BENCHMARKING SURVEY
SUMMARY REPORT

Drought and Climate Adaptation Program (DCAP)

Coutts J&R / **June 2017**

COUTTS J&R
MANAGING AND EVALUATING CHANGE

Queensland Government

ACKNOWLEDGEMENTS

This report would not have been possible without the assistance of the project leaders and program leader Neil Cliffe. Additionally, this report provided the opportunity to make an industry first benchmark of the climate change strategies of QLD/NT/WA producers and advisors. This would not have happened without those who completed the survey or the organisations who distributed the survey link through social media, websites, email and e-newsletters.

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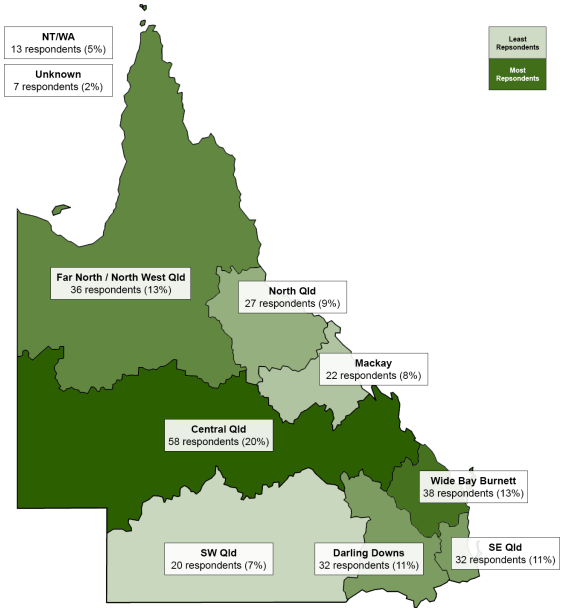
June 2017

KEY FINDINGS

285 RESPONSES

Demographics



Region: 93% of respondents were from Queensland.

Role: 71% Producers and 29% as Service Provider/Other respondents

Industry: Respondents were grouped into three unique groups:

- 54% Livestock only (including beef, dairy, sheep, and goats);
- 28% Other Industries (including sugar, cropping, horticulture, and 'other'); and
- 18% Livestock and Other Industries.

Documented Plan

The majority of respondents (78%) **did not have a documented plan** (or process to use) for managing a variable climate, with 46% of total respondents indicating decisions are made as needed.

Confidence

Overall, respondents were **moderately confident** in their preparedness to meet future climate variability (6.2 avg. n=282) and in their ability to access resources/tools/information needed to effectively make planning decisions for climate variability (5.9 avg. n=283).

Tools and Resources

Tools/Resources: The *BoM Website* (95% awareness, 87% use) was by far the most well-known and used resource when planning (or assisting clients plan) for climate variability. This was followed by *Long Paddock website* (55% awareness, 26% use), *Rainman/ClimateArm* (52% awareness, 13% use), *Stocktake/Stocktake Plus* (41% awareness, 15% use), and *USQ Climate Outlook and Review* (36% awareness, 21% use).

Seasonal climate forecasts: The two most well-known were *SST: Sea Surface Temperature Map* (66% awareness, 27% use) and *IOD: Indian Ocean Dipole* (50% awareness, 19% use)

Climate forecast periods: *Forthcoming Summer/Winter season* (60%) was the most selected climate forecast period that respondents saw as valuable, followed by *Rolling 3-6 months* (54%), *Rolling 0-3 months* (51%), and *Annual 1-2 years* (35%).

Access Barriers

Overall, 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 93 respondents were: *Internet access* (58%); *Lack of understanding about how to use resources* (56%); *Lack of understanding of technologies used in the resources* (42%); *Scepticism about usefulness of products* (37%); and *Lack of time* (35%).

Key Management Practices

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

Beef/Dairy/Sheep (n=206):

1. Adjusting stocking rates according to forage amount and quality (89%)
2. Carrying capacity (83%)
3. Adjusting stocking rates - buy, sell, agistment, etc. (79%)
4. Fencing (62%)
5. Property planning and land management (59%)

Sugar/Cropping/Horticulture (n=123):

1. Planting time/season (70%)
2. Fertilizing/spraying, weed control (63%)
3. Irrigation (54%)
4. Harvesting and product processing/management (49%)
5. Species selection (45%)

On-farm Changes

Respondents were asked to provide details of any changes made on-farm (whether part of a strategic plan or not) relating to managing for climate variability and the resulting (expected) benefits seen. The most common changes by respondent industry group included:

Livestock:

- **Pasture management** (42 mentions – e.g. *rotational grazing, paddock spelling, grass budgeting, weed reduction, planting improved pastures, fertiliser selection*)
- **Stocking rates/carrying capacity** (23 mentions – e.g. *reducing stocking rates, adjusted to season/pasture quality*)
- **Land/paddock management** (18 mentions – e.g. *fencing, erosion control, watering points, shade*)

Livestock & Other Industries:

- **Pasture management** (12 mentions – e.g. *rotational grazing, improved pastures/grasses*)
- **Water management** (10 mentions – e.g. *bore, dams, recycled water, tanks, securing water supply options*)

Other Industries

- **Water management** (16 mentions – e.g. *irrigation improvements, water storage, water licences, drainage*)
- **Soil/paddock management** (12 mentions – e.g. *zonal tillage, increased ground cover, mulching, shade, controlled traffic, protective structures*)

Final Comments

Respondents were asked to provide any other comments. The most common responses included:

- **Acknowledgement of weather/climate/industry challenges** (7 mentions)
- **Importance/need for accurate/reliable (long-term) forecasts** (6 mentions)

CONTENTS

1. ABOUT THE SURVEY

1.1 Context

This web survey was designed as a part of the monitoring and evaluation (M&E) process of the Drought and Climate Adaptation Program (DCAP) which aims to help producers be more resilient and better able to manage their drought and climate risks and adapt to impacts of climate change.

Focused on producers and advisors, the web survey was designed to benchmark the current approaches to decision making and planning for climate variability (season to season; year to year) and to capture the state of understanding, availability and use of tools and information and issues being faced by the industry in relation to drought and climate risk mitigation. This is a cross industry first and will provide valuable information not only for DCAP but for the organisations who helped distribute the survey link.

By repeating the survey in the future and using the same conduits to invite respondents, it is reasonable to expect a strong participant overlap. This should provide a good measure of change over time within this segment of the target population – and a reflection of any broader shifts across the population.

1.2 Methodology

The questions were interactively developed with DCAP team members to ensure they were relevant and useful. Various rural and agribusiness networks were approached initially by the DCAP Program Manager and then followed up by Coutts J&R to help with distributing the survey link through direct email, e-newsletters and social media. All were very cooperative and agreed to participate including:

- FutureBeef (social media, email distribution list)
- Leading Sheep (E-newsletter, social media)
- DAF communications (social media, website)
- Canegrowers (social media)
- Regional Canegrowers organisation (email list)
- Growcom (social media, E-newsletter)
- AgForce (social media, E-newsletter)
- Queensland Farmers Federation (social media, weekly E-newsletter)
- Other email distribution lists including: USQ Climate updates (Neil Cliffe email list)

There was some sharing of the social media posts (including five retweets of the QFF Twitter post) as well as instances of emails being forwarded by recipients to their respective networks. The survey was open to responses from 16 May 2017 to 13 June 2017.

1.2.1 Sampling and Confidence

Given the non-random sampling approach, calculating confidence intervals with respect to the data is not appropriate. The data needs to be viewed as a reflection of 'those who were reached through the invitation process and were inclined to respond'. The good response (285 valid responses) however, provides some degree of confidence that the results are reflective of the broader producer and adviser population in targeted groups.

2. FINDINGS

2.1 Demographics

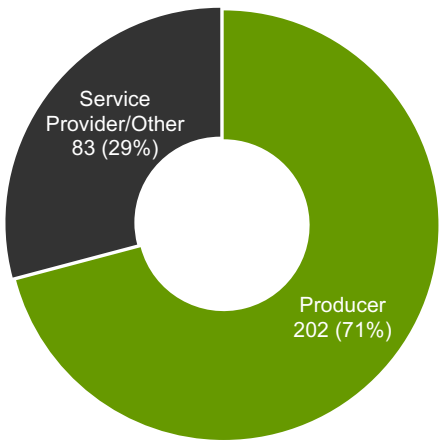
There were **285 valid responses** to the DCAP benchmarking survey.

2.1.1 Role

Seventy-one percent of respondents identified as Producers and 29% as Service Provider/Other respondents. Of these, 41 were service providers/consultants/advisers, 23 'Other', and 19 Extension Officers.

