Resilient and Profitable Dryland Farming on the Eyre Peninsula

Baseline Survey Report 2020

Coutts J&R / **July 2020**

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MANAGING AND EVALUATING CHANGE

Resilient EP
For a profitable farming future

ACKNOWLEDGEMENTS

This survey report has only been possible because of the willingness of growers, consultants and other stakeholders to provide their input for the benefit of others. The Regional Innovators Group members and the Project team have assisted in the planning and distribution of the survey and encouraging others to participate. It is hoped that the information provided will inform the project activities and provide a very useful benchmark to capture progress and further insights over the life of the project.

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July 2020

SUMMARY

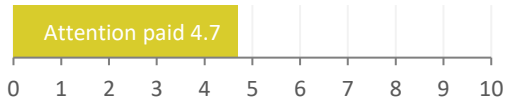
Survey Background

Baseline web surveys were undertaken over April-July 2020 with Farmers, Consultants and Informed Persons in the Eyre Peninsula to understand grower/producer awareness and use of soil moisture information and decision aids. As well as providing benchmarked information to revisit at the end of the project, the survey findings will assist in guiding project activities.

Respondents

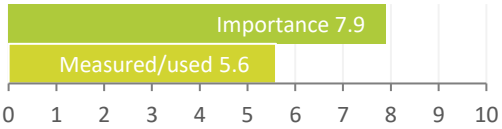
There were **61 respondents to the Farmer and Consultant Baseline Survey** (54 Farmers and 7 Consultants) and **22 respondents to the Informed Persons Baseline Survey** (8 Consultants, 6 NRM, 4 Researcher, 3 Farmer, and 1 Other).

Seasonal Forecasts



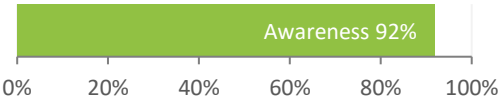
Farmers and consultants on average paid a **moderate level of attention to seasonal forecasts** and their implications for farm or property decisions (4.7 avg.), with forecast accuracy (particularly long-term) the major factor limiting their usefulness to decision making. Informed persons estimated on average 66% of growers/producers paid attention to seasonal forecasts.

Soil Moisture Levels



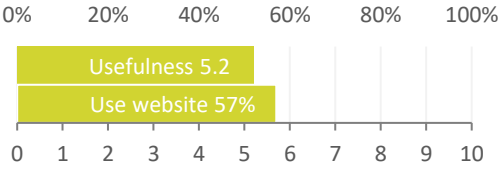
While farmers and consultants agreed that **understanding soil moisture levels was important** (7.9 avg.), the extent it was **actually measured and used to base cropping or management advice/decisions was varied** (5.6 avg.). Informed persons estimated on average 33% of growers/producers monitor soil moisture and base decisions on the levels found.

Network Awareness



There was **very high awareness of the EP Soil Moisture Probe Network** amongst farmers and consultants (92%). Informed persons estimated on average 53% of growers/producers were aware of the network.

Website Use



Just over **half of growers and consultants use or have used the Soil Moisture Probe Network website** (57) and felt it was **moderately useful in terms of assisting their decision making** (5.2 avg.). Informed persons estimated on average 29% of growers/producers had used the website.

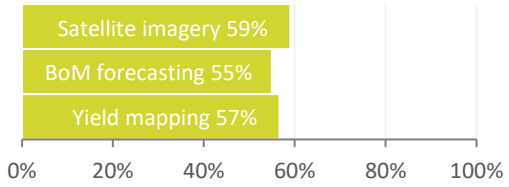
Using Network Data

Examples of how farmers and consultants had used data generated by the Moisture Probe Network included **estimating yields, deciding on spreading urea, guiding N application,** and **whether to sow or not**. Informed persons also provided examples of growers/producers using the network data to **formulate in-crop N decisions, influence yield targets, making seeding decisions, controlling summer weeds,** and **increasing confidence in crop choices**.

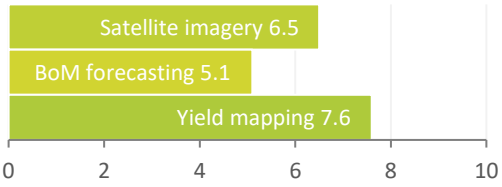
Maximise Benefits

Asked what they would like to see from the Soil Moisture Probe Network to maximise its benefits, farmers and consultants suggested **increasing/expanding the number of probes to more areas and soil types, improving the interface/software to be more user-friendly and accessible,** and **increasing confidence that the data is accurate and calibrated correctly.** Informed persons provided similar suggestions, particularly highlighting the need for the **data to be accurate and credible, easy to understand, and easily accessed.**

Use of Tools/Forecasts



59% of farmers/consultants had used satellite imagery for landscape management, 57% yield mapping, and 55% BoM seasonal forecasting tools. Informed persons estimated on average grower/producer use of tools/forecasts at 26% for satellite imagery, 64% BoM seasonal forecasting, and 58% yield mapping.



Of these, **yield mapping was rated the most useful** (7.6 avg.), followed by satellite imagery (6.5 avg.), and BoM seasons forecasting tools (5.1 avg.). Informed persons on average rated the usefulness of the tools/forecasts to growers/producers at 6.3 for satellite imagery, 6.2 BoM seasonal forecasting, and 7.5 yield mapping.

Greatest Needs

When asked what their greatest needs where when it comes to assistance with decision-making around best management of soil moisture and climate forecasts, farmers and consultants consistently reiterated the need for **accurate and reliable data**, particularly at an individual farm level and for long-term forecasts. The need for **user-friendly tools and increased training and support to help interpret and understand the data** was also seen as important. Informed persons agreed that both **consistent and accurate data was critical** and growers/producers needed **more education, training, and support to improve awareness, access, and understanding of the information.**

CONTENTS

1. INTRODUCTION

1.1 Background

The Smart Farming Partnerships is funded through round one (2017-22) of the National Landcare Program's Smart Farming Partnerships. The objectives are to:

- develop, trial and implement new and innovative tools and farm practices that support industry practice changes that will deliver more productive and profitable agriculture, fishing, aquaculture and farm forestry industries; protect Australia's biodiversity;
- protect and improve the condition of natural resources (in particular soils and vegetation); and
- assist Australia to meet its obligations under relevant international treaties.

In this project, new and emerging technologies will be used to assist farmers make efficient use of soil moisture. The Eyre Peninsula has an extensive soil moisture probe network which is underutilised. A *Regional Innovators* group of farmers and advisers is engaging with researchers and linking in with the region's farmers to develop techniques to integrate information generated from the probe network, satellite imagery, climate and yield models. The intention is that farmers will be able to make more informed, timely decisions to optimise the region's productive potential whilst protecting soil and water resources in a changing climate.

1.2 Survey Approach

This is a baseline survey which will be repeated at the end of the project to measure initial understanding and use of decision-support technologies around soil moisture and changes in knowledge and attitudes towards using data for on-farm decision making over the life of the project. The survey was designed and undertaken in two parts: 1) directed at farmers and consultants (their advisers); and 2) at informed persons/industry stakeholders.

Farmers and Consultants

The survey directed at farmers and consultants (advisers) was to understand their individual current awareness, understanding and use of different information sets and decision aids around soil moisture. This was designed as a web survey and the link forwarded to relevant electronic lists. Project staff and members of the Regional Innovators Group were also encouraged to contact individual growers to encourage them to respond and if necessary, assist them to complete the survey. As reported under the findings, 54 Farmers and 7 Consultants responded to the survey.

