlights to date include: • Completed the first draft of a comprehensive (approx. 750 items) database of Behavioural Insight Concepts (e.g. Biases, Effects, Heuristics and Fallacies) most relevant to the DCAP Grazing Futures and DST, to be used throughout the DCAP project. • Completed the first draft of a comprehensive (approx. 470 items) database of Social Psychology Insights, Theories and Concepts most relevant to the DCAP Grazing Futures and DST, to be used throughout the DCAP project. • Completed the first draft of comprehensive (approx. 400 items) database of Behaviour Change Interventions (e.g. Nudges, Instruments and Tools) most relevant to the DCAP Grazing Futures and DST, to be used throughout the DCAP project. • Linked the main barriers to the implementation of the (21) priority grazing BMP standards, to the Behaviour Change Technique Taxonomy (BCTTv1), using the Theoretical Domains Framework (TDF) to identify a comprehensive list of behaviour change techniques to address the specific barriers to the uptake of BMP standards. • Linked the main barriers to the implementation of the (21) priority grazing BMP standards grazing to BI concepts that might be contributing to these barriers. • Continuing to developing an animation in collaboration with the DES Science Delivery 2018 Artist in Residence (AIRS) program, for use on the Long Paddock website. Using a story-telling approach, the animation will explain how to interpret percentiles, using a Queensland grazing context.	
			On track (06/04/2018) This milestone is on track. Major highlights to date include: • Provided detailed feedback on the Pasture Growth Alert Report prototype to the DES Grazing Land Systems (GLS) team. • Attended the Grazing Futures Best Management Practice review workshop in Charleville in February 2018, gave a presentation about Behavioural Insights (BI) and how the knowledge support role could assist the DAF extension team.	

Milestone	Due Date	Milestone Description	Updates	Current Status
			• Collating a comprehensive database of Behavioural Insight Concepts (e.g. Biases, Effects, Heuristics and Fallacies) most relevant to the DCAP (currently approx. 500 concepts). • Compiling a spreadsheet for the DAF Grazing Futures team to identify (i) behavioural concepts that might be contributing to the barriers to the (21) priority grazing BMP standards and (ii) behaviourally informed strategies to systematically address these barriers.	
3	13/07/2018	Social research design agreed. Consultation regarding interview questions and pilot interviews complete, preliminary learnings from discourse analysis integrated into knowledge support activities.	**Achieved (14/09/2018)** Interview design and pilot interviews were completed at the end of July 2018.	
			On track (25/06/2018) • Discourse analysis is ongoing and on track. Over 2000 media articles, government policy and communication material, various websites etc contained in NVivo, and being analysed. Key narratives are becoming evident, and there have been regular discussions regarding the insights gained from this work shared amongst the project team, so that these are integrated into the knowledge support component. • Research design has been finalised. Feedback on the interview runsheet was received from key DAF extension staff, DRAS staff, DAF policy, DES science and key external stakeholders. Feedback was very constructive and supportive, and revisions based on feedback has enhanced the rigour and applicability of the research. • DRAS staff have provided the social science team with contact details of potential interview participants. So far, the details of 20 properties have been provided, and a process of recruitment has been commenced. • Pilot interviews will be conducted around Longreach during the week running from 9-13 July. To date, 4 interviews have been scheduled, with a fifth to be confirmed. The next field trip, to the Charleville/Mitchell region, will likely take place in late July.	
			On track (27/03/2018) • Research design confirmed (interviews/kitchen table discussions, discourse analysis). • Consultation with interested parties (including DAF staff and DES scientists) has commenced seeking input on the draft run sheet for the kitchen table discussions. Feedback currently being received. • Exploring potential alignment to NQ Dry Tropics Major Integrated Project (MIP), an outcome from the Great Barrier Reef Water Science Taskforce Reef: we have continued discussions with Scott Crawford (CEO NQ Dry Tropics) regarding a potential collaboration. NQ Dry Tropics are driving one of the Major Integrated Projects (MIPs), an outcome from the Great Barrier Reef Water Science Taskforce Reef. Scott has shown a keen interest in drought planning and policy and the adverse effects it can have on sustainability and the Reef. There is an opportunity to use the NQ Dry Tropics region as a case study for the project, with benefits both to DCAP2 and outcomes for the Reef. This would allow us to link into already-funded	

Milestone	Due Date	Milestone Description	Updates	Current Status
			extension (and other) activities for the knowledge support component of the program, as well as to access landholder contact details for the research component. We are hoping to meet with the NQ Dry Tropics team in mid-April.	
4	13/01/2019	Interviews and discourse analysis conducted.	**Achieved (21/01/2019)** This milestone has been achieved. Interviews have been completed and have been transcribed. Collection of media articles and other textual data for purposes of discourse analysis has been done with qualitative analysis performed on the data via NVivo. Small delays in the discourse analysis were experienced due to 1) more drought related media articles than anticipated in 2018, and 2) minor software issues. A preliminary overview of results will be presented to the Grazing Futures workshop in Barcaldine in February, and a more detailed analysis will be included in the final project synthesis report.	
			On track (14/09/2018) This milestone is on track. • The discourse analysis is ongoing, with discussion of drought in the media proliferating markedly during this reporting period in response to drought in NSW. While the discourse analysis is particularly focussed on Queensland, it will continue to identify the competing narratives surrounding how drought is understood, experienced and anticipated. • Since the completion of pilot interviews in Longreach, three other research field trips have been completed - two based in Charleville and one in Charters Towers. With these fieldtrips, the total number of completed interviews will be 23 of the 40 estimated to be required in the project proposal. Additional fieldtrips are planned in the coming months - the first to the Etheridge Shire (properties around Georgetown/Mount Surprise) in early October, then Charters Towers/Hughenden in late October, and finally to Longreach in late November. • So far, interviews have typically been conducted on the property, with multiple family members and employees present. A range of topics have been covered, and participants have been very generous in providing rich and nuanced accounts of drought and drought preparation, as well as opinions and ideas for building resilience in the grazing industry.	
			On track (25/06/2018) This milestone is on track. Key successes this quarter include: • The results of the discourse analysis indicate some dominant and potentially competing narratives surrounding how drought should be understood, experienced and anticipated, and the cultural effects these normative understandings might have on how graziers see themselves and their options when it comes to responding to and preparing for drought. The write-up of these results has commenced. • With the research design now final, the names of 20 potential interviewees have been obtained and a recruitment process has commenced. The graziers already approached for interview seem to be receptive to the nature and intent of the research. A series of 4-5 pilot interviews are scheduled for the week ending 13 July 2018, and follow-up interviews will commence in late July.	
			On track (27/03/2018)	

Milestone	Due Date	Milestone Description	Updates	Current Status
			• Research scoping commenced, including reviewing current literature on lived experience of drought and drought preparation; discourse analysis and grazier interviews. • Discourse analysis*: We have commenced searching for relevant articles across various sources, including the popular news media, government websites and drought-related documents, grazing industry group websites and drought-related documents, research and extension documents, and the websites of non-government organisations involved in drought responses in rural Queensland. The discourse analysis for this project aims to identify and describe discourses around drought, drought preparation and drought policy. It is an ongoing activity, collecting multiple forms of media over a period of time. • Challenges encountered: There was a delay in commencing analysis due to difficulties with purchasing and installing NVivo but we are back on track. • Grazier interviews/kitchen table discussions: Draft data collection process designed. It is centred around the idea of 'kitchen table' discussions held on grazing properties. This will combine a) open-ended interview questions about graziers' values and aspirations, their perceptions of drought preparation, and their views on what can support them to transition towards greater drought resilience, with b) a voluntary photo-elicitation exercise that seeks visual data on the things that graziers look for when assessing drought risk and the ways they define and practice 'drought preparation'. • Run-sheet drafted for the kitchen table discussion process (grazier interviews). Consultation has commenced with DAF policy, DES science and DAF extension staff. After consultation, 5 pilot discussions will be conducted to refine the process. • Additionally, we have continued discussions with Scott Crawford (CEO NQ Dry Tropics) regarding a potential collaboration. NQ Dry Tropics are driving one of the Major Integrated Projects (MIPs), an outcome from the Great Barrier Reef Water Science Taskforce Reef. Scott has shown a keen interest in drought planning and policy and the adverse effects it can have on sustainability and the Reef. There is an opportunity to use the NQ Dry Tropics region as a case study for the project, with benefits both to DCAP2 and outcomes for the Reef. This would allow us to link into already-funded extension (and other) activities for the knowledge support component of the program, as well as to access landholder contact details for the research component. We are hoping to meet with the NQ Dry Tropics team in mid-April. • Challenges encountered: A key challenge is recruiting participants. Unlike DCAP1, the social research in DCAP2 focusses on graziers that are not industry leaders but those that might be considered vulnerable or at risk in terms of drought. We explored using the DRAS database to access contact details for graziers who have participated in that scheme; however, DRAS cannot provide these contact details directly to us, instead contacting graziers on our behalf and inviting them to participate in the research. There is a large risk that this approach will not achieve sufficient numbers of participants. We seek assistance from DAF to find alternative means of obtaining contacts so that we can directly recruit vulnerable graziers. We are also engaging with Dry Tropics NRM to potentially partner with them and align to their Reef Major Integrated Project, which will potentially provide us access to grazier	