('Other' respondent roles included: analyst, researcher, education, exporter, feedlot operator, government, legal advisor, regulatory, manager, milling, NRM, peak body, and Landcare)

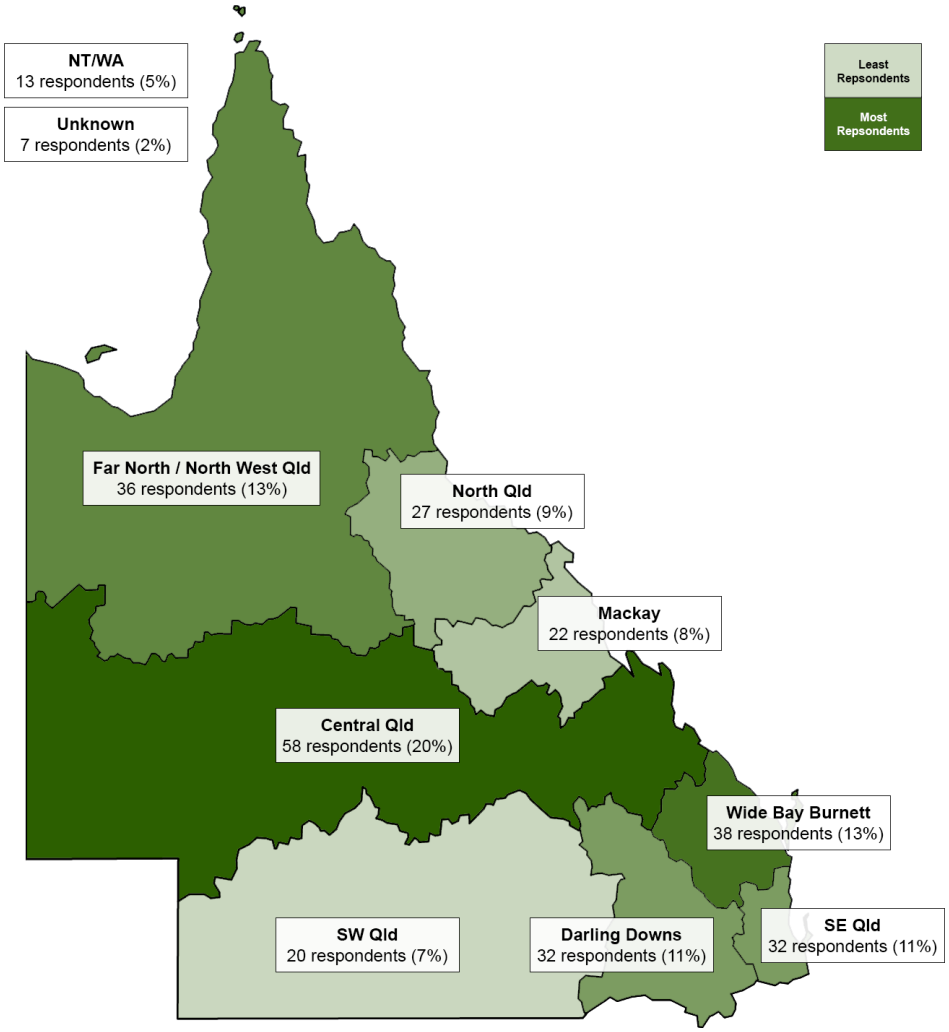
Chart 1: Respondent Role



2.1.2 Region

Ninety-three percent of respondents were from Queensland. Regions represented included: Central Qld (includes Central West, 20%); Wide Bay Burnett (13%); Far North Qld (includes North-west and Gulf, 13%); Darling Downs (11%); SE Qld (11%); North Qld (9%); Mackay, Isaac, and Whitsundays (8%); and SW Qld (7%). Five percent of respondents were from Northern Territory/Western Australian and 2% did not provide a region.

Chart 2: Respondent region



2.1.3 Industry

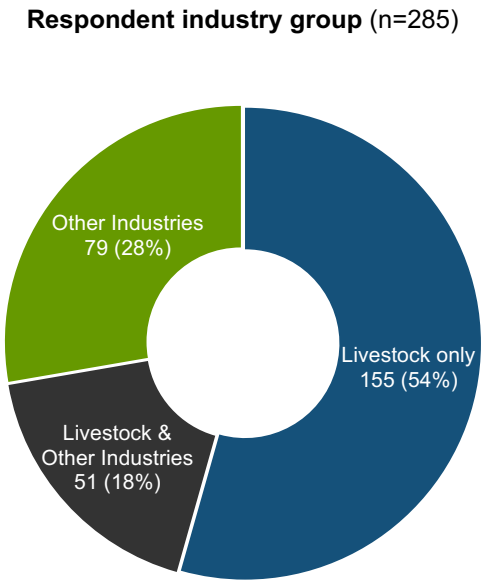
Respondents were able to select multiple industries. Based on responses three main groups were found: 54% Livestock only (including beef, dairy, sheep, and goats); 28% Other Industries (including sugar, cropping, horticulture, and 'other'); and 18% Livestock and Other Industries.

Breakdown of industries within these main groups:

- **Livestock only** (n=155) – 99% Beef, 9% Sheep, 2% Dairy, 1% Goats
- **Other Industries** (n=79) – 47% Sugar, 34% Horticulture, 13% Cropping, 13% Mixed Cropping/Grazing
- **Livestock and Other Industries** (n=51) – 96% Beef, 41% Mixed Cropping, 39% Cropping, 37% Horticulture, 24% Other, 22% Sheep, 16% Sugar, 12% Dairy

('Other' industries included: cotton, poultry, forestry, beekeeping, and seafood)

Chart 3: Respondent group by industry



2.2 Documented Plan

2.2.1 Documented plan for managing a variable climate

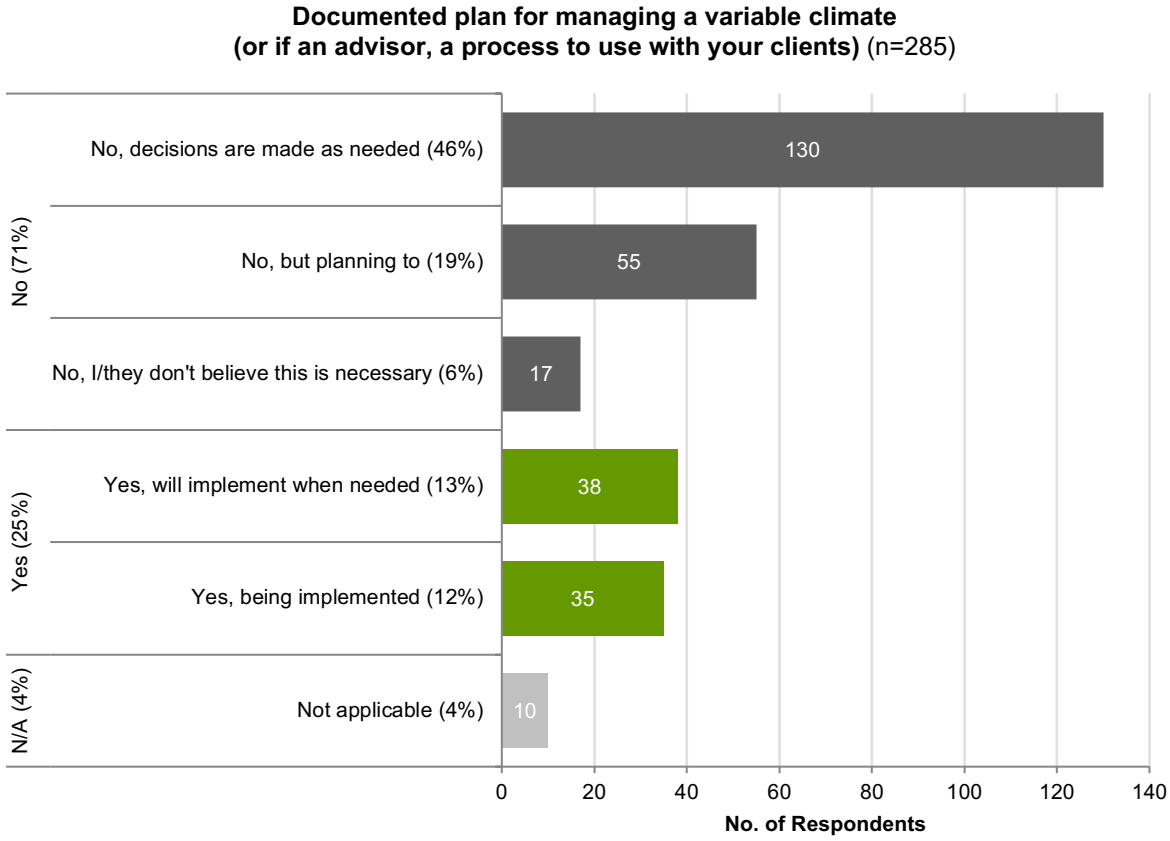
The majority of respondents (71%) did not have a documented plan (or process to use) for managing a variable climate, with 46% of respondents indicating decisions are made as needed, 19% intended to have a documented plan in future, and 6% did not believe it was necessary.