Informed Persons

This survey was to gain an overall perspective from consultants and researchers and other stakeholders who had a good overview of the industry. It was to capture their observations, assessments and insights to complement the individual responses from the other survey. These informed persons were directly contacted and asked to complete the survey. Twenty-two responded.

Limitations

There is a risk that growers already with greater awareness and use of information may be those more likely to respond to the survey. It was for this reason that the informed persons survey was run concurrently to gain a broader overview. The differences in responses of usage rates (actual and estimated) between the two surveys, for example, may be explained by this factor. There was very close agreement between both surveys in terms of identifying needs, issues and opportunities.

2. SURVEY FINDINGS

Charts and tables showing percentage and rating data are colour coded as below:

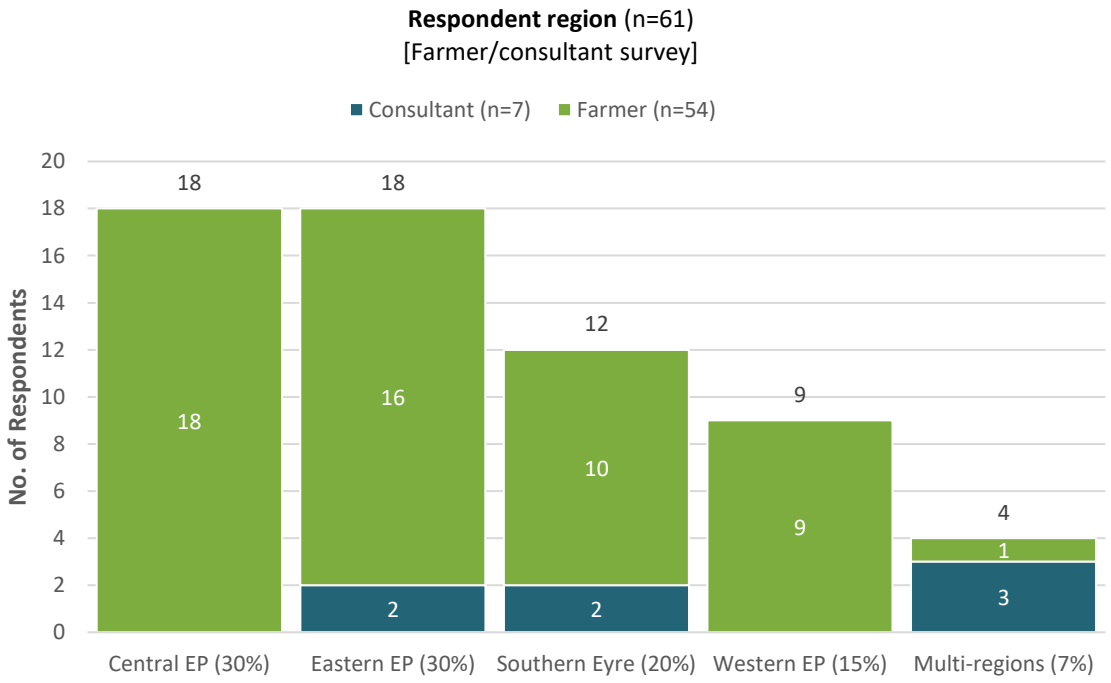
None	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0	1	2	3	4	5	6	7	8	9	10

2.1 Respondents

There were 61 respondents to the Farmer and Consultant Baseline Survey and 22 respondents to the Informed Persons Baseline Survey.

- **Farmer/consultant survey:** 54 Farmers and 7 Consultants – 30% from the Central Eyre Peninsula region, 30% Eastern, 20% Southern, 15% Western, and 7% across multi-regions.
- **Informed persons survey:** 8 Consultants, 6 NRM, 4 Researcher, 3 Farmer, and 1 Other. (Details of informed person experience listed in appendix table 1)

Figure 1



(Note: One respondent with no 'Type' data included as a Farmer and one respondent with no 'Region' data included in Central EP)

2.2 Attention to Seasonal Forecasts

Farmers and consultants on average paid a moderate level of attention to seasonal forecasts and their implications for farm or property decisions (4.7 avg. n=61).

- **Type:** Farmers (4.8 avg. n=54) paid slightly more attention than consultants (4.3 avg. n=7).
- **Region:** Those from the Southern EP paid the most attention (6.3 avg. n=12) – followed by Eastern (4.7 avg. n=18), Central (4.3 avg. n=18), Multi (4.0 avg. n=4), and Western (3.9 avg. n=9).
- **Comments:** Forecast accuracy – particularly long-term – was the major factor limiting the usefulness of seasonal forecasts on decision making, with one Central EP farmer commenting *longer term seasonal forecasts are not reliable or accurate enough to make sound business decisions.*
- **Informed persons:** On average estimated around 66% of growers/producers paid attention to seasonal forecasts and their decision-making implications (n=22), with comments noting that while many growers paid attention to the forecasts, their influence on decision making varied, with some deterred by perceived accuracy issues.
- Full comments are listed in appendix tables 2 and 3.

Figure 2

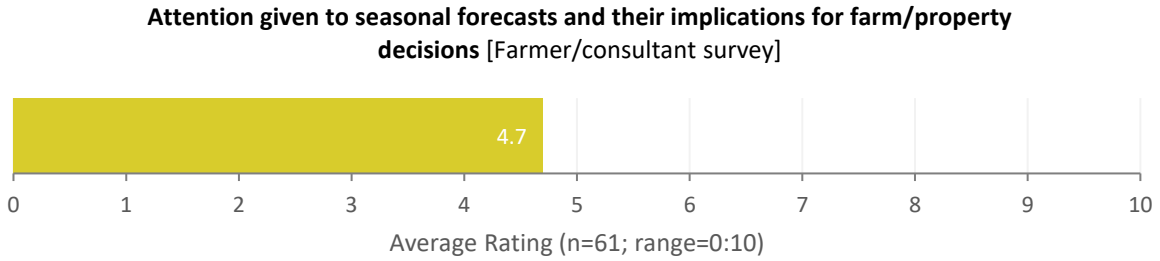
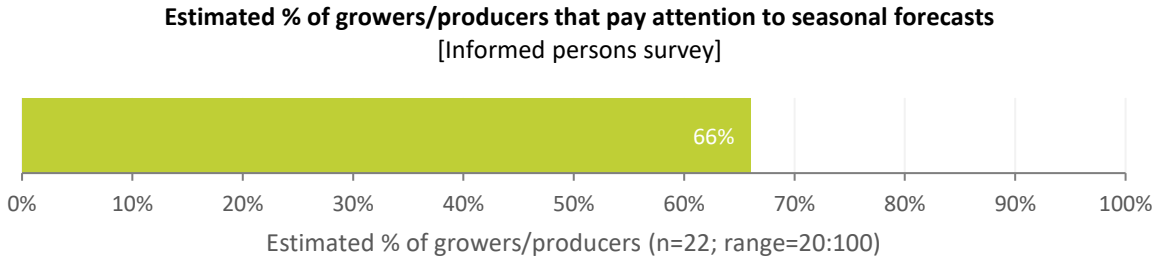


Figure 3



2.3 Use of Soil Moisture Levels

While farmers and consultants agreed that understanding soil moisture levels was important (7.9 avg. n=61), the extent it was actually measured and used to base cropping or management advice/decisions was varied (5.6 avg. n=61).