Milestone	Due Date	Milestone Description	Updates	Current Status
			contact details. * *Discourse refers to written and spoken communication and interaction. However, as a key concept in the social sciences, discourse denotes the way that language is used to accomplish tasks, negotiate different identities and understand the world in particular ways. Discourse analysis, then, is a research method in which the actual use of language is closely examined to dissect how it does this. It is an established method in the social sciences for examining how issues are understood, negotiated and experienced.*	
5	13/07/2019	Draft synthesis report on the cultural context of drought resilience and adaptiveness. Containing recommendations for drought policy.	**On track (28/06/2019)** Milestone on track for draft report titled "Towards greater drought preparedness in Queensland grazing: Lessons from qualitative interviews and discourse analysis" to be circulated for comment in mid-July. Report explores some of the 'cultural factors' that influence Queensland graziers' drought preparedness, a key factor in the grazing industry's capacity to adapt to and remain resilient in the face of climate variability.	
			On track (26/03/2019) Progress towards this milestone is on track. Data from discourse analysis and in-depth interviews with graziers has been collected and transcribed and is currently being synthesized for inclusion in the draft report. This report will make recommendations for enhanced communication, extension, and policy regarding drought preparation.	
			On track (21/01/2019) With the completion of data collection, the composition of the draft synthesis report has commenced and is on track.	
USQ 4	**Northern Australia Climate Program**			
1	31/08/2017	Contract signed, appoint project staff. Report outlining agreed work program on model development developed with USQ/BoM/UKMO.	**Achieved (19/03/2018)** Contract signed; Staff PDs confirmed;	
2r	01/05/2018	**Research Project:** Report of detailed gap analysis of the current knowledge and data regarding the influence of different climate drivers on northern Australia climate (including the Quasi Biennial Oscillation (QBO), MJO, ENSO and other climate phenomena relevant for northern Australia's agricultural industry.	**Achieved (21/06/2018)** A literature review was completed and sent to BoM on 1 May 2018.	
			On track (26/03/2018) Report of gap analysis is written and being revised with latest information. On track to be completed by 1 May 2018.	
2d	01/05/2018	**Development Project:** A detailed plan of decision tool development aligned with research and extension project plans. The framework of a targeted Climate Outlook is developed and tested	**Achieved (21/06/2018)** Development Project Milestone achieved by 1 May 2018 deadline	

Milestone	Due Date	Milestone Description	Updates	Current Status
		with advisers and key stakeholders. A desktop exercise shows how well drought indices identified the development of historical major droughts.		
2e	01/05/2018	**Extension Project:** Project partnerships formalised. Project staff and 'climate mates' appointed. Regional operational plans, including extension activities, communications and MERI, developed between project partners. MERI plan shows specific links/ integration of project outputs communicated and agreed upon between project service providers and extension and adoption program managers (e.g. Grazing BMP, Business Mentoring, GLM EDGE, PGS).	**Achieved (21/06/2018)** Project partnerships were formalised; 7 Climate Mates were appointed in June 2018; One Climate Mate position had to be re-advertised due to lack of applicants; Operational plans (Comms; MERI; Deliverables) all sent out for review, with final version incorporating feedback completed.	
3r	01/09/2018	**Research Project:** Report identifying existing and/or potential suitable climate indices (including flash drought, MJO and wet season indices) and forecast/hindcast data sources, (including the newly developing hindcasts from ACCESS-S1/2 systems).	**Achieved (26/03/2018)** Milestone 3, Research has been Completed. • Report completed that identified suitable climate indices. This report is summarised in MLA Mid-Year Report for 2018 • ACCESS-S1 hindcast archive has been finalised to provide a database to allow experimental products to be developed.	
3d	01/09/2018	**Development Project:** Regional communication network is developed and Climate Outlook is communicated to advisers and producers. Drought Indices fully operational on web and updated fortnightly. Prototype of Drought Monitor on restricted web and available for testing by advisers.	**Achieved (21/06/2018)** Drought Index is ready to be published on web and is being updated fortnightly, but web publication is delayed due to minor delays in hiring a Senior Software/Web developer. • The Drought Monitor work is experiencing minor delays because of the need to re-advertise the Software/ Web Developer position at USQ. However, due to the completion of the Drought Index work, creation of the Drought Monitor is moving forward. A representative from USQ will meet with key representatives from the centre that hosts the United States Drought Monitor to inform Drought Monitor development in Australia. • A monthly Climate Outlook has been developed, with the Climate Mates and Regional Partners providing feedback (August 2018). The feedback is now being incorporated into the Climate Outlook, and the Climate Outlook is on track to be communicated monthly as per MS4. • A detailed plan of tool development has been completed and initial feedback has been provided by the Climate Mates. Further feedback is forthcoming from regional contact.	
3e	01/09/2018	**Extension Project:** Industry consultation for regionally specific forecast, tool and product needs completed and reported through to BoM and UKMO teams. Mid-year progress review completed and reported against MERI plan-	**Achieved (21/06/2018)** Milestone 3, Extension, is Complete. • A range of media (TV, newsletters, newspapers, radio, etc) have been released promoting awareness of NACP, including the hiring of the Climate Mates. The total reach of all media as of 1 September 2018 is 122,580 individuals with an advertising-equivalent value of $44,067AUD. • At training week in August 2018, Climate Mates provided initial feedback on regional needs and developed regional Action Plans in order to address regional needs	

Milestone	Due Date	Milestone Description	Updates	Current Status
			• A detailed plan of tool development has been completed and initial feedback has been provided by the Climate Mates. Further feedback is forthcoming from regional contact. • Mid-year review submitted on-time	
4r	01/01/2019	**Research Project:** Research ACCESS-S forecast data to available to interface to decision making tools e.g. Rainman/ClimateARM, GRASP (basic products – daily rainfall, temperature at 5km resolution). Document describing improvements in the latest UKMO GC. Version general circulation model relevant to project needs for Northern Australia. Prototype MJO-based and similar wet season onset forecast products available in real time for trial, including supporting documentation of skill.	**Achieved (1/07/2019)** Research Milestone 4 has been achieved. A document outlining achievements that includes images and further detail can be found in Appendix A. The 5km calibrated hindcast and real-time forecast data is now available to USQ to interface to decision making tools. All the variables normally required for agricultural applications are available. This is made available through the following mechanisms: • All ACCESS-S1 hindcasts are available through the National Computational Infrastructure server • A research server has been set up at the Bureau to allow USQ to access 5km data from the real time forecasts. This will enable USQ to interface their agricultural models to ACCESS-S data and opens up the possibility of producing BoM prototype products on a USQ cloud server (which would allow further tailoring to users at USQ). This research server is also flexible enough that more value-added ACCESS-S1 data can be provided to USQ (e.g. MJO indexes, monsoon onset probabilities, etc). • BoM has set up an operational data server to provide ACCESS-S1 calibrated 5km data to commercial customers (subscription service). This has the added benefit that any prototype products developed by USQ/BoM based on the BoM research server and run on the USQ cloud server can in the future be transitioned to using the BoM operational server as an operational service beyond the lifetime of the project (subject to potential subscription fees). • BoM will host a visit from USQ IT scientist to explore how best to use the data on the BoM servers to drive models such as GRASP etc. • Further information is available at: http://poama.bom.gov.au/project/nacp/index.htm Key evaluation work and improvements in the latest UKMO model include: NACP UKMO now have two USQ employees working to improve the next version of the coupled model. Dr Matt Hawcroft working on model evaluation and Dr Sally Lavender working on convection parameterization. The main focus is to improve UKMO GC5 (atmosphere model GA9), which will form the basis for ACCESS-S3; A full report is shown in Appendix B • The unique setup of an Australian-based project directly supporting UKMO-based researchers appears to be working well and seems to have overcome some earlier difficulties (e.g. previous projects) to engage with the model development in a meaningful way; • Mean state precipitation and temperature summer (Dec/Jan/Feb) biases over Australia have reduced considerably; • The structure and variability of tropical Pacific precipitation has improved, including the frequency of El Niño occurrence in the model climate, providing promise for seasonal prediction of a key control on monsoon precipitation;	

Milestone	Due Date	Milestone Description	Updates	Current Status
			• The structure and propagation of the Madden-Julian Oscillation (MJO), a key feature of tropical intraseasonal variability, improves greatly, suggesting greater ability to predict active/break phases may be achievable; • Large reduction in temperature biases in the Southern Ocean, which can impact tropical performance in the model through altering the circulation; • The frequency and spatial distribution of the smaller scale convective events which dominate tropical precipitation generally improve, including over northern Australia; • Certain key errors persist in the model and will be a core focus of work within NACP, including errors in both the mean state and variability of Indian Ocean sea surface temperatures and precipitation, which have impacts in northern Australia via modifying the atmospheric circulation. New diagnostic techniques recently developed at the Met Office will greatly assist in understanding the mechanisms which cause these biases and will allow analysis of their remote impacts; • Looking further forward in the model development pipeline, one of the Senior Research Fellows (SRFs), Sally Lavender, is heavily involved in developing a new convection scheme, CoMorph, which will likely be a core component of the next model version, GC5. In the tropics, most precipitation is from convection and the ability to represent the timing and intensity of these rainfall events is key to predicting both local weather and climate, but also has remote impacts since heating in the tropical atmosphere associated with rainfall can substantially modify the wider circulation. Initial results indicate that the new scheme may well considerably improve our ability to represent this key process. • The work on analysing the Queensland floods of February 2019, both at BoM and at UKMO, has significantly helped to demonstrate the value of the project and mitigate potential funding risks. Prototype MJO-based product: • MJO index forecasts are now formally part of the ACCESS-S1 Forecast Visualisation Tool pipeline, producing daily-updated forecast plumes out to 35 days of the Wheeler and Hendon (2004) Real-time Multivariate MJO (RMM) index. The skill of these MJO forecasts have been documented in the journal publication: • Marshall, A. G., & Hendon, H. H. (2018). Multi-week prediction of the Madden–Julian oscillation with ACCESS-S1. Climate Dynamics, 52, 2513-2528. Northern rainfall onset (NRO) product: The NRO product is now formally part of the ACCESS-S1 Forecast Visualisation Tool pipeline http://poama.bom.gov.au/access-s1/nacp/, producing real-time forecast maps showing the probability of earlier than observed median onset for the 2019/2020 wet season. The first forecasts shown are initialised on 22 June and indicate a strong likelihood of later than median onset across the far north, consistent with POAMA forecasts. The NRO calculations are performed on the calibrated precipitation forecasts. • The skill of ACCESS-S1's hindcasts of the NRO over 1990-2012, as well as observed NRO dates, variability and trends (and supporting documentation) can be viewed at: http://poama.bom.gov.au/project/nacp/nar_obs.html; included in the skill assessment of	