The percentage of respondents **without** documented plans by groupings were:

- **Role:** 78% Producer, 51% Service Provider/Other
- **Industry:** 90% Other Industries, 66% Livestock & Other Industries, and 63% Livestock
- **Region:** 86% Far North Qld, NT/WA 85%, 75% SE Qld, 75% SW Qld, 74% Wide Bay Burnett, 73% Mackay, 70% North Qld, 59% Darling Downs, 57% Central Qld

(Note: percentage summary tables are located in Appendix 3.1)

Chart 4: Documented plan



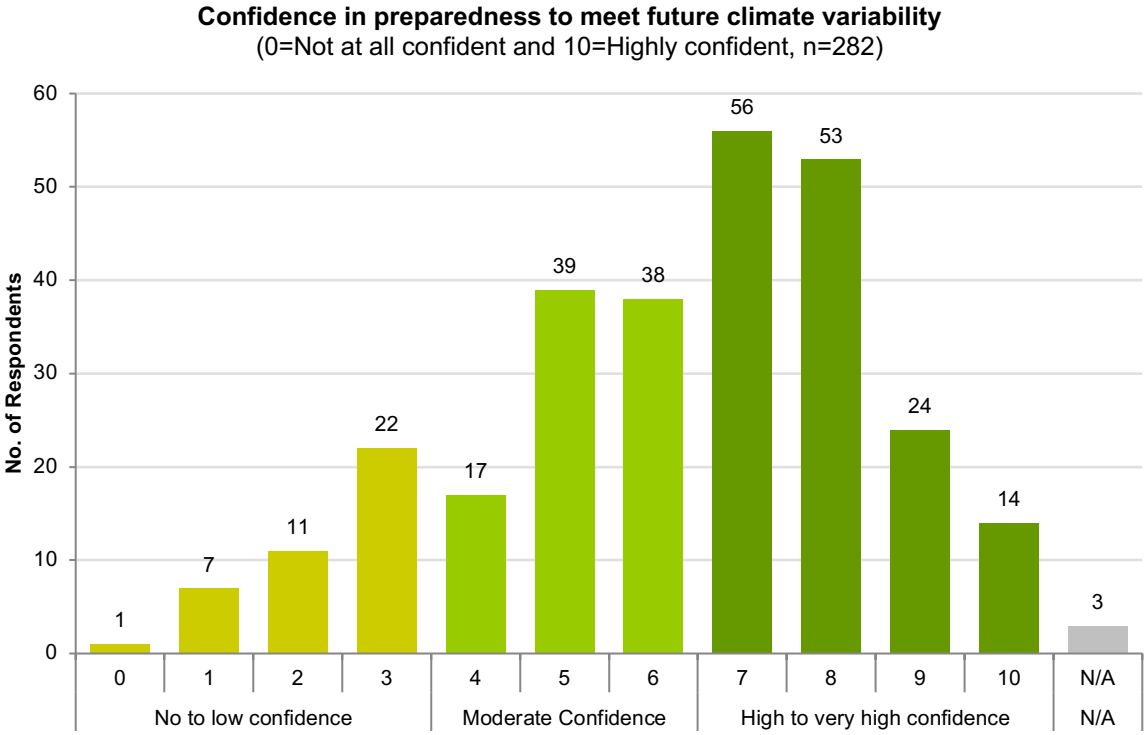
2.3 Confidence

2.3.1 Confidence in preparedness to meet future climate variability

Overall, respondents were moderately confident in their preparedness to meet future climate variability (6.2 avg. n=282). Average ratings by respondent groupings were:

- **Role:** 6.3 avg. Producer (n=201), 6.0 avg. Service Provider/Other (n=81)
- **Industry:** 6.5 avg. Livestock (n=152), 6.4 avg. Livestock & Other Industries (n=51), 5.6 avg. Other Industries (n=79)
- **Region:** 6.9 avg. Mackay (n=22), 6.8 avg. Wide Bay Burnett (n=38), 6.7 avg. Central Qld (n=58), 6.5 avg. Darling Downs (n=31), 6.4 avg. NT/WA (n=13), 6.3 avg. (n=31), 5.7 avg. North Qld (n=26), 5.5 avg. Far North Qld (n=36), 5.5 avg. SW Qld (n=20), 4.1 avg. Unknown (n=7)

Chart 5: Confidence in preparedness



Comments

Comments made by respondents on their preparedness to meet future climate variability included:

- Respondents with high to very high confidence (7-10 rating):
    - **Specific actions to prepare** (8 mentions – e.g. pasture management, water management, feed budgeting)
    - **Acknowledgement of the challenge of climate/seasonal variability** (4 mentions – e.g. *Even with the best planning, our variable seasons leave producers unprepared. A season can change within a few days. [Service Provider/Other, Central Qld, Livestock, 8])*
    - **Need for flexibility/adaptability** (4 mentions – e.g. *In a region where rainfall variability occurs on property to property or even paddock to paddock basis one has to react according to short to medium term forecasts. [Producer, Unknown, Livestock, 7]*)
    - **Experienced/dealt with variability before** (3 mentions – e.g. *Been through drought and floods before [Producer, Wide Bay Burnett, Livestock, 7])*
- Respondents with moderate confidence (4-6 rating):
    - **Confidence affected by uncertainty surrounding severity/length of future events** (5 mentions – e.g. *My confidence is diminished due to the unknown severity of future events. [Producer, Wide Bay Burnett, Livestock, 6])*
    - **Specific actions to prepare** (5 mentions – e.g. calving times, water storage, variety selection)
- Respondents with no to low confidence (0-3 rating):

- **Production severely impacted by seasonal variability** (4 mentions – e.g. *Changing climate can affect the ability to continue to grow our current crops [Producer, Far North Qld, Other Industries, 2])*
- **Confidence affected by uncertainty surrounding severity/length of future** events (2 mentions – e.g. *The length and severity of weather including drought is an unknown variable [Producer, SE Qld, Livestock & Other Industries, 3]).*
- **Lack of understanding** (2 mentions – e.g. *We don't understand the drivers of seafood productivity [Producer, SE Qld, Other Industries, 2])*

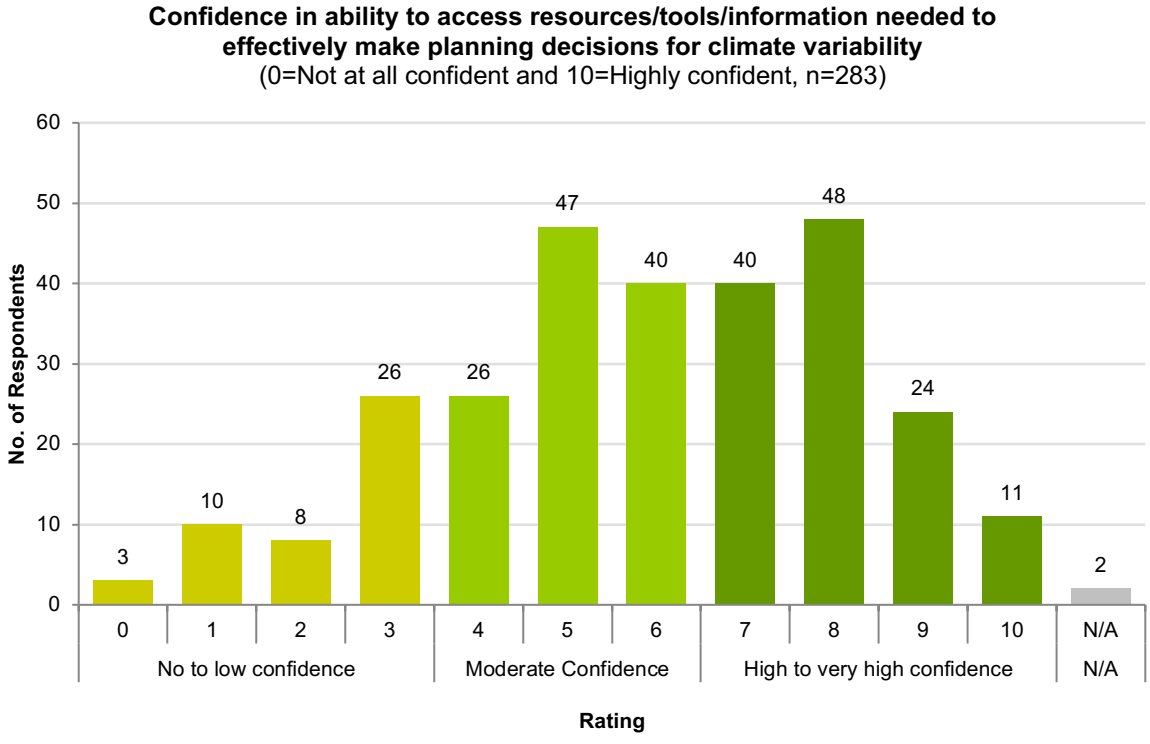
(Note: a complete summary of comments is located in Appendix 3.2)

2.3.2 Confidence in ability to access resources/tools/information needed to effectively make planning decisions for climate variability

Overall respondents were moderately confident in their ability to access resources/tools/information needed to effectively make planning decisions for climate variability (5.9 avg. n=283). Average ratings by respondent groupings were:

- **Role:** 5.9 avg. Producer (n=201), 5.9 avg. Service Provider/Other (n=82)
- **Industry:** 6.1 avg. Livestock (n=153), 5.9 avg. Livestock & Other Industries (n=51), 5.5 avg. Other Industries (n=79)
- **Region:** 6.9 avg. Mackay (n=22), 6.4 avg. Central Qld (n=58), 6.3 avg. Wide Bay Burnett (n=38), 5.9 avg. SE Qld (n=31), 5.8 avg. Far North Qld (n=36), 5.7 avg. Darling Downs (n=31), 5.7 avg. Unknown (n=7), 5.3 avg. NT/WA (n=13), 5.1 avg. SW Qld (n=20), 5.0 avg. North Qld (n=27)

Chart 6: Confidence in ability to access



Comments

Comments made by respondents on their ability to access resources/tools/information included:

- Respondents with high to very high confidence (7-10 rating):
    - **Limited confidence in reliability/accuracy of tools/resources** (4 mentions – e.g. *I am confident I have access to the tools, I don't have confidence in the tools [Producer, Central Qld, Livestock, 10]*
    - **Specific tool/resource used** (3 mentions – e.g. ECMWF, BOM)
    - **Value of local expertise** (2 mentions – e.g. *Our local extension officer is fantastic and always willing to help with advice etc. [Producer, Wide Bay Burnett, Livestock, 7])*
    - **Internet usefulness** (2 mentions – e.g. *The internet is a good tool [Producer, SE Qld, Livestock, 8])*
- Respondents with moderate confidence (4-6 rating):
    - **Lack of confidence in forecast accuracy/reliability** (7 mentions – e.g. *The reliability of the information available is not sufficient to make long term decisions. [Producer, Wide Bay Burnett, Livestock, 6])*
    - **Too many information sources** (2 mentions – e.g. *So many sources of info. Hard to know which are best. [Service Provider/Other, SE Qld, Livestock & Other Industries, 4])*
- Respondents with no to low confidence (0-3 rating):
    - **Lack of confidence in forecast accuracy/reliability** (7 mentions – e.g. *Current long-term forecasts are too inaccurate to be useful. [Producer, Darling Downs, Livestock, 3])*

(Note: a complete summary of comments is located in Appendix 3.2)

2.4 Tools and Resources

2.4.1 Awareness/use of tools used when planning for climate variability

Tools/Resources

The BoM Website was by far the most well-known and used resource when planning (or assisting clients plan) for climate variability, with a 95% overall awareness and 87% usage rate. The next most recognised tools/resources were: Long Paddock website (55% awareness, 26% use), Rainman/ClimateArm (52% awareness, 13% use), Stocktake/Stocktake Plus (41% awareness, 15% use), and USQ Climate Outlook and Review (36% awareness, 21% use). Usage of specific sections of the BoM and LongPaddock websites included:

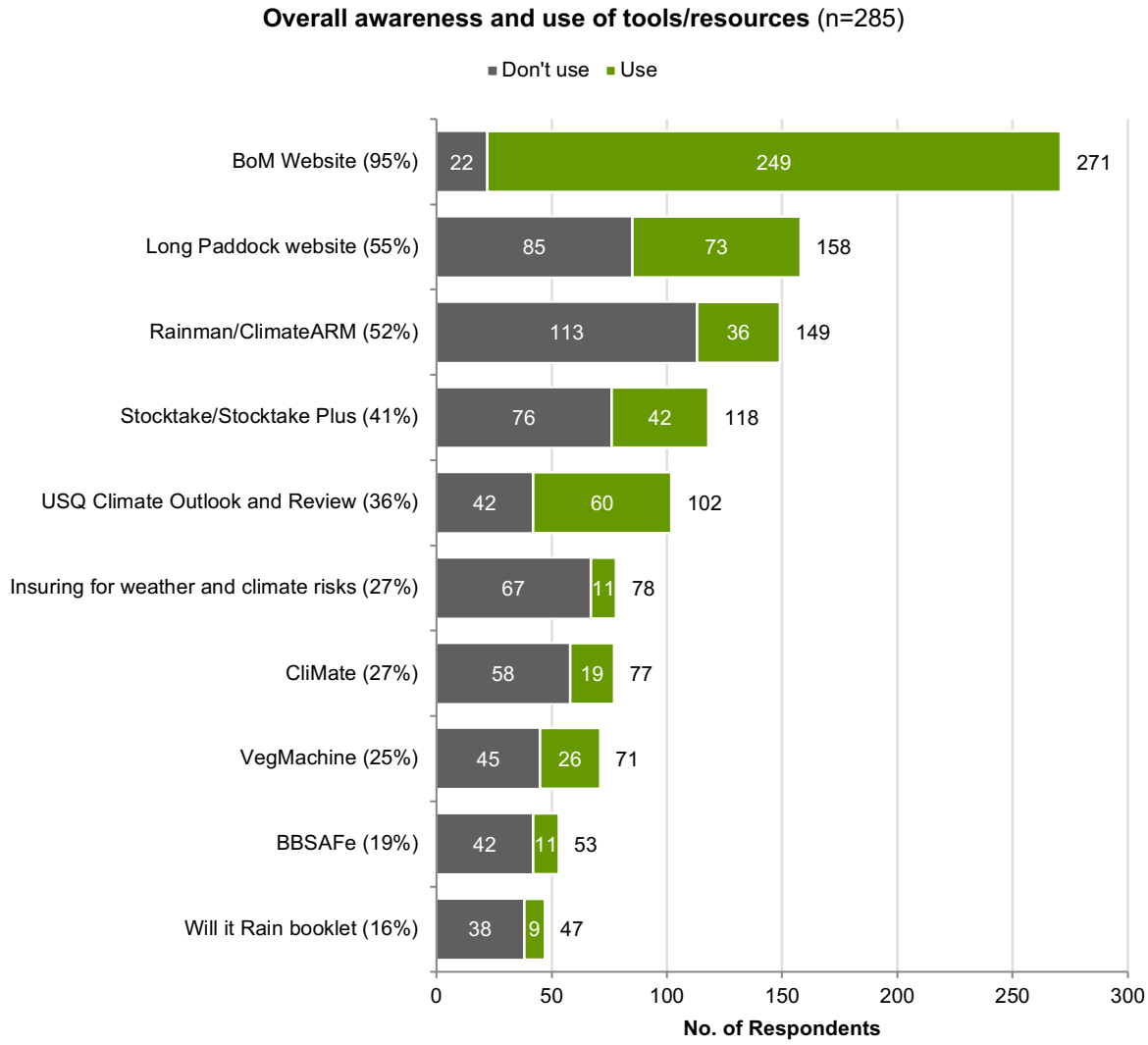
- **BoM website** (n=249)**:** 58% *ENSO tracker*, 55% *MJO or 40 day wave*, and 30% *POAMA*.
- **LongPaddock Website** (n=73)**:** 62% *SOI Phase system rainfall probabilities*, 41% *Forage*, 40% *Rainfall poster, 26% DSITI climate statement*, 25% *SILO*, 23% *AussieGRASS*, and 12% both *SPOTA-1* and *DSITI Climate Risk Matrix Assessment.*

Examples of tools/resources where one respondent group was notably more likely to use one over the other included:

- **Service Provider/Other vs. Producers:** *LongPaddock Website* (42% vs. 19%), *Rainman/ClimateARM* (25% vs. 7%), and *VegMachine* (20% vs. 4%).
- **Livestock vs. Other Industries:** *USQ Climate Outlook and Review* (11% vs. 37%), *Stocktake/Stocktake Plus* (25% vs. 0%), and *LongPaddock website* (29% vs. 13%)

(Note: percentage summary tables are located in Appendix 3.1)

Chart 7: Overall awareness and use of tools/resources and whether they are used or not



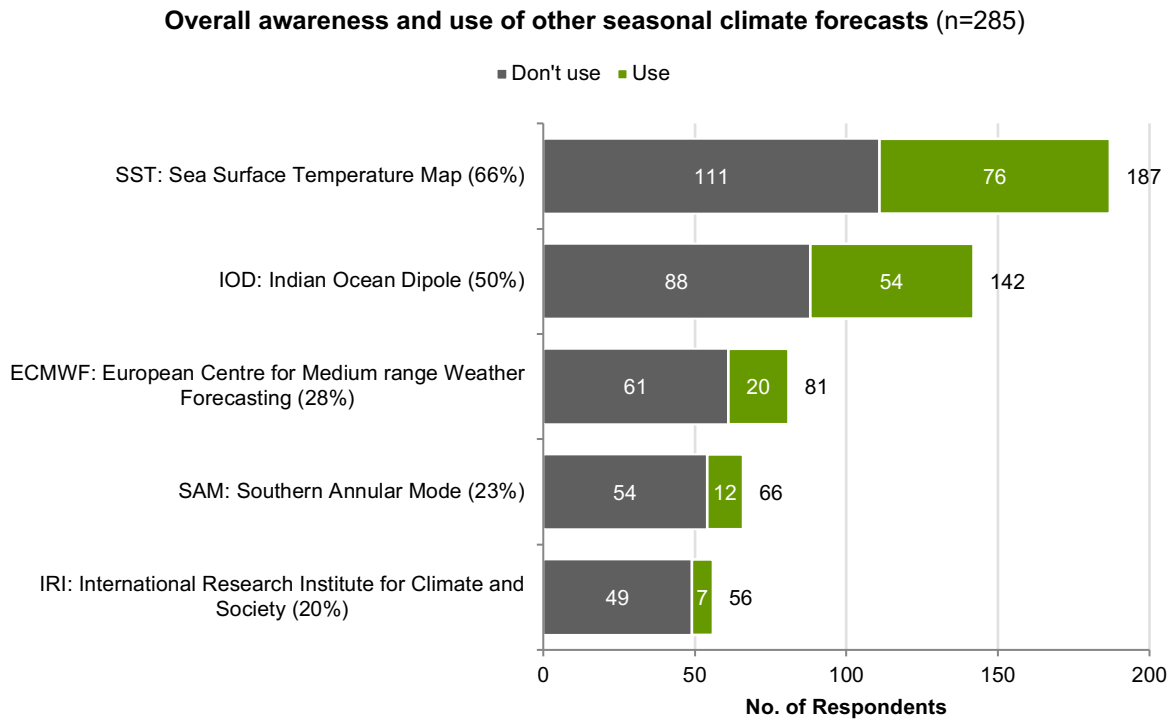
Other Seasonal Climate Forecasts

The two most well-known seasonal climate forecasts were *SST: Sea Surface Temperature Map* (66%) and *IOD: Indian Ocean Dipole* (50%), with 27% of total respondents using *SST* and 19% using *IOD.* The three other listed forecasts had comparatively lower awareness and usage: *ECMWF* (28% awareness, 7% use), *SAM* (23% awareness, 4% use), and *IRI* (20% awareness, 2% use).