- **Importance:** Only the Western EP region placed less importance on understanding soil moisture levels (6.6. avg. n=9) – there was little variation between all other regions (8.1 to 8.3 avg.) and respondent types (7.6 to 7.9 avg.). Comments suggested that it was becoming more important and moisture levels (for those that used them) influenced a variety of decisions including crop choice and fertiliser and disease management.
- **Region:** The extent soil moisture was measured and used varied across regions, with the Multi-region respondents most likely (6.8 avg. n=4; mostly consultants), followed by Central EP (6.3 avg. n=18), Eastern (5.7 avg. n=18), Southern (4.8 avg. n=12), and Western (4.3 avg. n=9).
- **Comments:** The level and method of soil moisture measuring was varied, with some farmers having multiple soil probes, others digging down with a shovel, and others relying on intuition or neighbours' measurements. Issues with calibration and limited usable data also prevented some from effectively using their probes.
- **Informed persons:** Estimated on average that only a third of growers/producers monitor soil moisture and base decisions on the levels found (33% n=22). Comments suggested that while the percentage varied – often by location – relatively few had moisture probes installed and *most would find it difficult to understand soil moisture and its constraints within the variances of soil structures*.
- Full comments are listed in appendix tables 4 to 6.

Figure 4

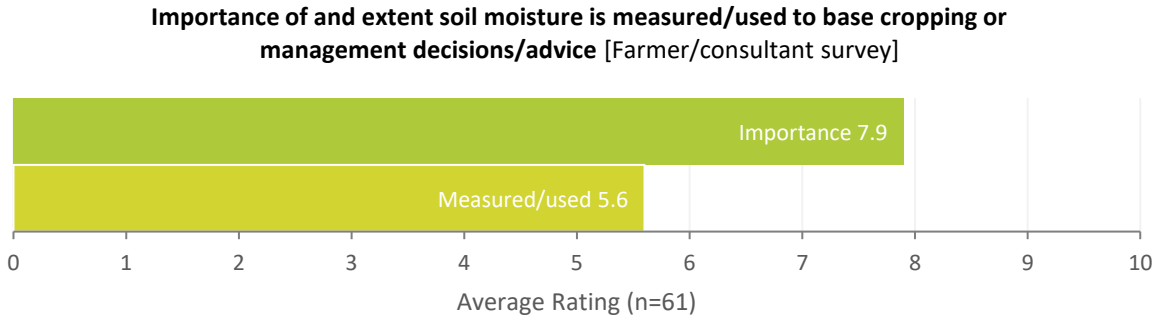
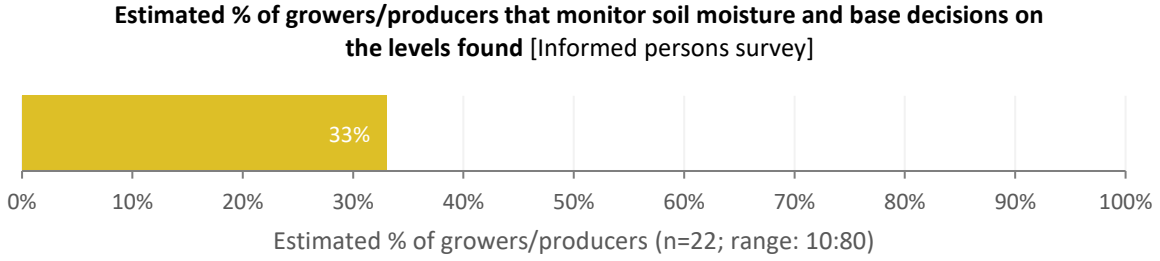


Figure 5



2.4 Awareness of Eyre Peninsula Soil Moisture Probe Network

There was very high awareness of the Eyre Peninsula Soil Moisture Probe Network amongst farmers and consultants (92% n=61).

- **Type:** 100% of Consultants and 91% of Farmers were aware of the network.
- **Region:** Awareness was high across all regions – 100% Multi-region, 100% Eastern, 92% Southern, 89% Western and 83% Central.
- **Informed persons:** Estimates of grower/producer awareness by informed persons was lower than actual awareness of those surveyed (53% estimated average vs. 91% actual awareness).
- Full comments are listed in appendix tables 7 and 8.

Figure 6

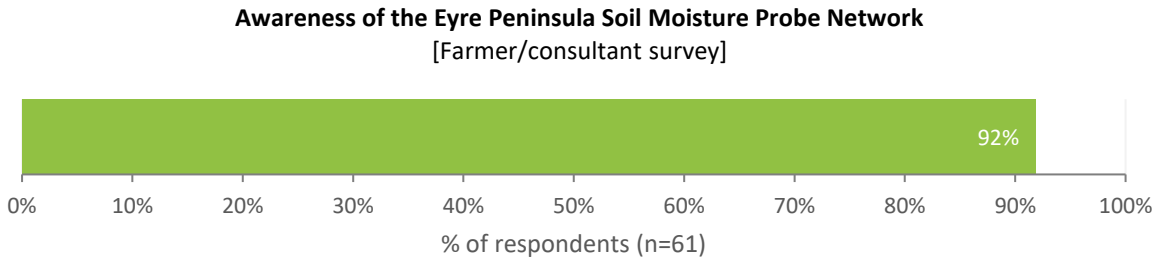
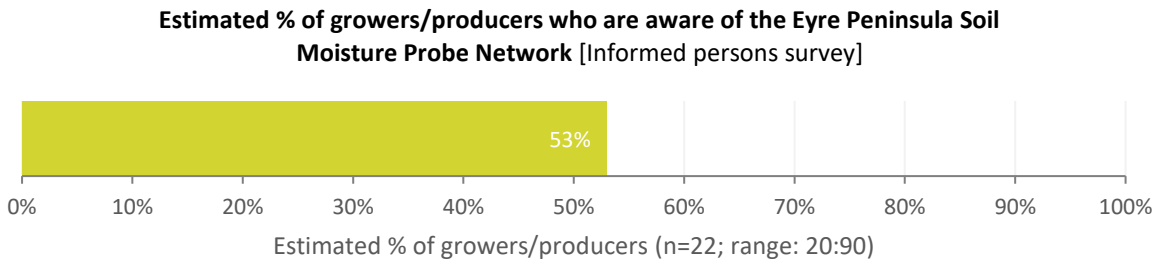


Figure 7



2.5 Awareness/Use of the Website

Just over half of growers and consultants use or have used the Soil Moisture Probe Network website (57% n=61) and felt it was moderately useful in terms of assisting their decision making (5.2 avg. n=35).