Milestone	Due Date	Milestone Description	Updates	Current Status
			the NRO for each year are maps of the probability of early onset, percentage correct, and Brier skill scores. • Hindcast skill of ACCESS-S1 for the NRO presented at AMOS-ICTMO 2019 in Darwin on 14th June. • New observed median NRO and ACCESS-S1 hindcast skill maps have been generated to replace the old POAMA skill maps operationally (by 1st August 2019). • A journal paper describing the NRO and the hindcast skill of ACCESS-S1 (including the raw output, bias corrected and calibrated data) is currently in preparation. The study shows that the greatest improvement in the prediction of the NRO is found in the hindcasts that have been calibrated. Events attended by BOM/UKMO for NACP • NACP annual project meeting - 10 June 2019 • NACP Climate mates training workshop – 13 June 2019 • Discussions with visiting UKMO scientists working on NACP (3-14 June 2019) • Presentations and discussions related to NACP at AMOS (11-14 June 2019) Our USQ partners and other project stakeholders have placed great value on the attendance of a BoM researcher at their extension workshops. Matt W participated in workshops from Broome to Katherine and received very positive feedback. Oscar Alves or Andrew Marshall will attend the next series in the southern and central NT. Where possible these workshops are being conducted in collaboration with the Bureau's Climate Guides project.	
			On track (05/04/2019) • First draft of manuscript written detailing the February 2019 floods over Northern Qld, investigating the associated atmospheric conditions and multi-week predictability of the event in ACCESS-S1 (and other forecast models). At this stage, this manuscript will be submitted to the journal Weather and Climate Extremes around April-May. Draft currently with co-authors. Three presentations on work presented to BOM and USQ audiences. • Draft of manuscript detailing the hindcast skill of ACCESS-S1 with respect to the northern rainfall onset (NRO) is currently in preparation. • Commencing development of code to calculate real-time NRO from 99-member ACCESS-S1 forecasts to prepare for first (official) ACCESS-S1 outlook for the end of June (official). • Manuscript in preparation on "Multi-year variations of Australian Summer Monsoon Rainfall", which examines observed variations 1900-present. This work was presented at the "Drought workshop" at Monash University (February 2019), and has been accepted for oral presentation at AMOS-ICTMO 2019, Darwin (June 2019). • Access was authorized to the UKMO to retrieve decadal prediction runs (UKMO-DePreSys3) from the supercomputer/data-centre (JASMIN). Development of scripts is currently underway to retrieve and post-process 66-month hindcasts for period 1960-present.	

Milestone	Due Date	Milestone Description	Updates	Current Status
			• ACCESS-S2 multi-year hindcast runs are underway and are expected to be available for assessment of multiyear predictions around May 2019. • First manuscript the Evaporative Stress Index (ESI) used to calculate Flash Droughts was submitted to a scientific journal (Env. Res. Lett.) last month • Draft on ESI climatology and variability completed and is currently with co-authors • ESI and Flash drought index monitoring in real time at 11 Climate Mate-related locations are accessible internally at BoM. We are currently working on putting this prototype product online for external access • ESI is being calculated from the ACCESS-S1 hindcast calibrated outputs (23yrs, 11 ensemble members) • MJO prototype forecasts from ACCESS-S1 on track to be available from June. Code is being developed to project the ACCESS-S1 forecast data onto the MJO spatial patterns • Calibrated 5km hindcast data (designed for interfacing to agricultural models) is available on a server at the National Computing Infra-structure (NCI) centre. • Real-time forecast version of this data is in the process of being made operational at the Bureau. This data is expected to become available operationally from the Bureau from mid-April 2019.	
			On track (05/02/2019) • NACP Prototype portal live for BOM tools: A new version of the NACP Portal to BOM prototype testing website has been released. • Following agreement from the FWFA project partners, the FWFA products are now included in the NACP Portal. • In addition, new BoM prototype products are available to NACP project participants including Climagrams, Probabilities of exceedance maps, and SST maps. • Flash Drought Update: Computation of 44yrs daily Evaporative stress index (ESI) is completed with the latest version 6 of AWRA-L released in November 2018. The main improvement compared to the previous v5 was the wind speed, which is now observed back to 1975, replacing the climatology. • 2 papers are in preparation: one on 'using ESI to monitor flash drought' with the case study of 2018, one on 'climatological variability of ESI and surface and atmospheric forcing'. • Flash Drought collaboration with Ailie Gallant, Jason Otkin and Mike Hobbins are being put in place. • The Northern Rainfall Onset (NRO) product has been calculated for the raw, bias corrected and calibrated ACCESS-S1 hindcasts. • A webpage has been developed which includes the calibrated hindcast and observed results (including skill), with the relevant descriptions and links. • Multi-year rainfall variability/drought: Data has been downloaded and processed and is now being used in models	

Milestone	Due Date	Milestone Description	Updates	Current Status
4d	01/01/2019	**Development Project:** Review of drought indices and Drought Monitor (minus in-situ ground-truthing) by advisors and producers. A network of regional experts in place for in-situ assessment of Drought Monitor and their training completed. Prototypes of new generation tools are tested in-house and available for testing by advisers. Restricted use Website completed and tested. Climate Outlook communicated monthly.	**On track (01/07/2019)** • A prototype Drought Monitor has been developed using a combination of four Drought Indices (CDI) (Appendix C). • Updated Drought Indices and the Drought Monitor were presented to the Climate Mates at the meeting on 13 June 2019. • The following drought indices have been updated to include May 2019: • Standard Precipitation Index (SPI) monthly, 2-monthly, 3-monthly, 6-monthly, 9-monthly, 12 monthly • Standard Precipitation Evaporation Index (SPEI) monthly, 2-monthly, 3-monthly, 6-monthly, 9-monthly, 12 monthly • Potential Evaporation Transpiration (PET) monthly • Self-calibrated Palmer Drought Severity Index (self-calibrated PDSI) monthly • Palmer Hydrological Drought Index (PHDI) monthly • Palmer Modified Drought Index (PMDI) monthly • Palmer Z Index (Z Index) monthly. • Climate Mates and regional associates reviewed both products and were trained on ground truthing. • Climate Mates and Regional Associates reviewed and were trained in new BOM prototype products including climograms, tercile and quintile forecasts, multi-week forecasts, etc. • The Climate Outlook Review and Climate and Weather Newsletter are communicated monthly/weekly directly to a network of 544 people and are also passed on to the distribution networks of the Climate Mates. • The Forecast Visualisation Tool (http://poama.bom.gov.au/access-s1/nacp/), the MJO forecast and the Northern Rainfall Onset have been presented to the Climate Mates and Regional Partners and are being tested. • The NACP website currently sits on a USQ test server and will be ported onto a cloud server after final approvals in the coming weeks. • Two scientific papers have been prepared as case studies; one showing that variability of annual rainfall and pasture growth have increased, and one showing the value of seasonal forecasts to a stocking rate / pasture availability / price decision for a northern beef herd varied between $0-14 / ha.	
			On track (05/04/2019) • Monthly Climate Outlook Review and Weekly Weather & Climate Update email lists currently have 545 subscribers • Above subscriptions will be automated once NACP website is live (code in place to automate this) • NACP website development is underway, with focus currently on delivering Drought Indices online. • Interview questions for regional case study surveys (livestock producers and/or key personnel in the red meat value chain) are being developed.	