There were no notable differences in usage of other seasonal forecasts between the respondent groups.

(Note: percentage summary tables are located in Appendix 3.1)

Chart 8: Overall awareness/use of other seasonal climate forecasts



Comments on other tools/resources/forecasts used

- **Other tools/resources/forecasts cited by multiple respondents:** WX Maps (4 mentions); WeatherZone (3 mentions); Elders Weather (2 mentions); Higgins Storm Chasers (2 mentions); and Yr.no (2 mentions).
- **Other websites/forecasts with single mentions:** AV Weather, Wetterkarte, Hayden Walker, Oz Cyclone Chasers, DSITI Monthly Climate Statement, ECMWF, The Ringer Weather Forecasting, WeatherUndergound, and GFS.
- **Specific mentions of other BoM tools/forecasts** (6 mentions): 4 day rainfall forecast, monthly videos, Climate Ahead, quarterly summaries, SOI, MJO
- **Other comments relating to tool/resource/forecast usage:**
    - Reliance on personal experience/intuition (5 mentions – e.g. *Common sense! Farmers have been using it for centuries! [SE Qld, Producer, Livestock])*
    - Use of historical records (4 mentions – e.g. *Own records and decision dates [SE Qld, Service Provider/Other, Livestock]*)
    - Pasture Feed Budgets (4 mentions – e.g. RCS Grazing Chart, MaiaGrazing)
    - Email updates (2 mentions – e.g. from Neil Cliffe, Roger Stone)

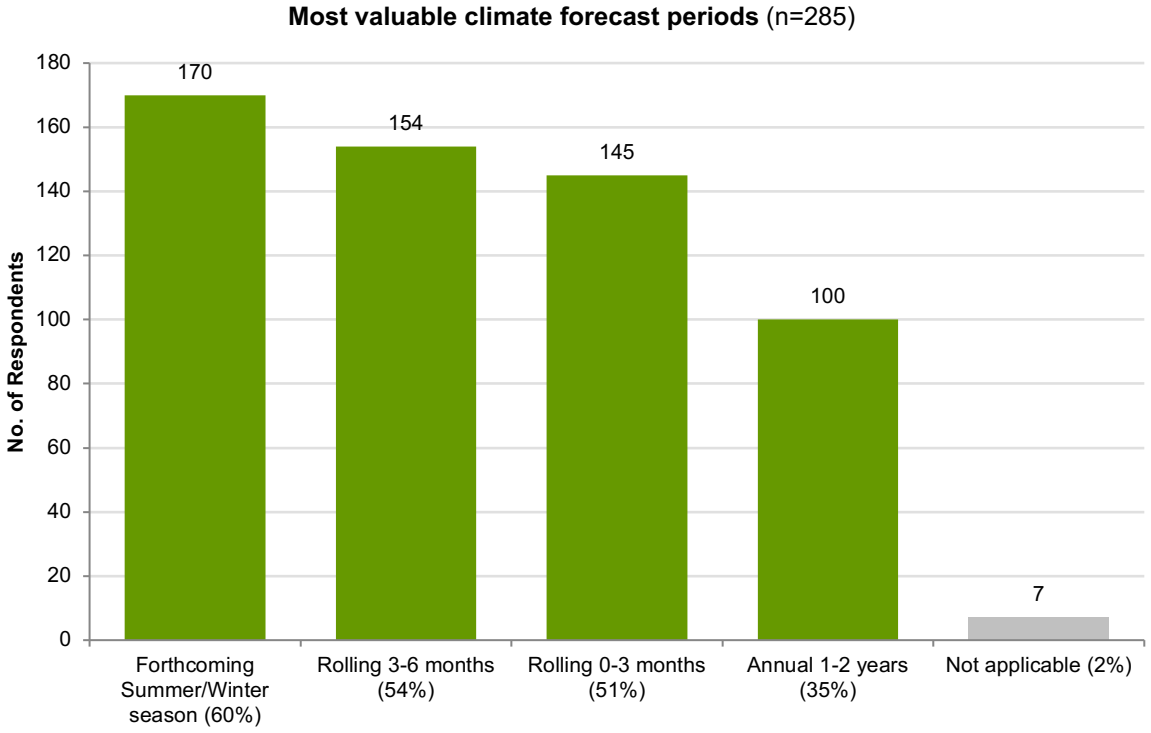
(Note: a complete summary of comments is located in Appendix 3.2)

2.4.2 Most valuable climate forecast periods

Forthcoming Summer/Winter season (60%) was the most selected climate forecast period that respondents saw as valuable, followed by *Rolling 3-6 months* (54%), *Rolling 0-3 months* (51%), and *Annual 1-2 years* (35%).

(Note: percentage summary tables are located in Appendix 3.1)

Chart 9: Valuable climate forecast periods



2.5 Barriers

2.5.1 Barriers preventing access to relevant tools/resources and/or knowledge

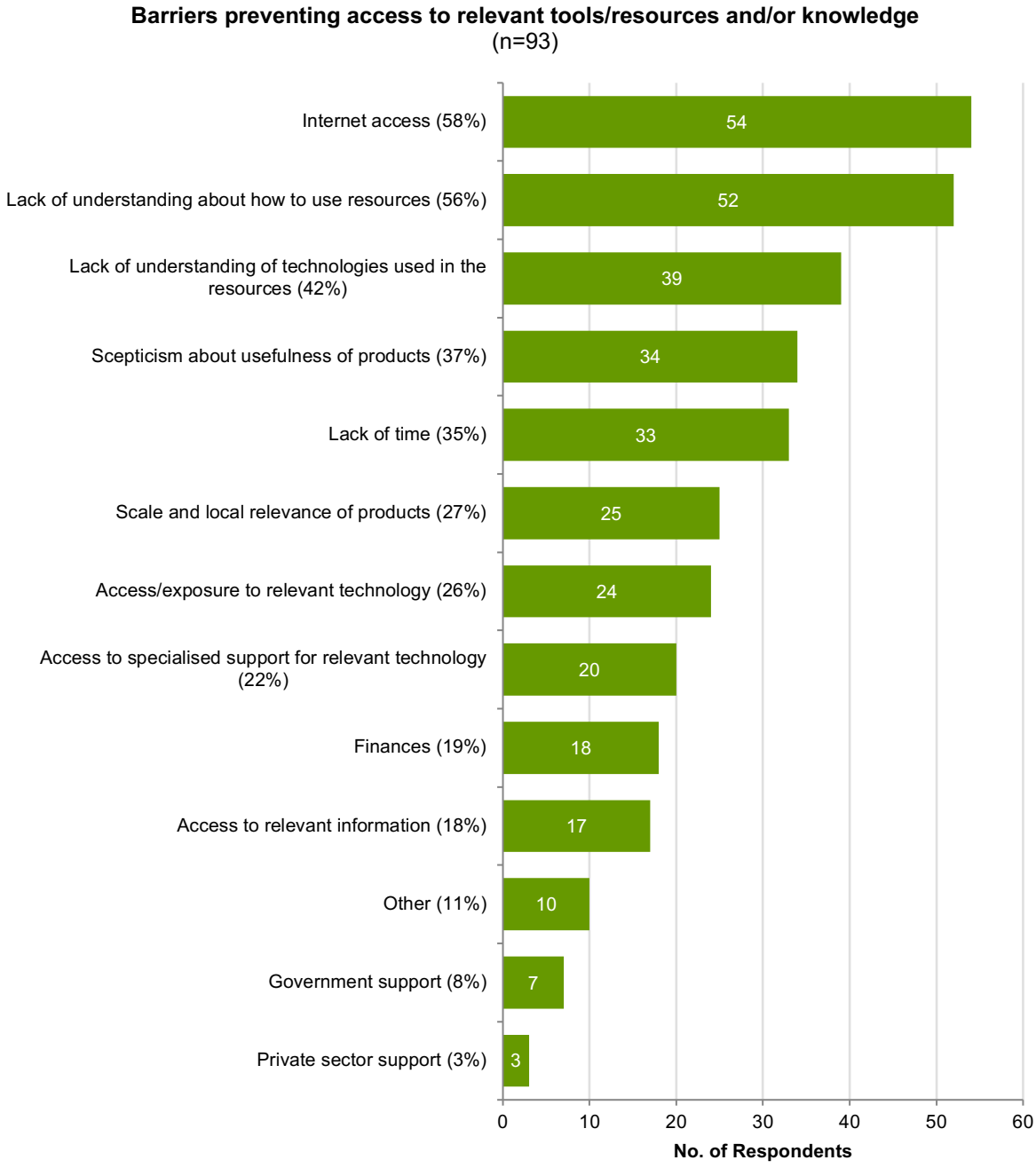
Overall, only a third of respondents believed there were barriers preventing them (or their clients) accessing relevant tools/resources and/or knowledge. The top five barriers indicated by these 93 respondents were: *Internet access* (58%); *Lack of understanding about how to use resources* (56%); *Lack of understanding of technologies used in the resources* (42%); *Scepticism about usefulness of products* (37%); and *Lack of time* (35%). Barriers experienced by respondent groups were:

- **Role:** 31% Producers and 36% Service Provider/Other had experienced barriers. Examples of barrier differences by role included:
    - Noticeably more Service Provider/Other respondents (compared to Producers) indicated that *a lack of understanding about how to use resources* (77% vs. 46%) and a *lack of understanding of technologies used in the resources* (60% vs. 33%) were barriers.