- **Type:** 86% of Consultants and 54% of Farmers used the website – usefulness ratings were similar.
- **Region:** Use of the website and usefulness ratings varied between regions, with the highest use by those in the Eastern EP (83%), followed by Multi-regions, Western (56%), Central (44%), and Southern (33%). Those from the Central EP who had used the website found it most useful (6.1 avg. n=8), followed by Southern (5.3 avg. n=4), Multi-region (5.3 avg. n=3), Western (5.0 avg. n=5), and Eastern (4.7 avg. n=15).
- **Comments – Suggested improvements:** Asked how the website could be improved, farmers and consultants felt it needed to be easier to use and navigate, with data easier to understand and interpret – a mobile friendly app was suggested.
- **Comments – Reasons for not using:** Of the 31% of farmers/consultants that were aware of the website but didn't use it, many hadn't got around to it, some were unsure how to use the website or read the data, while others used data from their own probes and weather stations.
- **Informed persons:** Estimated only around a third (29%) of growers/producers used the website – lower than the actual 57% usage reported by those surveyed. Commenting on why some may have not used the website, they highlighted a lack of grower awareness that it existed and understanding of how to use it, suggesting that promotion/awareness raising activities combined with training/extension would increase uptake and value.
- Full comments are listed in appendix tables 9 to 13.

Figure 8

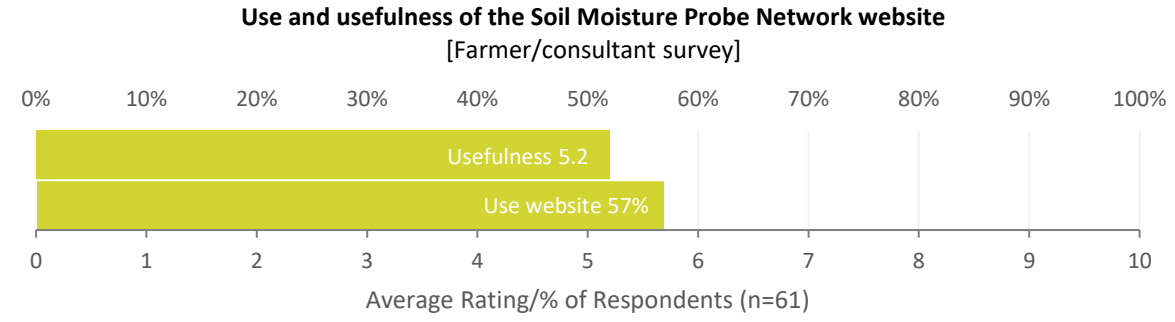
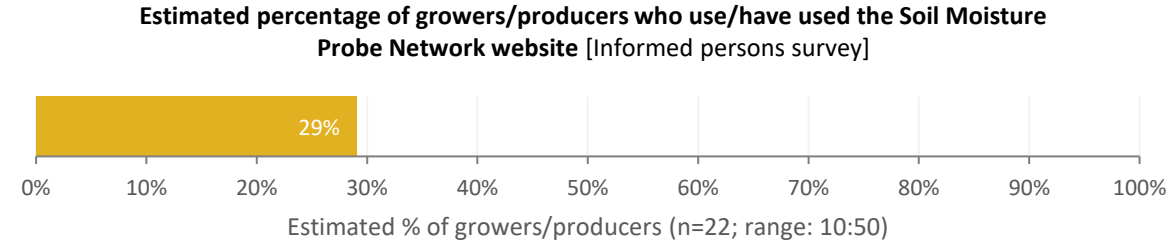


Figure 9



2.6 Use of Moisture Probe Network Data

Examples of how farmers and consultants had used data generated by the Moisture Probe Network included *estimating yields, deciding on spreading urea, guiding N application,* and *whether to sow or not.* Informed persons also provided examples of growers/producers using the network data to *formulate in-crop N decisions, influence yield targets, making seeding decisions, controlling summer weeds,* and *increasing confidence in crop choices*.

Farmer/consultant examples:

- *Estimating target yields and applying fertiliser to achieve it.* (Central EP Farmer)
- *Have tried to compare year to year for planting decisions (canola), for N decisions and for washing out grain contracts.* (Eastern EP Farmer)
- *I have a moisture probe installed which is part of the network. I use the data to inform myself of cropping risk and potential. This allows me to make informed fertiliser and timing decisions.* (Western EP Farmer)
- *I have one client with a probe on limestone-based soil type near the coast that has soil constraints between 40 and 50 cm. We looked at it last year and use it to make nitrogen topdressing decisions. You could watch the crop draw down on the moisture in the top 40cm and while the crop still looked OK you knew it wasn't far off running out of moisture so no additional N was applied.* (Eastern EP Consultant)
- *Useful when making decisions to top-dress urea. Can also see how much summer weeds are drawing. They stop drawing moisture on the day of spraying.* (Central EP Farmer)
- *What sow based on soil moisture, and whether to spread urea on the profile moisture provided, or not spread needing to leave moisture there to finish crops in September.* (Eastern EP Farmer)

Informed persons examples:

- *Yield targets have been influenced by soil moisture probe data – especially in 2019 when we could see there was less moisture in the profile in spring than other years. This in turn influenced N rates applied and may have influenced marketing decisions.* (Consultant)
- *I myself and some of our grower group have used it often to discover the abundance or deficit of moisture available to the crop (but equally being unsure of soil PAW, WHC and soil characteristics/constraints at depth and subsequent crop root depth) to enable guidance for N requirements, machinery purchasing, yield potentials/harvest estimates and grain marketing.* (NRM)
- *Understanding current soil moisture & then spraying summer weeds to conserve it. Having the confidence to put out N knowing there was soil moisture at depth.* (Researcher)

(Note: Full comments are listed in appendix tables 14 and 15)

2.7 Suggestions to Maximise Benefits

Asked what they would like to see from the Soil Moisture Probe Network to maximise its benefits, farmers and consultants suggested increasing/expanding the number of probes to more areas and soil types, improving the interface/software to be more user-friendly and accessible, and increasing confidence that the data is accurate and calibrated correctly. Informed persons provided similar suggestions, particularly highlighting the need for the data to be accurate and credible, easy to understand, and easily accessed.

Farmer/consultant examples:

- *Better platform with maps that can accurately show to a reasonable degree moisture levels over a wider area.* (Western EP Farmer)
- *Expand the number of probes. Recent years have shown marked variance in rainfall across neighbouring areas.* (Eastern EP Farmer)
- *More accurate PAW reading for individual farms and their particular soil types more accurate management decisions can be made.* (Eastern EP Farmer)
- *Not sure what is on there already but easy to find soil moisture data across the central ep as we have farms well spread apart and are aware they vary a lot with rainfall and soil moisture, but having it on hand to make critical decisions through the year and possibly stocking decisions before the year kicks off would help immensely!* (Central EP Farmer)
- *Well calibrated network with user friendly interface that provides real time information on which to make decisions* (Southern Eyre Consultant)
- *Ideally we'd like to know exactly how much moisture we have in the soil, whether that be in millimetres or available days or some other data type. In addition whether that moisture is plant available. For example a wet summer might show a nearly full profile but a dry autumn may mean that crops will not germinate until there is sufficient moisture in the upper layer.* (Eastern EP Farmer)

Informed persons examples:

- *Where probes indicate poor water use efficiency more detailed analyses of the causes (agronomic or soil) could lead to improved management.* (Consultant)
- *Farmers need to be confident that the data is real time and how to use it on their property. Need a good network across the wide range of soil types across EP.* (NRM)
- *For me, some estimate of the reading and error in mm would assist, especially if the promise is a network rather than a single probe in a paddock.* (Researcher)
- *I'd like to see all probes linked to one point. Categorized into soil types, showing all relevant information. Available by subscription to anyone who feels they could use the data.* (Researcher)

(Note: Full comments are listed in appendix tables 16 and 17)

2.8 Use of Tools/Forecasts

Around half of farmer and consultants had used the three tools/forecasts listed – 59% using satellite imagery for landscape management, 57% yield mapping, and 55% BoM seasonal forecasting tools. Of these, yield mapping was rated the most useful (7.6 avg. n=34), followed by satellite imagery (6.5 avg. n=36), and BoM seasons forecasting tools (5.1 avg. n=33).