Milestone	Due Date	Milestone Description	Updates	Current Status
			• Case studies will capture methods used by case study enterprises to manage the impacts of climate variability and interview participants' evaluations of the value of seasonal climate forecasts for their businesses • Case studies will be published both on the NACP website and in a ' guide to climate risk management for the northern Australian livestock industry' booklet. • During the Jan/Feb/Mar 2019 quarter, we produced the first set of Australian Drought Monitor maps. • The Drought Monitor map results were presented at a recent Multi-year Drought Workshop, 13-15 Feb 2019, at Monash University. • Updating the Python code for the mapping the drought monitor maps for Australian conditions was started though this process has been delayed due to an unforeseeable management issue. This issue will likely be resolved in the near future and the Drought Monitor, at this stage, is still on track for delivery at the end of June 2019.	
			On track (05/02/2019) • Dr. Christa visited the US National Drought Mitigation Centre (NDMC) at the University of Nebraska–Lincoln in October 2018 and met with the director, Dr Mark Svoboda who developed the U.S. Drought Monitor. The aim of the visit was to develop an Australian Drought Monitor prototype. The prototype is currently in the final development and test stage. • It is planned to use Climate Mates and regional advisors to report on drought-related conditions. The training will start as soon as the Drought Monitor maps are available on the NACP website. • NACP website development is underway, with a launch page scheduled for release in late summer and the full NACP website ready for restricted release on-time by 30 June 2019. • NACP web developer and software designer was commenced work on the 17 December 2018. • Climate Outlook is produced monthly and is available both on the USQ website and on the Long Paddock website. The Climate Outlook is also distributed via the Climate Mates' regional channels. • Development of regional case studies has begun, with eight or more studies planned. These studies include face-to-face/skype semi-structured interviews with livestock producers and/or key personnel in the red meat value chain to evaluate methods used to manage the impacts of climate variability, including evaluating the value of seasonal climate forecasts.	
4e	01/01/2019	**Extension Project:** Year-end extension progress reviewed against annual KPI and reported, including feedback on implementation of service improvements from mid-year review, progress towards meeting objectives, outputs, delivery of x Category A, B and C engagement and further improvements actioned. Year-end research reviewed through extension delivery and 'climate	**Update (05/04/2019)** • A year-end extension progress report was completed • A year end research & development summary of tool and product needs was completed • Collectively, the Climate Mates had the following achievements in AMJ 2019: • 17 presentations (workshops, field days, forums, and webinars) on NACP reaching over 330 producers and extension specialists	

Milestone	Due Date	Milestone Description	Updates	Current Status
		mates' network and dialogue on progress towards meeting forecast, tool and product needs held with USQ, BoM and UKMO research teams	• 10 One-on-one or on-property meetings • Three Managing Climate Variability Workshops took place: Broome, Katherine, and Esk with an additional associated two public forums in Broome and Kununurra. • 7 Social Media engagements or emails (not including Climate Outlook Review) reached 83 producers • 4 new narratives from the Climate Mates in the YourData system • Monthly and Weekly weather and climate updates continue to be distributed by Climate Mates to their extended networks • Category A, B, and C goals have been re-evaluated under more robust definitions, which has resulted in a lower number for Category A and a slight lowering for Category C, however, this lowering does not impact meeting milestones • Category A goals are at 38% for producers and 135% for associated industry. • Media reach has been extensive and if only 1% of the total reach is counted towards Category A, then Category A goals would be exceeded • Category B goals are at 50% for producers and 20% for associated industry (a gain of 18% in this quarter for producers) • Category C goals have been documented with 13 producers (13% of goal) • Annual Climate Mate meeting and training was conducted at Berrimah Farm, NT on 13 June 2019 with all climate mates in attendance. Training included BOM presenting on prototype website and instruction on ground truthing Drought Indices and Drought Monitor • A benchmark survey was conducted of the Climate Mates in May 2019. This survey allowed them to provide feedback as to how the program is progressing thus far, areas that are working well, and areas needing improvement.	
			Update (05/04/2019) • Collectively, the Climate Mates had the following achievements in JFM 2019 (also see Appendix A for summary): • 20 presentations (workshops, field days, forums, and webinars) on NACP including to the NABRC meeting in Townsville in March 2019 and to QLD DAF land management unit in Brisbane • 19 One-on-one meetings • One half-day Climate Workshop held in central QLD (Gin Gin); 8 producers attended • Presentations/Meetings/One-on-Ones reached over 250 producers • Media, including emails (Climate Outlook Review) and Facebook posts emails to over 200 producers • 4 Narratives in the YourData system (Appendix B) • Monthly regionally-focused supplement to Climate Outlook • Category A goals have been met (100%) and further gains are ongoing • Category B goals are at 25% (a gain of 11% in this quarter) • Category C goals have been documented with 15 producers (15% of goal) • All Climate Mates have been given access to BOM prototype product and are encouraged to test it themselves and are recruiting producers to test the site in a one-on-one setting	

Milestone	Due Date	Milestone Description	Updates	Current Status
			• Three Managing Climate Variability Workshops, (plus one evening town hall in Broome, and another shorter presentation in Kununurra) will occur in WA and NT in the first week of April. • The Climate Mate supplementary climate information (provided with Monthly Climate Outlook Review) was used in decision making by a producer to sell stock (Cat C) • Dr. Chelsea Jarvis visited with the BOM in Melbourne, meeting with all BOM/NACP employees and attending a monthly climate briefing • Prof. Roger Stone now sends out a weekly Weather & Climate Update (example in Appendix C) to a list to 545 people plus the Climate Mates send this on to their email lists	
			Achieved (05/02/2019) • Year-end extension report can be found in Attached document, Appendix D • Collectively, the Climate Mates had the following achievements in OND 2018: o 7 Presentations on NACP o 9 One on one meetings o 4 Meetings with other extension groups o Presentations/Meetings/One-on-Ones reached over 200 producers and 70 businesses o 10 Media Outlets (news, radio, TV, etc), likely reaching more than 5,000 (total reach was 200,000 people) o Introductory and monthly emails (ex of Climate Outlook) to over 200 producers o 6 Narratives in the YourData system (Appendix E) o Monthly regionally focused supplement to Climate Outlook (example in Appendix F) • All Category A goals have been met (100%); Category B goals are at 14%; Category C goals have not yet started, which is expected. • NACP posters (A0 and A1 size) that can be used for extension events produced and sent to every Climate Mate. • A series of Climate Workshops are being scheduled to take place in Western Australia and Northern Territory in early April. These workshops will meet category A and B goals, with category C goal potential in follow-ups. • Climate Mate “Catch-Ups” have taken place every 6-8 weeks since the Climate mates were hired. These meetings allow the Climate Mates to report what they’ve done recently, what worked/didn’t work, what type of support they need, and future plans. • The Climate Mates have been developing regionally-specific information to accompany the distribution of the monthly Climate Outlook. Most of the Climate Mates have their own email lists for distribution of these products, reaching over 200 producers each month. • A Climate Workshop was presented by Roger Stone in Peranga SE QLD in October 2018. • Year-end extension progress reviewed and complied into report for MLA and DAF. • Meeting with USQ, BOM, where BOM and USQ present recent research and development in tools and products took place 10 December 2018 with the next scheduled to include Climate Mates in mid-February.	

Milestone	Due Date	Milestone Description	Updates	Current Status
5r	01/09/2019	**Research Project:** Document describing the key evaluation work and the improvements in the latest UKMO GC model (likely GC version 4) relevant to project needs for northern Australia. Document describing evaluation of multi-year predictions using ACCESS-S1 and DePreSys case studies, and recommendations for their use by applications groups.	**On track (29/03/2018)** Progress towards Research Milestone 5 is well underway. • Manuscript on "Mechanisms of multi-year variability of northern Australia wet-season" is being revised. • Results have been presented at the "Drought workshop" at Monash University (February 2019) and at NACP Annual Meeting and AMOS-ICTMO 2019 in Darwin (June 2019). • Data retrieval are ongoing for decadal prediction runs (UKMO-DePreSys3) from the UKMO supercomputer/data-centre (JASMIN). Tools/code for post-processing and diagnostics of prediction skill of the DePreSys3 66-month hindcasts are being developed • A set of multi-year hindcasts from ACCESS-S2 (start date 1 May, 26 years and 3 ensemble members) have just been available for assessment of multiyear predictions. Note the Bureau decided to produce ACCESS-S2 multi-year hindcasts rather than using ACCESS-S1 because ACCESS-S2 is superior and the next operational model at the Bureau. Development of diagnostic tools are underway for assessing the model's mean state biases, long lead prediction of the standard Nino indices, prediction skill of mean surface temperature and accumulated rainfall (e.g., means for years 1-2, years 1-3, years 1-4, etc).	
USQ 5	**Producing enhanced crop insurance systems and associated financial decision support tools – Phase 2**			
1	31/12/2017	For comparative purposes, basic overview of Multi-Peril Crop Insurance (MPCI) and Named Peril products with potential pricing and coverage differences	**Achieved (11/04/2018)** Please see uploaded report for 1 and 1a in Quarterly reporting for Jan-Mar 2018	
1a	31/12/2017	A report on facilitated discussions between farm businesses and insurance industries to test the financial viability and appetite of potential insurance products for sugar and cotton industries.	**Achieved (11/04/2018)** Please see uploaded report for 1 and 1a in Quarterly reporting for Jan-Mar 2018	
2a	31/03/2018	Farmer feedback recorded on the financial viability and suitability of experimental insurance products. Detailed case study report with 'focus farm' to test out experimental insurance products for sugarcane and cotton producers.	**Achieved (05/07/2018)** **On track (29/03/2018)** Please see attached report titled "Milestone 2a report update QFF.docx" for details	
2b	31/03/2018	Experimental insurance products matured (market ready) after incorporating farmers' preference and appropriateness. Including, discussion of prototype 1 with international capacity providers and negotiation of outline terms including pricing for various levels of coverage, discussions with local	**Achieved (29/03/2018)** Please see attached report titled "Milestone 2b report WTW.docx" for details	