- **Industry:** 49% Livestock & Other Industries, 34% Livestock, and 20% Other Industries had experienced barriers – examples of barrier differences by industry:
    - Noticeably more Livestock respondents indicated *a lack of understanding of technologies used in the resources* compared to Other Industries respondents (44% vs. 19%), while those in the Other Industries group were more likely to cite *lack of time* as a barrier (50% vs. 27%).
- **Region:** The regional breakdown of those who had experienced barriers was - 54% NT/WA, 40% Central Qld, 40% SW Qld, 38% Darling Downs, 33% Far North Qld, 29% Wide Bay Burnett, 29% Unknown, 28% SE Qld, 22% North Qld, and 14% Mackay.

(Note: percentage summary tables are located in Appendix 3.1)

Chart 10: Access barriers



Comments on barriers

Respondent comments on barriers included:

- **Forecast accuracy/reliability** (6 mentions – e.g. *A lot people I work with don't have faith in the accuracy of forecasts and so don't use these to make good decisions…[Central Qld, Service Provider/Other, Livestock])*
- **Internet speed/reliability/access** (4 mentions – e.g. *Too unreliable to get in the habit of using internet required tools. [SW Qld, Producer, Livestock]*)
- **Lack of locally/industry relevant information/forecasts** (3 mentions) – e.g. *BoM is only relevant for east coast [North Qld, Producer, Livestock])*

(Note: a complete summary of comments is located in Appendix 3.2)

2.6 Management Practices

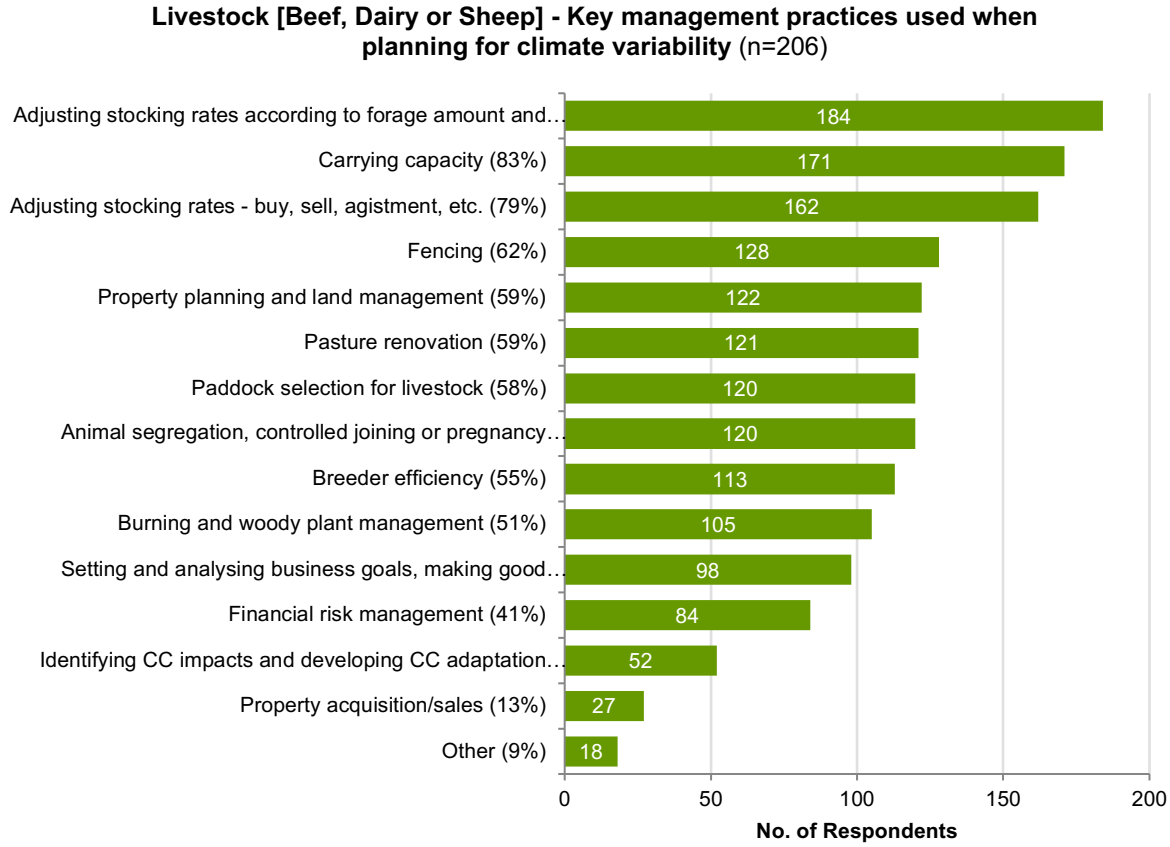
2.6.1 Key management practices used when planning for climate variability

The top five key management practices used (or clients used) when planning for climate variability by industry were (respondents were shown a list of specific management practices based on the industry/ies they selected):

- **Beef/Dairy/Sheep** (n=206):
    1. Adjusting stocking rates according to forage amount and quality (89%)
    2. Carrying capacity (83%)
    3. Adjusting stocking rates - buy, sell, agistment, etc. (79%)
    4. Fencing (62%)
    5. Property planning and land management (59%)
- **Sugar/Cropping/Horticulture** (n=123):
    1. Planting time/season (70%)
    2. Fertilizing/spraying, weed control (63%)
    3. Irrigation (54%)
    4. Harvesting and product processing/management (49%)
    5. Species selection (45%)
- **Other Industry** (only 3 options provided, n=25):
    1. Identifying climate change impacts and developing climate change adaptation strategies (56%)
    2. Developing a drought management plan (32%)
    3. Other (8%)

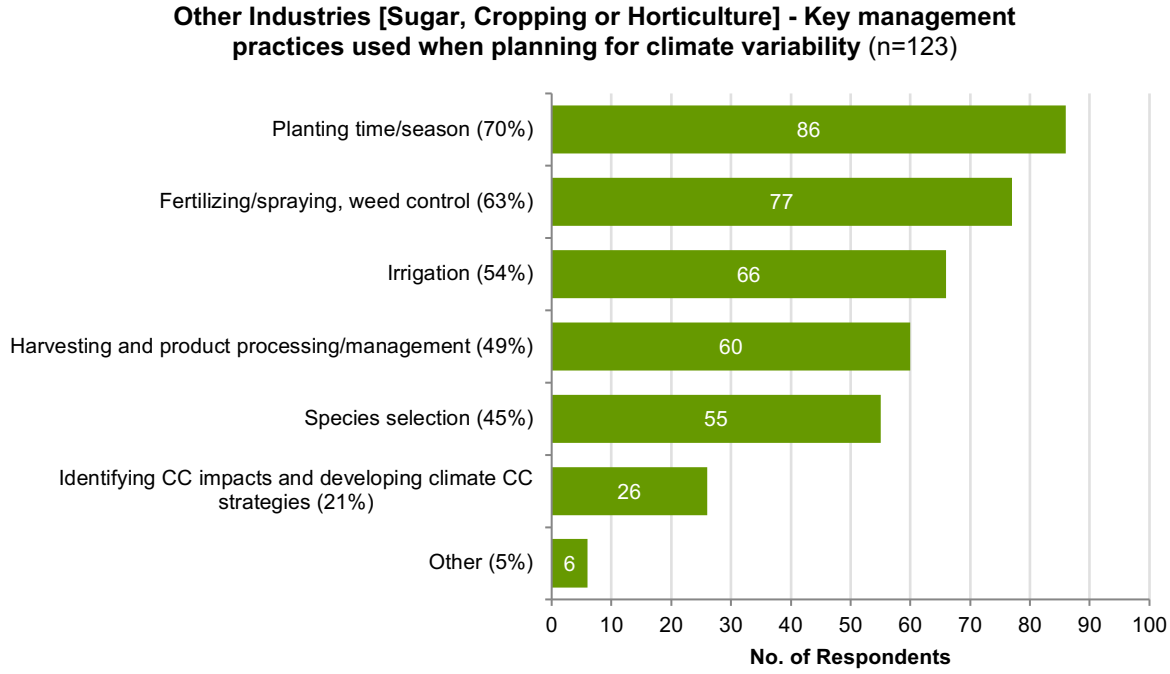
(Note: percentage summary tables are located in Appendix 3.1)