- **Type:** Consultants were more likely to be using all types of tools/forecasts – e.g. 100% using satellite imagery vs. 54% of farmers.

	% Using			Avg. usefulness		
	Satellite imagery	BoM seasonal forecasting	Yield mapping	Satellite imagery	BoM seasonal forecasting	Yield mapping
Consultant	100%	71%	86%	5.3	5.4	6.7
Farmer	54%	53%	53%	6.8	5.0	7.8

- **Region:** There was some variability in the number using and usefulness of different forecasts/tools across regions. The table below shows this variation:

	% Using			Avg. usefulness		
	Satellite imagery	BoM seasonal forecasting	Yield mapping	Satellite imagery	BoM seasonal forecasting	Yield mapping
Central	67%	61%	39%	6.8	4.6	8.4
Eastern	56%	47%	67%	5.8	5.3	7.3
Southern	50%	50%	64%	6.7	6.0	7.7
Western	44%	56%	44%	7.5	4.0	7.5
Multi	100%	75%	100%	6.0	6.0	6.8

- **Other tools/forecasts included:** Other Mapping (8 mentions – 6.6 avg. usefulness; e.g. pH, soil, protein, harvest yield, biomass, em 38)**,** Own observations/intuition (6 mentions - 7.7. avg. usefulness; e.g. based on historical records/forecasts), Other weather websites/tools (5 mentions – 6.6. avg. usefulness; e.g. Weatherzone, Willy Weather, CSIRO Graincast, iPaddock Yield, Ag Vic Soil Moisture website), and Soil testing (4 mentions – 6.8 avg. usefulness; e.g. Ph, nitrogen, grid)
- **Comments:** Example comments from farmer/consultant respondents on each tool/forecast include:
    - **Satellite imagery for landscape management:** *It seems quite accurate; we traditionally use it to identify poor performing areas in season. Before imagery we historically had to wait until the yield data at the end of the season, by which time it was too late to impact on the current crop.* (Eastern EP Farmer)
    - **BoM seasonal forecasting tools:** *They give you a rough idea but don't seem to have a high level of accuracy in the longer outlooks.* (Central EP Farmer)

- **Yield mapping:** *Accurately maps the performance of the crop and soil types for the particular season. This is used for variable nutrition and identifying areas with yield limiting characteristics.* (Eastern EP Farmer)
- **Other mapping:** *pH mapping is in my eyes the best $ spent on the farm. Identifies a major constraint that is cheaply and easily rectified.* (Multi-regions Consultant)

- **Informed persons:** Estimates from informed persons on the percentage of growers/producers using specific tools/forecasts was similar for BoM seasonal forecasting and yield mapping compared to the percentage reported using in the grower/consultant survey – though the reported usage of satellite imagery was about double what informed persons estimated (54% actual vs. 26% estimated). Estimated usefulness was similar to reported usefulness, though BoM seasonal forecasting was lower than informed persons expected (6.2 avg. estimated vs. 5.0 avg. actual).

	Est avg. % grower using			Avg. usefulness to users		
	Satellite imagery	BoM seasonal forecasting	Yield mapping	Satellite imagery	BoM seasonal forecasting	Yield mapping
Informed persons	26%	64%	58%	6.3	6.2	7.5

Comments: Example comments from informed persons on each tool/forecast include:

- **Satellite imagery for landscape management:** *I assume this means Satellite NDVI imagery. Its useful information if the growers knows how to use the data and has a good understanding of their soil types.* (Consultant)
- **BoM seasonal forecasting tools:** *Most treat forecasts of some indication of what potentially could happen, but also most maintain a healthy dose of scepticism given these things can change direction quite quickly and have done so in the past.* (NRM)
- **Yield mapping:** *Up to between 60 and 80% create yield maps due to machinery technology, but whether or not they use them is significantly lower (maybe10-30%) due to machinery/technology/training limitations.* (NRM)
- **Other mapping:** *EM and pH mapping are used by a relatively small number of farmers. EM mapping data can be difficult to interpret and the appropriate management actions can be difficult to implement. pH mapping is very useful in areas of acid soils and is being increasingly adopted but further promotion would be beneficial.* (Consultant)

- Full comments are listed in appendix tables 18 to 28.