Milestone	Due Date	Milestone Description	Updates	Current Status
		"fronting" companies with the ability to issue weather-index solutions in Australia.		
3a	30/06/2018	Tailored climate data and information systems and integrated crop modelling datasets for new commodity (potentially horticulture or broadacre) completed, that can be used in the financial sector for risk and premium assessment.	**Achieved (28/06/2018)** Please see reports uploaded in outputs section of YourData	
3b	30/06/2018	(continue from MS 2b): Discussion with local insurance regulator to ensure that the prototype products comply with local insurance regulation and development of regulatory compliant legal documentation including policy wordings and cover notes for prototype 1.	**Achieved (05/07/2018)** Please see uploaded report for Milestone 3b	
4	30/09/2018	Detailed affordability analysis for new crop (potentially horticulture or broadacre) with farmers/farmers' organisation completed, which highlights the key risks, affordability and willingness to pay the expected premiums.	**Achieved (02/10/2018)** Please see uploaded report	
5a	31/12/2018	Update on Climate Risk Assessment and Reporting Tool for new crop (potentially horticulture or broadacre) completed.	**Achieved (29/01/2019)** Please see report uploaded for Milestone 5a	
5b	31/12/2018	Development of a suite of sales literature and sales strategy for prototype 1 solution (for cotton and sugar), and formal review of success of prototype 1 (for cotton and sugar) policies and refinement of options if required	**Achieved (15/01/2019)** Please see attached report for Milestone 5b	
5c	31/12/2018	Development of conceptual framework completed for innovative alternative ways to maximise cost effective penetration & adoption of experimental insurance products (for sugar industry as industry/regional level simulated experiment).	**Achieved (15/01/2019)** Please see attached report for Milestone 5b	
6a	31/03/2019	New experimental insurance re/insurance products available for new commodity (potentially horticulture or broadacre) based on improved data and modelling and considering affordability and market liquidity.	**Achieved (29/03/2019)** Please see attached prototype index insurance products for Bundaberg and Gatton	

Milestone	Due Date	Milestone Description	Updates	Current Status
6b	31/03/2018	Data collection completed for innovative alternative ways to maximise cost effective penetration & adoption of experimental insurance products (for sugar industry as industry/regional level simulated experiment).	**Achieved (06/04/2019)** Data collection for mutual 17/1/2019. Meeting with upper management to outline the plan for the development of the DMF and what data requirements we need from CANEGROWERS. QFF followed up with two informal meeting with Burn Ashburner to request specific data required by WTW.	
6c	31/03/2018	Facilitated discussions (workshops) between farm businesses and insurance industry to (i) educate farm businesses on agricultural crop insurance and its use as a risk management tool and (ii) educate the insurance industry on new commodities and industries in QLD and their associated risks	**Achieved (06/04/2019)** • 9/1/2019 - QFF – ABGC Cyclone insurance teleconference. • 16/1/2019 – QFF – QFES – climate change and risk mitigation meeting – Cyclone insurance. • 7/2/2019 – Presentation to QDO board on the project. • 20/2/2019 – QFF Growcom. Agri-risk insurance/stamp duty catch up • 13/3/2019 – QFF to DAF LMU. Insurance generally and DCAP project.	
7	30/06/2019	Report on modelling and simulated experimental insurance products that examine the potential for innovative pathways (e.g. 'discretionary mutual funds') to rollout 'market ready insurance' products.	**Achieved (02/07/2019)** Please see attached report titled "DCAP milestone 7 CANEGROWERS DMF.pdf"	
DAF 6	**Delivering integrated production and economic knowledge and skills to improve drought management outcomes for grazing systems**			
2	30/07/2018	Acceptance by DCAP program administration of 2 reports detailing synthesis of scientific knowledge and accompanying economic analysis of the effect of management strategies (designed to prepare, respond and recover from drought) for an initial 2 regions (Fitzroy and Northern Gulf).	**Achieved (27/03/2018)** Modifications to our reporting structure and milestones were approved so that this milestone is no longer relevant.	
3	30/12/2018	Submission of 1 report detailing synthesis of scientific knowledge and accompanying economic analysis of the effect of management strategies (designed to prepare, respond and recover from drought) for the Fitzroy region. This report was originally submitted to Animal Science and DCAP in April 2018, has undergone rigorous external review, and was re-submitted for approval on 24th August 2018.	**Achieved (14/12/2018)** This report was approved by Science Leader Bob Karfs on 13/12/18 and hence the milestone has been achieved.	
4	30/06/2019	Submission of 2 reports detailing synthesis of scientific knowledge and accompanying economic analysis of the effect of management strategies (designed to prepare, respond and recover from drought) for an additional 2 regions (Northern Gulf,	**On track (28/06/2019)** • 1)The first draft of the 2nd regional report, for the Northern Gulf region, was submitted to DAF Beef and Sheep Science Director on 30/07/18. No feedback or comment was received prior to submission of the final version on 13/12/18. An external review commissioned by DAF Beef and Sheep and charged to the project ($6,500), was	

Milestone	Due Date	Milestone Description	Updates	Current Status
		Central West Mitchel Grasslands). A well-developed draft of the Northern Gulf document is available. At the Northern Beef team's request, we have scheduled additional project meetings in October and late November to incorporate some additional scenarios to the analysis. The Central West Mitchell Grasslands analysis is also well advanced.	received by the authors on the 10/05/19. As for the external review of the Fitzroy region report (the 1st regional report), this review of the Northern Gulf report found that the methods and approach used in the analyses were sound and that the report contained a lot of useful material to inform drought management decision making. A revised version of the report (in response to the external review) was submitted on 14/06/19. The milestone for submission of this report to DCAP is 30/06/19. As of the 28/06/19, when this Quarterly Report was uploaded to YourData, official approval of the report had not been received by the authors. • 2)The 3rd regional report, for the Central West Mitchell Grasslands region, also due for submission to DCAP on the 30/06/19, was submitted to DAF Beef and Sheep Science Director on 03/04/19 for review and approval. On 07/06/19, DAF Beef and Sheep Science Director requested an extension to 31/07/19 for delivery of the report due to the external review process being still underway. As of the 28/06/19, when this Quarterly Report was uploaded to YourData, the external review had not been received by the authors.	
			On track (14/12/2018) A final draft of the Northern Gulf region report was submitted to Science Leader Bob Karfs on 13/12/18 for his approval. The report for the Central West Mitchell Grasslands region is well advanced with the second draft of output/results distributed to the analysis team for review on 14/12/18.	
5	30/06/2020	Submission of 2 (possibly 3) reports detailing synthesis of scientific knowledge and accompanying economic analysis of the effect of management strategies (designed to prepare, respond and recover from drought) for the final 2-3 regions (Northern Downs, Mulga Lands and, possibly, Goldfields).	**On track (28/06/2019)** Progress on the Northern Downs analysis has been hampered by the severe flooding event in this region and the associated impact on both producers and DAF staff time and resources. However, base property herd and scenario modelling has commenced. A producer workshop in Julia Creek and a team meeting to inform and progress this regional analysis occurred over 04-06/06/19. A follow-up meeting to review the first iteration of the results for the Northern Downs analysis is scheduled for mid-July 2019.	
			On track (14/12/2018) Initial meetings (09/10/18 and 26/11/18) have been held with relevant DAF teams to begin developing the scenarios and assumptions required for the two regions, Mulga Lands and Northern Downs, respectively.	
6	30/12/2020	a. Completion of workshops, where required, for producers, advisors and agribusiness representatives in each of the target regions. b. Completion of fact sheets for each of the completed regions summarising key messages from regional analyses. c. Submission of a final report synthesising the learnings and recommendations from the project. d. Submission of a draft journal paper resulting from project results.	**On track (28/06/2019)** DAF extension officers continue to incorporate relevant results from our work in workshops conducted as part of their wider extension program. Subsequent to these events, workshops continue to be held in CQ on an ongoing basis and extension events have now also been held in the Northern Gulf, Northern Downs and Central West Mitchell Grasslands regions. • A paper has been presented at the AARES Annual Conference in February 2019 and is available on-line. This paper reports results for the economic benefit of genetic improvement of fertility in northern beef herds. • A draft scientific journal paper submitted to 'Animal Production Science' which includes DCAP project results indicating the economic importance of phosphorus supplementation for beef cattle has been accepted with minor revision (June 2019).	

Milestone	Due Date	Milestone Description	Updates	Current Status
			• 9 recorded presentations and accompanying spreadsheet examples have been prepared to assist producers in assessing drought response and recovery options. • Printed hard copies of the Fitzroy report are being distributed rather than fact sheets (520 in Q4 2018-19 alone) due to the demand from producers and industry professionals for full detail of the analyses and results. • We have produced a web page with links to project products and information and believe that in conjunction with the social media promotion we have been conducting that this may replace the need for fact sheets as an awareness raising product.	
			On track (14/12/2018) Three dedicated producer workshops were held in Central Queensland to extend the results of the Fitzroy regional analysis in April 2018. Additionally, seven phosphorus supplementation workshops were held in the Fitzroy and Burdekin regions which included results from our DCAP analysis indicating the economic importance of effective and appropriate P supplementation. A draft journal paper is in preparation for 'Animal Production Science' which includes DCAP project results indicating the economic importance of phosphorus supplementation for beef cattle. It is anticipated that the paper will be submitted to the journal in early 2019.	
DAF 7	**Use of BoM multi-week and seasonal forecasts to facilitate improved management decisions in Qld's vegetable industry**			
1	31/08/2017	Contracts established with project collaborators	**Achieved (31/08/2017)**	
2	30/09/2017	Quarterly Report	**Achieved (30/09/2017)**	
3	31/12/2017	A comprehensive work program and M&E developed. Collaborative supply chain participants and vegetable industries identified and engaged for ground-truthing appropriate ACCESS-S1 multi-week and seasonal forecasts and hindcasts over the first two years of the project. Additional two Queensland horticulture regions and hind-cast cases added to the BoM VG13092 experimental forecast products. Engage with DCAP M&E project to develop a Monitoring and Evaluation program. Quarterly Report on project activities, outcomes and outputs submitted.	Achieved (19/12/2017) Industry participants identified and engaged in one on one fashion to explain concept and content of proposed work. 80% of Sweet Corn, 80% of Green Been, 60% of Broccoli, and 50% of Lettuce industry growers and packers indicated willingness to be involved in project activities. All growers place high importance on accurate forward temperature forecast as a tool to enhance business management and potential profitability. Two major Qld vegetable processors (national suppliers) engaged in work plans. Aldi, Coles, Woolworth's supply co-ordinators indicated interest in information and being kept involved and informed. Refer to attached Qtrly Report.	