Chart 11: [Beef/Dairy/Sheep] Key management practices



(Other included: watering points, supplements, variety selection, rotational grazing, holistic management, cattle trading, fodder conservation, parasite management, weaner management)

Chart 12: [Sugar/Cropping/Horticulture] Key management practices



(Other included: cover cropping, water storage, zero till, laser levelling, crop timing, controlled traffic)

2.6.2 On-farm changes relating to managing for climate variability

Respondents were asked to provide details of any changes made on-farm (whether part of a strategic plan or not) relating to managing for climate variability and the resulting (expected) benefits seen. Types of changes by respondent industry group included:

Livestock

- **Pasture management** (42 mentions – e.g. rotational grazing, paddock spelling, grass budgeting, weed reduction, planting improved pastures, fertiliser selection)
- **Stocking rates/carrying capacity** (23 mentions – e.g. reducing stocking rates, adjusted to season/pasture quality)
- **Land/paddock management** (18 mentions – e.g. fencing, erosion control, watering points, shade)
- **Water management** (12 mentions – e.g. water and irrigation infrastructure, water diversion, water use efficiency, solar pumps, water storage)
- **Business management** (8 mentions – e.g. market selection, trading, farm management deposits, strategic preparations)
- **Weening/breeding/joining** (7 mentions – e.g. changes to timing, early weening, controlled joining)
- **Strategic/flexible decision making** (5 mentions – e.g. based on weather/seasons/rainfall/forecasts)
- **Property/agistment selection** (5 mentions – e.g. purchasing in areas with reliable rainfall)
- **Other changes:** silage storage (4 mentions), nutrition supplementation (4 mentions), breed selection (3 mentions)

Livestock & Other Industries

- **Pasture management** (12 mentions – e.g. rotational grazing, improved pastures/grasses)
- **Water management** (10 mentions – e.g. bore, dams, recycled water, tanks, securing water supply options)
- **Business management** (4 mentions – e.g. conversion to/from cropping/grazing, diversification, insurance coverage)
- **Strategic/flexible decision making** (4 mentions – e.g. based on weather/seasons/rainfall/forecasts)
- **Land/paddock management** (4 mentions – e.g. fencing, shade, watering points, erosion)
- **Stocking rates/carrying capacity** (4 mentions)
- **Other changes:** silage/feed storage (2 mentions), machinery selection (1 mention), breed selection (1 mention)

Other Industries

- **Water management** (16 mentions – e.g. irrigation improvements, water storage, water licences, drainage)

- **Soil/paddock management** (12 mentions – e.g. zonal tillage, increased ground cover, mulching, shade, controlled traffic, protective structures)
- **Crop selection** (6 mentions – e.g. diversification, resistant varieties)
- **Strategic/flexible decision making** (6 mentions – e.g. based on weather/seasons/rainfall/forecasts)
- **Timing of spraying/planting/fertilising** (6 mentions – e.g. in response to forecasts/outlooks)
- **Other changes:** herbicide/fertiliser management (2 mentions), solar power (1 mention)

(Note: a complete summary of comments is located in Appendix 3.2)

2.7 Final Comments

2.7.1 Other comments

Respondents were asked to provide any other comments – the most common responses included:

- **Acknowledgement of weather/climate/industry challenges** (7 mentions – e.g. *Climate has and will continue to change and as producers we continue to adapt and respond to the best of our abilities within financial restraints, legislative requirements and to maintain sustainability now and into the future... [Central Qld, Producer, Livestock & Other Industries])*
- **Importance/need for accurate/reliable (long-term) forecasts** (6 mentions – e.g. *I know forecasts are getting better but sometimes there are shortcomings on decisions I make because they change [Far North Qld, Producer, Other Industries])*

(Note: a complete summary of comments is located in Appendix 3.2)

3. APPENDIX

Appendix 3.1: Additional Data Tables

Documented plan for managing a variable climate

Table A1: Documented plan by **role** (n=285)

Response	Producer (n=202)	Service/Provider Other (n=83)
No, decisions are made as needed	52%	29%
No, but planning to	19%	20%
No, I/they don't believe this is necessary	7%	2%
Total No	**78%**	**51%**
Yes, will implement when needed	10%	20%
Yes, being implemented	11%	16%
Total Yes	**21%**	**36%**
N/A	0%	12%

Table A2: Documented plan by **industry** (n=285)

Response	Livestock (n=155)	Livestock & Other Industries (n=51)	Other Industries (n=79)
No, decisions are made as needed	41%	35%	62%
No, but planning to	17%	27%	19%
No, I/they don't believe this is necessary	5%	4%	9%
Total No	**63%**	**66%**	**90%**
Yes, will implement when needed	16%	22%	3%
Yes, being implemented	17%	10%	4%
Total Yes	**33%**	**32%**	**7%**
N/A	4%	2%	4%

Table A3: Documented plan by **region** (n=285)

Response	Central Qld (n=58)	Darling Downs (n=32)	Far North Qld (n=36)	Mackay (n=22)	North Qld (n=27)	NT/ WA (n=13)	SE Qld (n=32)	SW Qld (n=20)	Wide Bay Burnett (n=38)	Unknown (n=7)
No, decisions are made as needed	33%	44%	69%	55%	41%	54%	34%	45%	47%	57%

No, but planning to	16%	9%	11%	18%	22%	23%	34%	25%	21%	29%
No, I/they don't believe this is necessary	9%	6%	6%	0%	7%	8%	6%	5%	5%	0%
Total No	**57%**	**59%**	**86%**	**73%**	**70%**	**85%**	**75%**	**75%**	**74%**	**86%**
Yes, will implement when needed	19%	25%	6%	9%	7%	8%	9%	10%	18%	0%
Yes, being implemented	22%	13%	3%	18%	19%	8%	9%	10%	5%	0%
Total Yes	41%	38%	8%	27%	26%	15%	19%	20%	24%	0%
N/A	2%	3%	6%	0%	4%	0%	6%	5%	3%	14%

Awareness/use of tools used when planning for climate variability

Tools/Resources

Table A4: Awareness of tools/resources by **role** (n=285) Note: usage is indicated in brackets

Response	Producer (n=202)	Service/Provider Other (n=83)
BoM Website	95% (87%)	95% (89%)
Long Paddock website	49% (19%)	71% (42%)
Rainman/ClimateARM	47% (7%)	65% (25%)
Stocktake/Stocktake Plus	36% (10%)	53% (25%)
USQ Climate Outlook and Review	33% (18%)	41% (28%)
Insuring for weather and climate risks	23% (2%)	36% (7%)
CliMate	21% (3%)	39% (14%)
VegMachine	19% (4%)	38% (20%)
BBSAFe	16% (3%)	25% (6%)
Will it Rain booklet	14% (1%)	21% (7%)

Table A5: Awareness of tools/resources by **industry** (n=285) – note: usage is indicated in brackets

Response	Livestock (n=155)	Livestock & Other Industries (n=51)	Other Industries (n=79)
BoM Website	95% (85%)	98% (92%)	94% (89%)
Long Paddock website	64% (29%)	60% (35%)	36% (13%)
Rainman/ClimateARM	57% (15%)	55% (18%)	42% (5%)

Stocktake/Stocktake Plus	59% (25%)	39% (6%)	8% (0%)
USQ Climate Outlook and Review	26% (11%)	41% (27%)	51% (37%)
Insuring for weather and climate risks	29% (5%)	41% (8%)	16% (0%)
CliMate	24% (5%)	41% (14%)	24% (6%)
VegMachine	33% (14%)	26% (8%)	9% (0%)
BBSAFe	24% (6%)	16% (2%)	9% (0%)
Will it Rain booklet	17% (3%)	18% (6%)	14% (1%)

Other Seasonal Climate Forecasts

Table A6: Awareness of other seasonal climate forecasts by **role** (n=285) – note: usage is indicated in brackets

Response	Producer (n=202)	Service/Provider Other (n=83)
SST: Sea Surface Temperature Map	67% (27%)	62% (25%)
IOD: Indian Ocean Dipole	50% (20%)	51% (17%)
ECMWF: European Centre for Medium range Weather Forecasting	29% (8%)	28% (5%)
SAM: Southern Annular Mode	24% (5%)	21% (2%)
IRI: International Research Institute for Climate and Society	19% (1%)	19% (5%)

Table A7: Awareness other seasonal climate forecasts by **industry** (n=285) – note: usage is indicated in brackets

Response	Livestock (n=155)	Livestock & Other Industries (n=51)	Other Industries (n=79)
SST: Sea Surface Temperature Map	65% (26%)	78% (33%)	57% (23%)
IOD: Indian Ocean Dipole	51% (17%)	55% (24%)	44% (19%)
ECMWF: European Centre for Medium range Weather Forecasting	23% (3%)	34% (12%)	35% (11%)
SAM: Southern Annular Mode	25% (5%)	28% (4%)	18% (4%)
IRI: International Research Institute for Climate and Society	18% (1%)	30% (8%)	16% (1%)

Most valuable climate forecast periods

Table A8: Most valuable climate forecast periods by **role** (n=285)

Response	Producer (n=202)	Service/Provider Other (n=83)