Figure 10

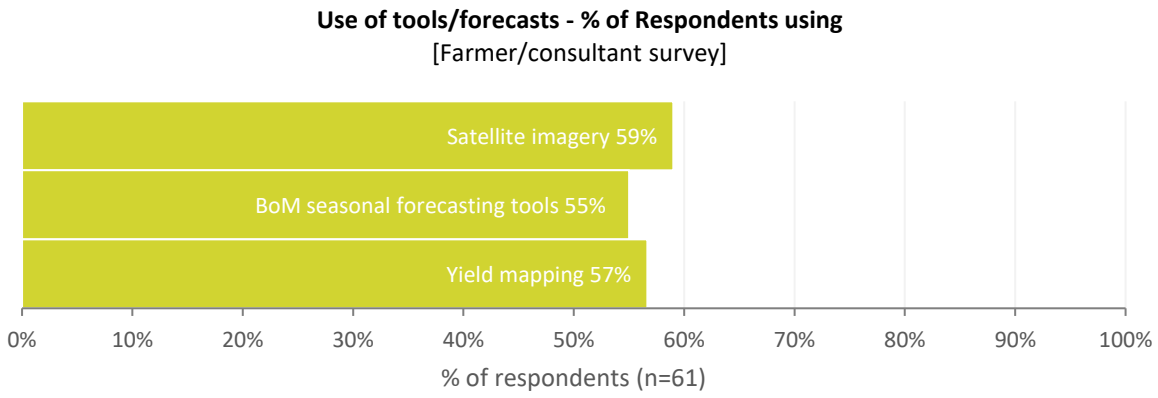


Figure 11

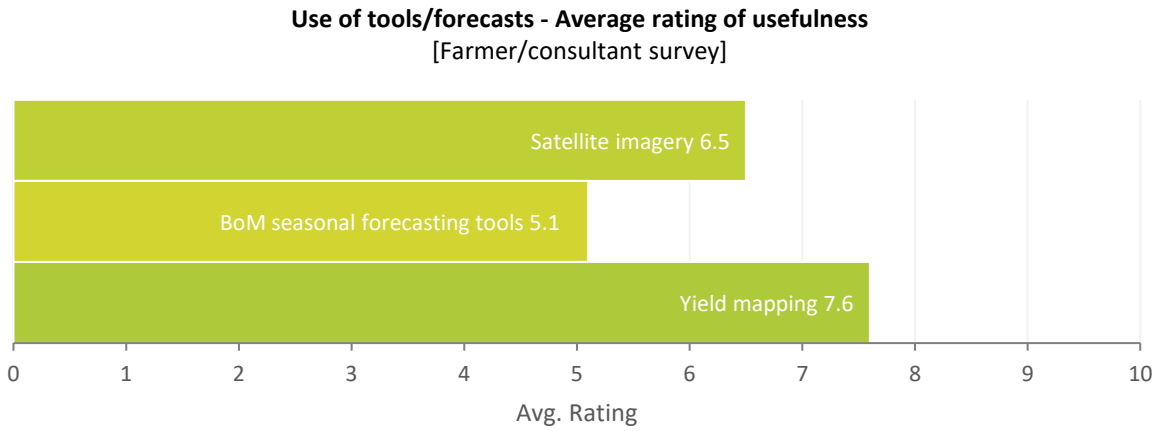


Figure 12

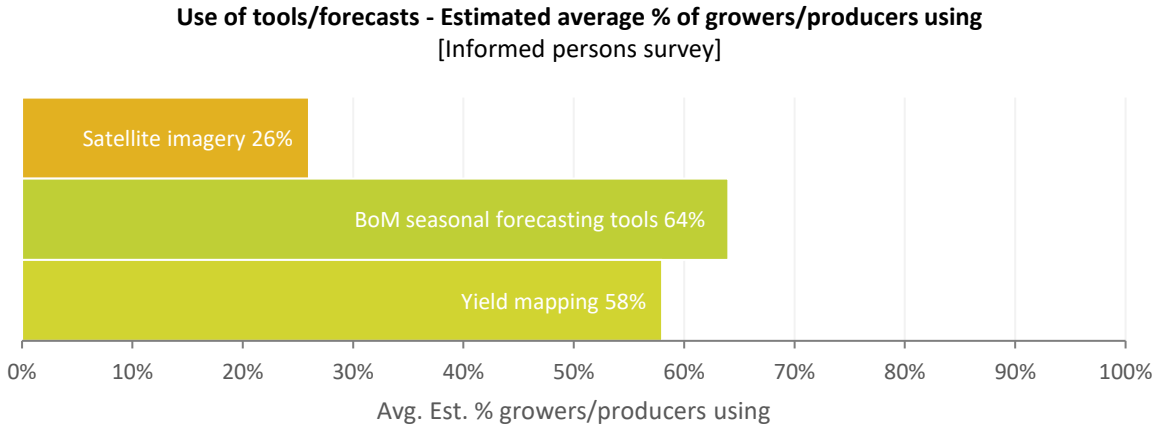
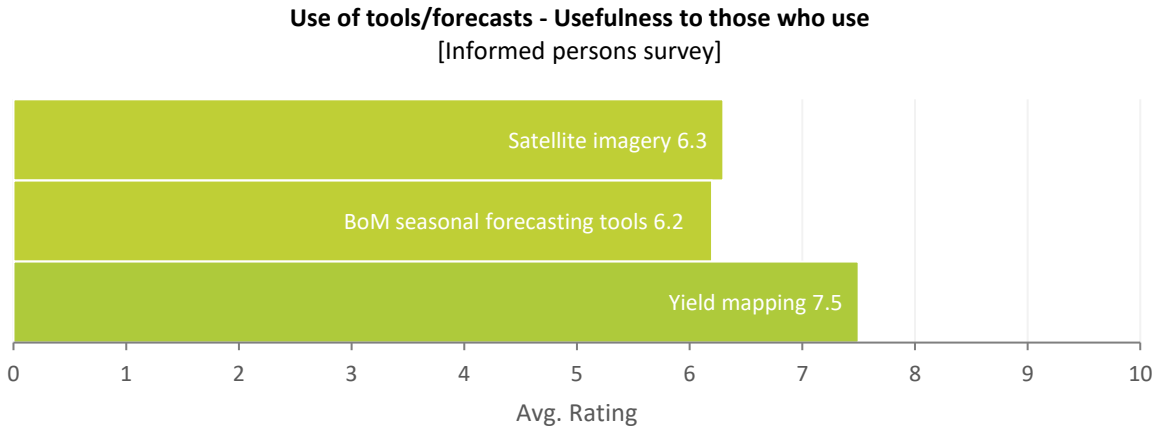


Figure 13



2.9 Greatest Needs

When asked what their greatest needs where when it comes to assistance with decision-making around best management of soil moisture and climate forecasts, farmers and consultants consistently reiterated the need for accurate and reliable data, particularly at an individual farm level and for long-term forecasts. The need for user-friendly tools and increased training and support to help interpret and understand the data was also seen as important. Informed persons agreed that both consistent and accurate data was critical and growers/producers needed more education, training, and support to improve awareness, access, and understanding of the information.

Farmer/consultant examples:

- *Climate forecasts need a better than 50/50 chance of being accurate to be any use - and that is not evident to me at the moment. Soil moisture information firstly needs to be relevant to our properties, and then it needs to be calibrated for soil types because they vary so much in a single paddock. The information provided by the probes then needs to be translated into potential actionable steps to inform the farmer's decision processes.* (Central EP Farmer)
- *Every farmer will use the data differently to suit their particular system. Receiving accurate data relevant to the individuals farm is the first step. From this accurate data there are many possibilities for the use of the probes.* (Eastern EP Farmer)
- *Improved accuracy of forecasts and more detail of what is coming in. Another radar and weather station somewhere on the coast of lower Eyre peninsula. Maybe installing a few of our own weather stations/ moisture probes on different properties.* (Southern Eyre Farmer)
- *Accurate data is the greatest need, followed by an interface that allows growers to interrogate that data to inform decisions. This data could be supported by models to make predications around what that PAW number is likely to achieve under various conditions.* (Eastern EP Farmer)
- *User friendly tools that provide real time information and are easy to access.* (Southern Eyre Consultant)

Informed persons examples:

- *Education (time efficient) Also the perceived relevance to farmers bottom-line, their yoy farm profitability, which affects their long-term viability and hence their resilience. (NRM)*
- *An easier network to access and monitor. Simpler formats to easily comprehend the information.* (Consultant)
- *Consistent and accurate climate forecasting/modelling. Promotion of soil retention practices/technologies.* (NRM)
- *Good knowledge of what level of accuracy is needed to support a decision and which decisions can extract the most value from these tools.* (Researcher)

(Note: Full comments are listed in appendix tables 29 and 30)

APPENDIX 1: COMMENTS

Table 1: *[Informed persons] Experience/perspective*

Consultant 11	Experience and focus has largely been on overcoming soil constraints
Consultant 3	18 years agronomic experience
Consultant 7	10 years farming experience and 20 years as a consultant agronomist with a retail outlet.
Farmer 18	8 years farm experience, 4 year soil and plant nutrition consulting.
Farmer 22	Project management and extension
Farmer 5	Farm manager and budding Bag!
NRM 12	From a farming background -Live in a remote area
NRM 16	Dryland farming family background. Environmental and agricultural degrees and practical experience working with farmers and pastoralists.
NRM 20	Family farm, Owner, Manager 30+ years experience BAgSc Waite - Interest and appreciation of Agric Res and Science
Other 19	Officer
Researcher 1	Three years research experience in the Eyre Peninsula agricultural dryland farming systems as SARDI staff member.
Researcher 10	Researcher engaged in the project.
Researcher 17	Worked in the Ag industry 3 years as an Ag Researcher. 35yrs, selling and advising growers on pesticide use over a variety of crops, pastures & growth stages.
Researcher 6	Climate applications
Researcher 8	30 years ag research experience with CSIRO

Table 2: *[Farmer/consultant] Attention given to seasonal forecasts and their implications for farm or property decisions*