Milestone	Due Date	Milestone Description	Updates	Current Status
4	30/03/2018	Lockyer Valley Vegetable Industry Engagement and Communication of work program for the Winter 2018 season. Workshop with growers and supply chain participants conducted; multi-week and seasonal forecasts; and improved management decisions discussed. Quarterly Report on project activities, outcomes and outputs submitted.	**Achieved (30/03/2018)** Very successful Lockyer vegetable supply chain and industry forum completed and survey data entered to Your Data	
5	30/06/2018	Granite Belt Vegetable Industry Engagement and Communication of work program for the Summer 2018/19 season. Workshop with growers and supply chain participants conducted; multi-week and seasonal forecasts; and improved management decisions discussed. Quarterly Report on project activities, outcomes and outputs submitted.	**Achieved (05/07/2018)** • The Project team has followed up with multiple Lockyer Industry members seeking feedback on the DCAP2 Horticulture program outputs to-date. Information has been well received and we have implemented some suggested small changes to the way the DAF#7, ACCESS-S experimental forecast data is presented. • "DAF#7" project staff are recording and checking BoM ACCESS-S forecasts for the two target vegetable production regions Lockyer Valley and Granite Belt as they become available on the BoM R&D portal. However, we are aware that currently when BoM do not generate an ACCESS-S model forecast on a particular date, that forecast will not be provided at a later date, making DAF#7 validation difficult or impossible for those missing forecasts. This situation has impacted two forecast dates between Jan 1st and March 30th, 2018. Additionally, due to the ACCESS-S model being moved to BoM's operational computer we have been unable to obtain 5 weeks of forecasts from the end of April 2018 until early June 2018. ACCES S experimental forecasts became available again in early June 2018. After recent discussions with BoM R&D staff, the DAF#7 project team has advised that the 5 weeks of missing forecasts will not ever be produced by BoM. This makes ground truthing those 5 weeks of experimental forecasts impossible and will result in a 5 week gap in our forecast ground-truthing data. The fact that this gap occurred in the Winter production period (when climate variability is historically less severe) will not prevent the team issuing a forward experimental forecast for August and September in mid-July. Peter Deuter (PLD Horticulture) has utilised the BoM Outlook service and other experimental forecast tools in order to be able to underpin the ACCESS data used to issue DCAP 2 vegetable region experimental forecasts. • Constructive discussions have been held with the Granite Belt Vegetable industry and plans for the initial interactive vegetable industry DCAP2 experimental forecast forum in late August are well advanced. • Industry members advised the project team that the best time to hold an industry meeting would be just prior to the growing season commencing in the Granite Belt (Sept) 2018.	
6	30/09/2018	Quarterly Report	**Achieved (02/10/2018)** • The Project team has had multiple meetings with BoM R&D staff in order to improve both the content, user friendliness and information contained on the DCAP Lockyer Valley and Granite Belt Experimental Forecast site. BoM have now switched from using the POAMA model to the ACCESS-S model for all operational forecasts.	

Milestone	Due Date	Milestone Description	Updates	Current Status
			During this change over period DAF#7 project staff took the opportunity to upgrade the information explaining the DCAP project on the dedicated BoM DCAP2 Hort experimental web page. The project team also took the opportunity to enhance the Pie Chart and Histogram output format, improving both the context and interpretation of the forecast format. The DAF#7 team are also currently working to see if we can develop a method of statistically evaluate the experimental forecast output - to determine if small differences in experimental forecast outcomes are in fact statistically significant. The team has continued to develop and refine the two page experimental DCAP regional experimental forecast format, based on grower business and supply chain participant feedback. In early September we issued an experimental forecast for the Lockyer Valley vegetable region for the months of October, November and December 2018. In September the project team again produced an experimental forecast for the Bowen production region in response to a request from a nationally significant Queensland based Sweet Corn and Green Bean grower and marketer. These DCAP Experimental Vegetable Region Forecasts also reviewed, analysed and commented on the previous experimental forecast issued in June 2018. This information has been well received by our collaborating businesses and we have implemented some small suggested changes to the way the DAF#7, ACCESS-S experimental forecast data is presented in order to enhance user clarity. • DAF#7 project staff are recording and checking BoM ACCESS-S forecasts for the two target vegetable production regions (Lockyer Valley and Granite Belt) as they become available on the BoM R&D portal. However, we are aware that currently when BoM do not generate an ACCESS-S model forecast on a particular date, that forecast will not be provided at a later date, making DAF#7 validation difficult or impossible for those missing forecasts. This situation has impacted two forecast dates between Jan 1st and March 30th, 2018. Additionally, due to the ACCESS-S model being moved to BoM's operational computer we have been unable to obtain 5 weeks of forecasts from the end of April 2018 until early June 2018. ACCESS-S experimental forecasts became available again in early June 2018. After recent discussions with BoM R&D staff, the DAF#7 project team has advised that the 5 weeks of missing forecasts will not ever be produced by BoM. This makes ground truthing those 5 weeks of experimental forecasts impossible and will result in a 5 week gap in our forecast ground-truthing data. The fact that this gap occurred in the winter production period (when climate variability is historically less severe) did not prevent the team issuing the planned DCAP experimental forecast for August and September in mid-July. Peter Deuter (PLD Horticulture) has utilised the BoM Outlook service as well as other operational and experimental forecast tools (e.g. BoM's Heatwave Service) to compare those forecast outputs with the Lockyer Valley and Granite Belt ACCESS-S experimental forecast model. The project team has used real life (highly accurate) forecast examples from Heatwave Service at both the Lockyer Valley and Granite Belt DCAP Experimental Forecast Forum meetings. Discussion at these events and follow up feedback indicated that over 80% of our collaborating grower and supply change business managers were previously unaware of this valuable forecast tool.	

Milestone	Due Date	Milestone Description	Updates	Current Status
			• The Granite Belt DCAP Experimental Forecast Forum was held in Stanthorpe in early September 2018. Prior to scheduling and conducting the event the Project Leader spoke, one on one with interested local producers to raise their awareness of the DCAP program. These 20 horticultural businesses were also sent a DCAP Project Outline document explaining the planned project work program and upcoming local Experimental Forecast Forum. The Granite Belt DCAP Experimental Forecast Forum was attended by grower and supply chain business managers who produce, apples, berries, lettuce, green beans, carrots, cabbage, lettuce, tomatoes, baby leaf salad lines and capsicums through the Queensland summer. These businesses combined, operate over several thousand acres, employ several hundred local staff and are significant local economic drivers. The interactive presentation style used during the Granite Belt Forum provided an overview of the DCAP program and explained the local DCAP Veg Experimental Forecast geographical model boundaries. The project team highlighted other existing BOM forecasting tool such as The BoM "Heatwave Service" (which many locals were unaware of - but will no doubt utilize over the coming summer, now they are aware), reviewed results from our Granite Belt experimental model “ground-truthing' for August, and presented the Granite Belt DCAP Experimental Forecast for (max, min, rainfall) October, November and December. The interactive presentation utilized all team members skills, Neil White highlighted his work (“in-progress") on the DAF Temp LookUp Tool - which allows the user to easily look up and automatically graph temperature data from a local nearby official BoM weather station. This tool can also be used to LookUp local temperatures above a user defined critical temperature. The LookUp Tool displays in an easily read table (and graph) how many days the critical (user set) temperature has been reached at the selected location. The Granite Belt Experimental Forecast Forum presentation was well received by local growers who are at the start of their summer production season with limited surface water available and the memory and impacts of last Februaries record maximum temperatures still fresh in their minds. Good questions and locally focussed follow up comments and points of clarification were raised by and discussed with attendees. The DCAP Program manager Neil Cliffe attended this Granite Belt DCAP event so may have additional comment to provide on the event. Neil took the chance to further highlight the Qld Government DCAP initiative which funded this local horticultural industry focussed project.	
7	31/12/2018	A Report – “First year of ground-truthing ACCESS-S1 multi-week and seasonal forecasts and hind-casts, in collaboration with vegetable industry supply chain participants”. Improved management decisions identified, assessed and documented. Quarterly Report on project activities, outcomes and outputs submitted.	**Achieved (31/12/2018)** Milestone # 7 - A Report – “First year of ground-truthing ACCESS-S1 multi-week and seasonal forecasts and hind-casts, in collaboration with vegetable industry supply chain participants”. Improved management decisions identified, assessed and documented. Quarterly Report on project activities, outcomes and outputs submitted. (Due 31st Jan 2019). Summary: • ACCESS-S1 experimental forecasts commenced in Jan 2018, for the Lockyer Valley and Granite Belt regions, in a specific format for the DAF7 DCAP project.	