Forthcoming Summer/Winter season	54%	73%
Rolling 3-6 months	56%	49%
Rolling 0-3 months	49%	57%
Annual 1-2 years	33%	40%
N/A	2%	2%

Table A9: Most valuable climate forecast periods by **industry** (n=285)

Response	Livestock (n=155)	Livestock & Other Industries (n=51)	Other Industries (n=79)
Forthcoming Summer/Winter season	65%	59%	49%
Rolling 3-6 months	55%	57%	49%
Rolling 0-3 months	47%	61%	52%
Annual 1-2 years	42%	35%	22%
N/A	3%	0%	3%

Table A10: Most valuable climate forecast periods by **region** (n=285)

Response	Central Qld (n=58)	Darling Downs (n=32)	Far North Qld (n=36)	Mackay (n=22)	North Qld (n=27)	NT/ WA (n=13)	SE Qld (n=32)	SW Qld (n=20)	Wide Bay Burnett (n=38)	Unknown (n=7)
Forthcoming Summer/ Winter season	71%	72%	47%	59%	41%	69%	59%	65%	50%	71%
Rolling 3-6 months	69%	63%	47%	32%	52%	38%	41%	45%	61%	86%
Rolling 0-3 months	53%	53%	50%	55%	67%	38%	41%	55%	39%	71%
Annual 1-2 years	41%	34%	33%	27%	44%	23%	28%	45%	26%	57%
N/A	3%	0%	6%	0%	0%	0%	9%	0%	0%	0%

Barriers preventing access to relevant tools/resources and/or knowledge

Table A11: Barriers preventing access to relevant tools/resources and/or knowledge by **role** (n=93)

Response	Producer (n=63)	Service/Provider Other (n=30)
Internet access	54%	67%
Lack of understanding about how to use resources	46%	77%

Lack of understanding of technologies used in the resources	33%	60%
Scepticism about usefulness of products	32%	47%
Lack of time	40%	27%
Scale and local relevance of products	21%	40%
Access/exposure to relevant technology	24%	30%
Access to specialised support for relevant technology	16%	33%
Finances	24%	10%
Access to relevant information	17%	20%
Other	10%	13%
Government support	10%	3%
Private sector support	3%	3%

Table A12: Barriers preventing access to relevant tools/resources and/or knowledge by **industry** (n=93)

Response	**Livestock** (n=52)	**Livestock & Other Industries** (n=25)	**Other Industries** (n=16)
Internet access	58%	72%	38%
Lack of understanding about how to use resources	52%	64%	56%
Lack of understanding of technologies used in the resources	44%	52%	19%
Scepticism about usefulness of products	33%	44%	38%
Lack of time	27%	44%	50%
Scale and local relevance of products	23%	32%	31%
Access/exposure to relevant technology	35%	16%	13%
Access to specialised support for relevant technology	23%	28%	6%
Finances	15%	28%	19%
Access to relevant information	13%	28%	19%
Other	12%	12%	6%
Government support	8%	8%	6%
Private sector support	2%	4%	6%

Table A13: Barriers preventing access to relevant tools/resources and/or knowledge by **region** (n=93)

Response	Central Qld (n=23)	Darling Downs (n=12)	Far North Qld (n=12)	Mackay (n=3)	North Qld (n=6)	NT/ WA (n=7)	SE Qld (n=9)	SW Qld (n=8)	Wide Bay Burnett (n=11)	Unknown (n=2)
Internet access	65%	58%	67%	67%	17%	43%	67%	75%	45%	50%
Lack of understanding about how to use resources	57%	42%	67%	67%	67%	57%	67%	50%	45%	50%
Lack of understanding of technologies used in the resources	48%	42%	42%	67%	33%	43%	11%	50%	45%	50%
Scepticism about usefulness of products	57%	50%	42%	0%	33%	29%	44%	13%	9%	0%
Lack of time	30%	25%	42%	0%	33%	29%	67%	38%	45%	0%
Scale and local relevance of products	17%	25%	42%	67%	33%	57%	22%	13%	18%	0%
Access/ exposure to relevant technology	30%	17%	25%	0%	17%	43%	22%	38%	27%	0%
Access to specialised support for relevant technology	13%	42%	25%	33%	17%	43%	11%	25%	9%	0%
Finances	26%	33%	25%	0%	50%	0%	22%	0%	0%	0%
Access to relevant information	17%	25%	8%	0%	67%	0%	33%	13%	9%	0%
Other	13%	8%	0%	33%	33%	29%	0%	0%	0%	50%
Government support	4%	17%	8%	0%	17%	0%	0%	13%	9%	0%
Private sector support	0%	0%	0%	0%	50%	0%	0%	0%	0%	0%

Key management practices used when planning for climate variability

Table A14: Key management practices used by **role**

Response	Producer	Service/Provider Other
[Beef, Dairy or Sheep]	(n=140)	(n=66)
Adjusting stocking rates according to forage amount and quality	89%	89%
Carrying capacity	86%	77%
Adjusting stocking rates - buy, sell, agistment, etc.	76%	85%
Fencing	62%	62%
Property planning and land management	56%	65%
Pasture renovation	59%	59%
Paddock selection for livestock	58%	59%
Animal segregation, controlled joining or pregnancy testing	54%	67%
Breeder efficiency	57%	50%
Burning and woody plant management	56%	41%
Setting and analysing business goals, making good business decisions	44%	56%
Financial risk management	41%	39%
Identifying CC impacts and developing CC adaptation strategies	21%	33%
Property acquisition/sales	8%	24%
Other	8%	11%
[Sugar, Cropping or Horticulture]	(n=87)	(n=36)
Planting time/season	66%	81%
Fertilizing/spraying, weed control	60%	69%
Irrigation	53%	56%
Harvesting and product processing/management	49%	47%
Species selection	40%	56%
Identifying CC impacts and developing climate CC strategies	16%	33%
Other	6%	3%
[Other Industry]	(n=16)	(n=9)
Identifying CC impacts and developing CC adaptation strategies	56%	56%
Developing a drought management plan	50%	0%
Other	0%	22%

Table A15: Key management practices used by **region** (n=93)

Response	Central Qld	Darling Downs	Far North Qld	Mackay	North Qld	NT/ WA	SE Qld	SW Qld	Wide Bay Burnett	Unknown
[Beef, Dairy or Sheep]	(n=54)	(n=23)	(n=20)	(n=12)	(n=13)	(n=13)	(n=25)	(n=18)	(n=23)	(n=5)
Adjusting stocking rates according to forage amount and quality	83%	91%	95%	83%	92%	54%	76%	89%	87%	40%
Carrying capacity	94%	91%	95%	75%	92%	92%	80%	94%	87%	60%
Adjusting stocking rates - buy, sell, agistment, etc.	85%	91%	85%	83%	77%	54%	68%	78%	70%	80%
Fencing	56%	61%	70%	67%	69%	38%	40%	67%	65%	60%
Property planning and land management	69%	65%	50%	50%	77%	46%	40%	56%	57%	60%
Pasture renovation	67%	57%	60%	33%	77%	54%	32%	61%	43%	40%
Paddock selection for livestock	48%	74%	30%	42%	46%	46%	48%	44%	43%	40%
Animal segregation, controlled joining or pregnancy testing	44%	48%	40%	42%	38%	31%	28%	44%	43%	40%
Breeder efficiency	15%	30%	5%	17%	8%	8%	4%	22%	4%	20%
Burning and woody plant management	70%	70%	50%	67%	54%	62%	44%	50%	52%	60%
Setting and analysing business goals, making good business decisions	61%	74%	70%	58%	77%	46%	44%	67%	74%	20%
Financial risk management	57%	83%	65%	50%	77%	23%	48%	67%	61%	20%
Identifying CC impacts and developing CC adaptation strategies	54%	57%	55%	67%	46%	23%	52%	56%	48%	20%
Property acquisition/sales	17%	52%	15%	58%	31%	23%	28%	17%	9%	40%
Other	4%	9%	10%	0%	15%	8%	16%	6%	17%	0%
[Sugar, Cropping or Horticulture]	(n=14)	(n=19)	(n=21)	(n=15)	(n=14)	(n=2)	(n=13)	(n=7)	(n=15)	(n=3)
Planting time/season	64%	68%	29%	40%	29%	50%	42%	57%	40%	33%
Fertilizing/spraying, weed control	79%	74%	86%	80%	86%	100%	42%	57%	47%	33%
Irrigation	71%	74%	62%	100%	71%	100%	17%	57%	33%	67%
Harvesting and product processing/management	21%	63%	33%	87%	50%	50%	50%	29%	87%	67%
Species selection	36%	53%	48%	60%	86%	0%	33%	57%	20%	100%
Identifying CC impacts and developing climate CC strategies	21%	26%	24%	27%	14%	0%	42%	0%	7%	33%
Other	7%	0%	5%	0%	7%	0%	8%	14%	7%	0%
[Other Industry]	(n=2)	(n=2)	(n=2)	(n=4)	(n=1)	(n=0)	(n=7)	(n=3)	(n=4)	(n=0)

Identifying CC impacts and developing CC adaptation strategies	50%	0%	0%	25%	0%	-	14%	67%	75%	-
Developing a drought management plan	100%	50%	50%	100%	0%	-	43%	33%	50%	-
Other	0%	0%	50%	0%	100%	-	0%	0%	0%	-