Eastern EP Farmer 19	8	Short range forecasts 1-20 days are particularly important due to their higher accuracy compared to long range.
Multi-regions Farmer 18	8	iOD Sam La Niña El Niño Useful guides with increasing value mid season Recognise not always reliable
Central EP Farmer 10	6	Keep an eye on forecast with a view to sowing on a date eg 15 April and 25 April
Central EP Farmer 15	6	The imprecision of forecasts makes them little more than of interest in terms of the practical application of the 'information' in the forecasts
Central EP Farmer 27	6	Accuracy leaves a lot to be desired, lucky to get it right in hindsight let alone foresight
Central EP Farmer 33	5	Longer term seasonal forecasts are not reliable or accurate enough to make sound business decisions.
Central EP Farmer 40	5	We have set rotations for different farms dependent on the seasonal forecast but each farm is farmed differently due to year to year rainfall differences! We

		do depend on the seasonal forecast for timeliness of sowing and other operations taking place like spreading and spraying!
Central EP Farmer 54	5	They are usually not accurate
Eastern EP Farmer 12	5	Look at them but dont necessarily believe they really know most of the time.
Eastern EP Farmer 50	5	I am becoming increasingly frustrated with seasonal forecasts, to the point i take little notice of them for the benefit of my mental health. There are many seasonal forecasters out there, and often the conflict each other, including the bureau. The accuracy of seasonal forecasting by the bureau is less than satisfactory at the time that many crucial decision around our cropping program need to be made.
Southern Eyre Farmer 55	5	Look at them but base decisions on what's happening more locally.
Central EP Farmer 36	4	Forecasts are just not accurate enough for financial decisions.
Central EP Farmer 42	4	I take interest in them but don't really let them influence my program
Western EP Farmer 29	4	Anything can happen
Western EP Farmer 62	4	Forecasting is still a little unreliable to make large decisions on
Eastern EP Consultant 5	3	Forecasts to date have not been reliable enough to make significant changes to farm programs.
Multi-regions Consultant 2	3	Very low accuracy when we need them early in the season for crop choices. 3-7 day forecasts are used as a guide
Southern Eyre Farmer 20	3	They are mildly interesting but not accurate enough to assist with management decisions around cropping intensity/inputs.
Western EP Farmer 11	3	everchanging conditions need to adapt
Central EP Farmer 6	2	Have to right better than 50% of the time to be useful. The accuracy is generally too low to be useful, although BOM is getting better
Multi-regions Consultant 1	1	Would rate a little higher from July onwards but don't really change decisions given a particular forecast at this stage
Eastern EP Farmer 44	0	My personal view is that the accuracy of seasonal forecasts is very close to 50%, and therefore futile to weight this too much into decisions because of the near equal chance of it being accurate or not.

Table 3: *[Informed persons] Estimated percentage of growers/producers that pay attention to seasonal forecasts and their implications for farm or property decisions*

Farmer 18	90	Short range forecast in particular due to their high accuracy.
Researcher 17	90	I feel 60% would base their farm plan/decision around a seasonal forecast. 30% would loosely base decision making on this & gut feel. 10% would carry on as normal, following district practice and slowly evolve with that practice.
NRM 12	80	Majority of decisions are based around weather forecasts or predictions Only small minority will push ahead regardless of weather outcomes
Researcher 1	80	Growers use phone apps like CliMate or go to the BOM website
NRM 20	70	On UEP, a Large range. Overall, about 70% make an attempt, but ranges from obsessive monitoring to hearing info at the pub or on Country Hour to total ignorance and complacency based on the fact that BoM can't even get daily forecasts correct,
Consultant 3	60	They shouldn't take as much notice of it!

Researcher 8	50	I recently published a survey which indicated that less than 40% growers take notice of soil moisture when making fertilizer decisions.
Consultant 7	40	A higher percentage would look at the seasonal outlook but no matter what the season prediction is it does not influence what they do on their property.
Researcher 6	30	I have put this at 30%. If take any notice at all would be maybe 80%, if place a lot of weight in forecast maybe 10%.

Table 4: *[Farmer/consultant] Importance of understanding soil moisture levels on decision making*

Eastern EP Farmer 50	10	The moisture probe network is an untapped resource that will offer so much in our decision making. Accurate data and a sound understanding of plant available water throughout the season will assist us with crucial decision making around planting certain crop types, forward selling grain (or washing out contracts), applying N, yield forecasting for insurance.
Eastern EP Farmer 53	10	We only guess this up to now unless it is an obvious extreme either way
Multi-regions Farmer 18	10	Monitoring soul water all year round. Little influence on crop choice , big influence on nitrogen and disease management practices
Central EP Farmer 10	9	Essential to know what is stored in the profile. Cropping year confidence and hence cropping area and crop type decisions can be made
Eastern EP Farmer 19	9	N applications, crop types, varieties, time of sowing, hay cutting, fertiliser etc. are important decisions which are affected by current soil moisture status.
Multi-regions Consultant 2	9	Very high importance for N & fungicide decisions in season. Can help with crop choice at start of the year
Central EP Farmer 33	8	Soil moisture is a known factor and can give confidence to seasonal planning.
Central EP Farmer 36	8	Need to know more
Central EP Farmer 42	8	I have a moisture probe that I am learning how to use efficiently
Eastern EP Consultant 5	8	Understanding moisture levels in the soil will significantly impact farm decisions both prior to seeding starting and during the growing season
Eastern EP Farmer 12	8	The more we learn the more important this is
Southern Eyre Farmer 20	8	More accurate and localised data.
Central EP Farmer 40	7	Regardless off how much moisture is in the soil at the beginning of seeding we still need to stick to our plan and paddock rotation but if lack of rain and deep soil moisture we might not sow our legume crops (peas/lupins) and save paddocks for extra grazing of livestock! We will need to know soil moisture levels to know if post spreading urea/SOA is warranted or going to be beneficial
Western EP Farmer 28	7	Probably more in the future
Central EP Farmer 61	6	once we gain more understanding could be very important
Western EP Farmer 11	5	The level of soil moisture available dictates what will be planted first

Table 5: *[Farmer/consultant] Extent soil moisture is measured and levels used to base cropping or management advice/decisions*

Central EP Farmer 10	9	Have own probe and intend to extend to other blocks/soil types and regularly kept an eye on to give confidence what and when to sow