Milestone	Due Date	Milestone Description	Updates	Current Status
			• Forecasts from the BoM experimental website have been converted by project team members into an easily readable format for growers and supply chain participants in the two regions and delivered to them on a bi-monthly basis. • The BoM R&D experimental product delivers daily experimental forecasts from ACCESS-S to our R&D site, with some gaps due to occasional technical issues associated with developing a new experimental forecast system. The consequence of this is that on occasions, no forecast is available to the project team and also to our collaborators. • Three well attended pre-season grower meetings (including an end of season meeting in the Lockyer Valley) have been conducted in the Lockyer Valley and the Granite Belt, where project information, detailed forecasts and additional information on BoM operational products have been delivered, together with useful discussion on these forecasts and the use of these forecasts in improving management decisions by growers and supply chain participants. • A pre-season meeting for the Lockyer Valley is scheduled for late Feb 2019, and an end of season meeting will be held in the Granite Belt in May 2019. • Many of the vegetable businesses collaborating with this project have production systems in multiple locations across Queensland and in some cases also have directly owned interstate production farms. The project team are dealing directly with two of the largest vegetable growing and supply businesses in Queensland. These businesses each farm on average 5000 Ha of vegetable crops annually, employ several hundred permanent employees as well as large numbers of casual staff at peak periods, and utilise hi-tech packing plants. The vegetables produced are transported throughout Australia. • The project commenced with ground-truthing maximum temperature forecasts only, but due to requests from growers in both the Lockyer Valley and the Granite Belt Regions, minimum temperature and rainfall forecasts have been added to the project work program. Subsequently, forecasts have also been developed for the Bowen region, as two major vegetable grower collaborators based in the Lockyer Valley, also farm in the Bowen region.	
8	30/03/2019	Lockyer Valley Vegetable Industry Engagement and Communication of work program for the Winter 2019 season. Workshop with growers and supply chain participants conducted; multi-week and seasonal forecasts; and improved management decisions discussed. Quarterly Report on project activities, outcomes and outputs submitted.	**Achieved (31/03/2019)** DCAP 7 highlights Jan – Mar 2019. In the current reporting period, our DAF 7 team has; • 1. On the 21st of February the project team ran a highly successful well attended Lockyer Valley DCAP Experimental Forecast Forum at the Lockyer Valley Cultural Centre. ○ a) The team reviewed the previous 12 months (since DCAP forecast inception) of bi-monthly DCAP Lockyer Valley forecasts (maximum, minimum temperature and rainfall) and discussed these results with our collaborating businesses. This data was presented in our December Qtr Milestone #7 report to the steering committee. ○ b) The team reviewed and discussed the DCAP Heatwave Advisories issued to Lockyer Valley growers and supply chain collaborators since December 2018. ○ c) The team conducted an interactive “hands on” collaborator session where working in 2 groups meeting attendees (with no input from project staff) discussed and listed possible management decisions they could/would make in their business based on a	

Milestone	Due Date	Milestone Description	Updates	Current Status
			stated forecast scenario. Refer to the attached collaborator scenario response document https://yourdata.com.au/dcap/#dashboard/reporting-data/view-reporting-data-details/5c9dc03b2315d632fe617365/kn-asset/82-147-42-5c9deb5f5b4bac2ffe70c478/lockyervalleymanagementactionstranscribed260219.pdf ○ d) The team presented the DCAP Experimental Forecast (Lockyer Valley) for February, March and April 2019. ○ e) Good two-way discussion occurred throughout the multi-speaker sessions with all team members contributing to the discussions and answering questions from the Lockyer Valley group. • 2. The project team issued 2 experimental forecasts for both the Lockyer valley and Granite Belt business collaborator groups. The team also issued a March experimental forecast to collaborators in the Bowen regional forecast area. The Bowen season is winter so a March update provides experimental region based forecast information for collaborating local business to consider when planning the coming season. • 3. The team has issued 2 separate targeted heatwave advisory notices to Lockyer Valley and Granite Belt collaborating businesses. Recipients have responded well to this information and feedback indicate they "take action" and modify management decisions to try and minimise the impact of these Heatwave events forecast by a dedicated and publicly available "operational" forecast. Business owners comment that having a concise targeted DCAP DAF#7 Heatwave Advisory notice sent to their "in-box" backed up by a quick advisory SMS means they are instantly aware of the forecast climate event and can implement appropriate management to minimise crop and supply chain impacts. • 4. Project team members have visited 7 consecutive Sweet Corn plantings in the Lockyer Valley to inspect crop quality after periods of extreme heat. • 5. Project team members are working with and providing considerable amounts of valuable information and science based insight to the USQ 5 DCAP insurance team. Refer attachments. • 6. The Qld based project team spent a day discussing ACCESS-S experimental forecast issues with Bureau of Meteorology (BoM) staff in Melbourne. This meeting gave BoM staff greater appreciation of the impact extreme heat and out of season climate impact have on businesses in the horticultural sector. We also discussed methods to improve forecast analysis and interpretation.	
9	30/06/2019	A Report – "Second year of ground-truthing ACCESS-S1 multi-week and seasonal forecasts and hind-casts, in collaboration with vegetable industry supply chain participants". Improved management decisions identified, assessed and documented. Quarterly Report on project activities, outcomes and outputs submitted.	**Achieved (02/07/2019)** Have improved management decisions been identified? • Yes, collaborating business managers recently participated in a small group discussion (4 to 8 business owners) and written task during their local DCAP Experimental Forecast update meeting to identify management decisions they would consider reviewing and altering. Project staff did not contribute to these discussions, ensuring commercial realism (page 27) • Example: business owners said they would, change and finesse planting schedules based on forecasts, select and choose varieties to match forecast conditions. Supply chain managers indicated they would consider changing supply locations, review crop selections and size of each production order by location and volume.	

Milestone	Due Date	Milestone Description	Updates	Current Status
			Have these decisions positively impacted risk and profitability, and/or product quality and reliability of production and supply? • Yes, we have documented real life examples and anecdotes that demonstrate how the DAF#7 Heatwave Advisories as well as the long lead-time experimental forecasts combined with our informative pre and post season Experimental Forecast meetings have allowed business managers to better manage climate extremes. Product quality, marketable yield, business efficiency and supply reliability have all been positively impacted by our work to date. Our collaborators view the DCAP Experimental Forecasts a science based piece of information that they will consider when thinking about management decisions. The information will help better inform their business decisions • Collaborator quote. "This is perhaps one of the most worthwhile projects undertaken by a government department in a long time. SURELY HAVING A BETTER UNDERSTANDING ON OUR EVER CHANGING CLIMATE has to be the greatest management tool for grower that he can use" (from Ray B)	
10	30/06/2019	Review first two years of ground-truthing ACCESS-S1 multi-week and seasonal and retrospective case-studies from the hindcasts – (if positive outcome of Stop/Go mid-term review, and the project is to continue) Key review questions to be answered: - • Is there sufficient skill for these forecasts to be useful? Do the forecasts offer the potential for improved management decisions? • Have improved management decisions been identified? • Have these decisions positively impacted risk and profitability, and/or product quality and reliability of production and supply?	**Achieved (02/07/2019)** Stop / Go Milestone Highlights. Since February 2018 (17 months) when we began using our dedicated ACCESS-S1 based regional LV and GB experimental DCAP forecast model to engage with our collaborators we have; • Worked closely with BoM R&D staff in developing our DCAP vegetable region climate model. • Organised and held 5 DCAP Experimental Forecast Forums (each is a 2 to 2.5 hour long informative, educational presentation, including an interactive discussion session). • Developed and distributed 19 bi-monthly experimental forecasts for our collaborating business managers in the Lockyer Valley, Granite Belt and Bowen regions. • Developed and issued 5 Heatwave Advisory warnings to collaborating businesses (during summer). • Held over 50 one on one DCAP related discussions with our project collaborators. • Organised seven dedicated meetings with DCAP collaborators to discuss and document what management decisions they would change if they had access to a reliable long lead-time forecast. • Conducted 5 surveys of collaborating businesses in both the GB and LV region to measure and monitor the impact of information presented by the DAF #7 project team and gauge the appetite for and interest in this DCAP experimental forecast work (in addition to Coutts JR). • Assessed the accuracy of all forecasts to-date and discussed this with all our business collaborators and BoM R&D staff. External and cross-industry interactions. • DAF#7 presented an overview of the projects results to a Farmers for Climate Action local meeting held in April 2019 in Stanthorpe (180 attendees).	

Milestone	Due Date	Milestone Description	Updates	Current Status
			• DAF#7 presented (via webinar) to the Victorian based Birchip Seasonal Climate forecasting Community of Practice group in April 2019. This presentation resulted in requests for follow up information from both BoM and CSIRO staff who attended the webinar. • DAF#7 has met with the DCAP Insurance project staff (USQ) on multiple occasions and provided them with documented specific horticultural crop information and critical temperature and yield impact information to assist their understanding and their work. Do the forecasts offer the potential for improved management decisions? • Both the collaborating vegetable grower business's as well as the supply chain managers have stated and given practical examples of how valuable a skilful long lead-time forecast is to their respective operations. A long lead-time forecast is a vital management tool and we have documented real world examples ($ impact) of the positive impact on crop yield, and farm gate prices that have been achieved since our DCAP project team has been communicating forecast interpretation information and working closely with our collaborator business partners • Example: A nationally significant Green Bean and Sweet Corn grower explained how beneficial this information can be to them. Planting times (usually weekly) can be adjusted (spaced out further) if they are aware of extended periods of above average temperatures in advance (i.e. at seeding, 8 to 12 weeks before scheduled harvest date. This prevents sequential plantings maturing faster and catching up to each other by harvest time. In a highly perishable crop with a 5 day shelf life (e.g. Green Beans) this results in the unwanted bean plantings being ploughed in which is a complete waste of time, labour, money, fertilizer, water other business resources.	
DAF 8	**Grazing Futures: Promoting a resilient grazing industry**			
1	31/01/2019	6-month progress report	**Achieved (04/02/2019)** Reporting was completed before 25 Dec 2018.	
DAF 9	**Forewarned is forearmed: Equipping farmers and agricultural value chains to proactively manage the impacts of extreme climate events**			
1.1	01/12/2017	Staff appointed and draft industry engagement plans developed with sugar and northern red meat.	**Achieved (01/11/2018)**	
1.2	01/12/2017	Industry reference groups nominated for sugar and northern red meat industries.	**Achieved (01/11/2018)** Northern beef and sugar reference groups established. Beef Meetings held in Charters Towers, Longreach and Rockhampton. Sugar industry meeting held in Townsville.	

Milestone	Due Date	Milestone Description	Updates	Current Status
1.3	01/12/2017	Progress report submitted to MLA	**On track (04/12/2018)**	
2.1	30/03/2018	Industry engagement plans for sugar and northern red meat industries completed and submitted to MLA.	**Achieved (11/04/2019)** N Industry engagement plans submitted to MLA	
2.2	30/03/2018	Bureau of Meteorology (BoM) existing products: access and training for members of sugar and northern red meat industry reference groups.	**Achieved (11/04/2019)** Bureau of Meteorology (BoM) existing products: access and training for members of sugar and northern red meat industry reference groups. Reference groups advised of products through email and direct contact on teleconferences. Feedback received and noted for further improvement of products	
2.3	01/02/2018	Progress report submitted to MLA detailing: 2.3.1 Training 2.3.2 WP4 component contributions	**Achieved (11/04/2019)** Report on progress achieved submitted by due date.	
3.1	28/09/2018	Report to MLA	**Achieved (11/04/2019)** • 3.1.1 decisions that are sensitive to climate extremes identified and prioritised through industry engagement in sugar and northern red meat industries. Completed • 3.1.2 WP4 component contributions - Products from WP3 have been communicated to Reference group members • 3.1.3 outputs and outcomes from the implementation of industry engagement plans in relation to increasing project awareness, feedback on trial products and the use (adoption) and utility of Extreme Event forecasts and risk management strategies. These outputs now being processed	
3.2	28/09/2018	Contribution to report to MLA (led by SARDI) outlining methods to analyse the risk and returns of climatically sensitive decisions documented and reported to MLA.	**On track (11/04/2019)** Contribution to report to MLA (led by SARDI) outlining methods to analyse the risk and returns of climatically sensitive decisions documented and reported to MLA. In progress at current time.	
4.1	29/03/2019	Progress report to MLA	**On track (11/04/2019)** Progress report to MLA including: • 4.1.1 sugar and northern red meat industry reference groups feedback on BoM product set #1 experimental weekly and seasonal climate extreme forecasts. Reference groups continuing to be consulted on regular basis. • 4.1.2 WP4 component contributions. General producers being advised of products developed in WP1 & WP2 through some BMP workshops and other general Climate update workshops. • 4.1.3 outputs and outcomes from the implementation of industry engagement plans in relation to increasing project awareness, feedback on trial products and the use (adoption) and utility of Extreme Event forecasts and risk management strategies. Ongoing review occurring with reference groups.	

APPENDIX 4: FEEDBACK SHEET SUMMARIES

Steering Committee & Project Leader Meetings

PROJECT STEERING COMMITTEE MEETINGS (3)

Average ratings			
Jul 18	Oct 18	Apr 19	
			Details: • 18 July 2018 (7 respondents) • 25 October 2018 (9 respondents) • 16 April 2019 (7 respondents)
7.9	8.2	8.3	**Meetings were highly useful in updating on DCAP progress.**
7.7	7.4	8.4	**Members were satisfied with program progress.** • Comments noted the good progress made despite some early contracting/recruitment delays – *Majority of projects have made good progress and there were outputs to share with the Steering Committee* (October Meeting)
9.0	9.3	9.3	**Project presentations highly useful in increasing members' understanding of project progress.** • Positive comments included: *very interesting work and Grazing Futures is very impressive in their results so far; presentations appropriately pitched in terms of detail; good to see the social project team being responsive to industry feedback.*

- It was suggested that *going forward would be good for projects to identify any barriers or strategic opportunities being encountered* (July Meeting)

8.7 8.6 8.3

Members very satisfied with their roles and opportunities to provide input into the program.

- One respondent described *it is a well-run process* (July Meeting)
- The *need to have better integration across all DCAP projects* was suggested (October Meeting)

As a result of the meetings, participants described improving their knowledge of the overall DCAP program and better understanding project progress and outputs – including increasing confidence in the *work being undertaken* and that *proponents are suitably skilled to deliver good outcomes.* One respondent at the April 2019 meeting commented that the presentations were *very welcome* and *report summaries effective.*

The importance of continuing to (better) communicate project progress – including benefits and outcomes – was highlighted by some respondents, with comments including: *Researchers need to take more responsibility for communicating what they are up to (July); A focus on communicating benefits and outcomes was identified and needs re-emphasising (July); Would be good to have a traffic light system to understand how projects are tracking (October); I'd like to better understand how projects are progressing against DCAP targets (October)*

PROGRAM REVIEW AND PROJECT COLLABORATION WORKSHOP

Average Ratings

Details: 28 November 2018 – 17 respondents

8.8

Workshop was very useful in updating participants on projects and forward DCAP planning, with those presenting highly satisfied with the opportunity to share project progress and the associated discussion.

- Comments highlighted the value of focused and concise presentations that effectively communicated project progress and outputs – for example: *great to have concise focussed presentations with objectives and outputs to date shared amongst the program team; first time*

hearing what others are doing - very useful for potential integration; good to see the outputs starting to come out of the projects; and good targeted presentations and effective in catching up on progress and *implications for wider drought reforms*

7.5

Respondents were quite satisfied at this stage with the level of integration across DCAP projects.

- Comments suggested that there was *lots of room for improvement* and while *integration seems to be occurring to some extent*, *it is unclear whether all opportunities are being taken advantage of.* One respondent believed the program was *under-selling and under-reporting the amount of integration that is already happening*.

8.2

There was high level of comfort with project and program M&E activities.

- One respondent described being *more comfortable now given Amy's indication that the research elements appear on track.*

8.1

There was high level of comfort with project and program communication activities.

- *Great to hear a positive presentation on the opportunities around targeted social media.*

8.5

Respondents were very happy with program progress to date.

Prompted by the workshop, many respondents were keen *further pursue integration, discuss more collaboration*, and *follow up several new contacts*.

Other positive comments related to the workshop included: *very helpful for me; very good; great opportunity to present DCAP messages; useful workshop to understand where the opportunities and gaps are; very helpful to hear what everyone was up to; good interaction and information.*

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PROJECT LEADERS WEBINAR

Average Ratings	**Details:** 7 August 2018 – 5 respondents
7.6	**Webinar quite useful in terms of (better) understanding DCAP project progress.** • *Good to keep up with what other projects are doing and get steering Committee feedback.*
8.4	**Project leaders highly satisfied with the progress made on their projects to date.** • One project leader was happy with *progress but always anxious about evaluation and comms activities to promote DCAP and projects and demonstrate impact.*
8.0	**Feedback from steering committee meeting was considered very useful.** • The feedback was seen to be good in providing *another perspective* and *generally useful*. It was suggested that *more advice around expectations of impact would be handy.*
	New insights and understanding that resulted from the webinar included: *cross-project work through the vast grazing industry; BoM making advances in providing information and making ACCESS-S available;* and *insight into other DCAP projects and the overlap between them.*

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Project Workshops/Meetings

Project	Activity	Feedback Example
USQ 4	Climate Variability and Grazing Risk Management Workshops (Apr 2019)	• 26 responses (6 Gin Gin, 14 Broome, 6 Katherine) • 8.4 avg. rating (1-10 scale) – Usefulness of the workshops in terms of better considering climate risk issues to your industry/business • 8.0 avg. rating (1-10 scale) – Likeliness to use (or use to a greater extent) seasonal climate forecasting information in your future decision making • 8.4 avg. rating (1-10 scale) – Overall value of workshop in improving knowledge in incorporating climate information into business decisions • *"Great cover of all the basics! Great environment and speakers"* • *"More positive outlook on understanding tools that can be used with assistance to understand climate risk"* • *"It helps me a lot to make climate related decisions at the field level"*
	Peranga Seasonal Climate Forecasting Workshop (Oct 2018)	• 17 responses • 9.2 avg. rating (1-10 scale) – Usefulness of the workshops in terms of better considering climate risk issues with your industry/business • *"Very good. Great info from knowledgeable, experienced and realistic presenters."*
DAF 6	Julia Creek Workshop (Jun 2019)	• 7 responses • 6.0 avg. (1-7 scale) – Usefulness of the workshop • 5.2 avg. (1-7 scale) – Average increased understanding of topics presented • 5.4 avg. (1-7 scale) – Average likeliness of using tools/information presented within the next year • *"Generally very well run workshop. Follow-up on 1 on 1 would be very valuable."* • *"I found the day very beneficial. I would really like some follow up training."*
DAF 7	Granite Belt End Season Review Meeting (May 2019)	• 8 responses • 72% (8 respondents) had their decision making influenced as a result of attending a previous meeting • 100% found the experimental forecasts useful (62% quite useful) • 86% found the information presented moderate to highly valuable • 86% improved their knowledge of temperature forecasting as a result of the meeting
	Lockyer Valley DCAP Meeting (Feb 2019)	• 7 responses • 4.3 avg. rating (1-6 scale) – valuable the information presented at meeting • 100% slightly to greatly improved (2 slightly improved, 4 moderately improved, 1 greatly improved) – Knowledge and understanding of temperature forecasting after today's presentation

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	• 43% a little (3 respondents) and 43% Yes (3 respondents) – After attending a previous experimental forecast meeting has the information you learnt / observed about weather forecasting tools influenced your decision making in the last year
Industry Climate Forecasting Meetings (Sep & Nov 2018)	• 19 responses (2 feedback sheets) • 89% Improved their knowledge of temperature forecasting a moderate amount to a lot • 100% rated the information as moderately to highly valuable

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