Eastern EP Farmer 45	9	Have multiple moisture probes
Eastern EP Farmer 12	8	Extremely nervous this year as there isnt any sub soil moisture
Multi-regions Farmer 18	8	2 soul probes on property attached to weather stations (not on ep network)
Southern Eyre Farmer 21	8	Have Soil Moisture Probe
Southern Eyre Farmer 48	8	Use soil moisture probes to manage urea applications and forecast/guide business decisions based on late season moisture linking it to yield potential
Central EP Farmer 42	7	Have our own moisture probe we are learning to use
Eastern EP Farmer 44	7	We have installed our own probe, and the information will improve over time as we overlay the crop type and season with the reading from the probe.
Eastern EP Farmer 52	7	We have an EPARF probe, we look at the data but are yet to trust it enough to make solid decisions
Central EP Farmer 15	6	Soil moisture influences mid-season fertilizer decisions and in spring crop insurance and grain marketing decisions - but measuring it is time consuming and imprecise/ad hoc.
Central EP Farmer 39	6	Dig down with a shovel
Western EP Farmer 28	6	Shovel and summer spraying at this stage
Central EP Farmer 6	5	Have a probe, but not really getting very useable information from it yet
Eastern EP Consultant 5	5	I have a number of clients with moisture probes and I am starting to look at them more and more - especially in season when trying to work out additional nitrogen applications
Eastern EP Farmer 50	5	Data is currently inaccurate due to lack of calibration. We use the data in decision making, but not with the level of confidence we need. Also the user interface is shit! It's not user friendly, you can't extract tabled data for your own comparison.
Southern Eyre Farmer 55	5	Have long term rainfall records but no moisture probes. Make decisions on what moisture levels are believed to be there.
Central EP Farmer 61	4	still learning
Eastern EP Farmer 19	1	The level of soil moisture is currently poorly measured (by visual and textual feel), however, still base important management decisions of this knowledge. Therefore it makes sense to increase the measurement accuracy of on farm soil moisture status.
Western EP Farmer 11	1	Just go by the neighbour's weather soil moisture probe
Western EP Farmer 29	1	I use a shovel and dig to find where the moisture is. We do not have probes.

Table 6: *[Informed persons] Estimated percentage of growers/producers that monitor soil moisture and base decisions on the levels found*

Farmer 18	50	90-100% would monitor soil moisture but less would base management decisions off the current PAW status
Researcher 17	30	Most would find it difficult to understand soil moisture and its constraints within the variances of soil structures. (Who does completely.) Not completely the growers' fault. There is a big void in information/research in the arena.
Consultant 3	40	Not enough emphasis placed on this known part of the business from the grower perspective

NRM 12	30	Not sure if this question is asking if farmers use formal technology to monitor soil moisture i.e. probes, or whether it is based on observation and digging below the surface to observe moisture depth. Some farmers I work with monitor soil moisture through observation and digging, and then base cropping decisions on this.
NRM 20	40	Once again a wide range, but relatively few have soil moisture meters stationed on their farms and hence some are sceptical as to whether those that do can translate to those that don't and their own situation. Many just use rain received and gut feel and what others say.
Researcher 1	50	The percentage is affected by the concentration of soil moisture probes in the area. For example, most of Ceduna (the area does not have soil moisture probes) growers were not aware about the existence of the EPARF soil moisture probe network. However, in areas such as Elliston/Port Kenny/Streaky Bay, growers currently use the EPARF soil moisture probe network as a support tool to make agricultural management decisions. Usually because the neighbour or growers themselves own a soil moisture probe.

Table 7: *[Farmer/consultant] Awareness of the Eyre Peninsula soil moisture probe network*

Central EP Farmer 36	Have many in buckleboo area
Central EP Farmer 40	Neighbour has one
Central EP Farmer 42	Not sure how to utilize it yet
Central EP Farmer 10	Part of it
Eastern EP Farmer 19	We use it to give a general reading of soil moisture and temperature. However, are aware of the discrepancies between farms and soil types.

Table 8: *[Informed persons] Estimated percentage of growers/producers who are aware of the Eyre Peninsula soil moisture probe network*

NRM 20	Wide range. Most that attend MAC FD, EPARF members and farmer research meetings in March are aware. Outside that, there would be very little awareness.
Researcher 17	With the crop walks/sticky beak/industry/Ag Bureau days that I have attended in the past 5 years. 60-65% of growers understand there is soil moisture in their district. But don't understand that they can be linked or what features & benefits it offers.

Table 9: *[Farmer/consultant] Suggestions on how to improve the website*

Eastern EP Farmer 31	10	FDI alerts sent out automatically in our area when the index reaches 35 and above at harvest
Eastern EP Farmer 25	9	easier to log into
Central EP Farmer 7	8	An app
Central EP Farmer 33	7	Make the data easier to interpret.
Central EP Farmer 39	7	Make it rain
Eastern EP Farmer 52	7	We only look at our own data. The interface could be more user friendly. It needs to be easier to add paddock treatments etc. We are yet to trust the data fully as the available moisture isn't abundantly clear. It seems to register

		higher levels of moisture than we would anecdotally recognise from personal experience.
Eastern EP Farmer 53	7	Calibration of the soil moisture readings would be very helpful. Expanding the information ie. graphs get very clunky particularly on mobile device
Multi-regions Consultant 2	7	Not having to login every time Being able to have the same probe open in a tab on your phone to be able to monitor A simple app where we can monitor Have an estimated crop lower limit on every probe
Southern Eyre Farmer 21	6	To be able to see all moisture probe status at the same time in map view
Central EP Farmer 10	5	Don't really know soil types that probes are based and whether they would extrapolate to my situation
Central EP Farmer 6	5	Needs to be quicker to navigate and perhaps present the data as a table so a number of sites can be viewed at once.
Eastern EP Consultant 5	5	Knowing what the "bucket" is for the sites would make a huge difference or at least putting in field capacity and drained lower limit lines so we have an understanding of what moisture is left in the profile to use.
Eastern EP Farmer 50	5	See above; we use it, with low confidence and great frustration at the inadequacies of the user interface
Multi-regions Consultant 1	5	Better interface to make swapping between probes quicker
Western EP Farmer 4	5	Ease of use
Western EP Farmer 62	5	More integration, area summaries with deciles etc
Central EP Farmer 61	4	Haven’t used the website enough to offer suggestions
Multi-regions Consultant 22	4	need an indication of how confident we can be with the data
Eastern EP Farmer 43	3	Easier to understand
Eastern EP Farmer 19	2	Interpolating the data to give a more accurate reading of land not containing a probe.
Eastern EP Farmer 51	2	have not seen the web site
Eastern EP Farmer 58	2	We need a mobile friendly app
Southern Eyre Farmer 57	0	I think on whole more probes are needed, but nothing would be a substitute for your own as even close neighbours practises and soil types differ from your own

Table 10: *[Farmer/consultant] Aware of the website but haven't used it - Reasons*

Central EP Farmer 15	There are no weather stations with relevant data for our properties situated between Lock and Yeelanna (at Murdinga and Tooligie Hill).
Central EP Farmer 27	I have not got around to it
Central EP Farmer 30	haven't got around to it and due to rainfall variability from farm to farm
Central EP Farmer 36	Don't know how to read data
Central EP Farmer 42	Still learning how to use our own then will explore
Central EP Farmer 54	Don't know how to read the data
Eastern EP Farmer 41	only just found out about it

Eastern EP Farmer 44	We have our own, as well as the BFIG network.
Multi-regions Farmer 18	Use own data from own stations Would use if I didn't have my own
Southern Eyre Consultant 47	I don't a particular need to use it in my work
Southern Eyre Farmer 13	Probes are too far away or not working or on different soil types.
Southern Eyre Farmer 20	Find the Agbyte platform far easier to use
Southern Eyre Farmer 46	Have our own weather station and probe.
Southern Eyre Farmer 48	Have own probe and station more relevant to our area values differ too much from our farms to the probes location
Southern Eyre Farmer 55	Not many probes that would be relevant to my area and soil types.
Western EP Farmer 16	unsure how to log into it

Table 11: *[Informed persons] Estimated percentage of growers/producers who use/have used the Soil Moisture Probe Network website*

Researcher 17	I feel the lack of understanding of soil moisture/soli structure. Makes the use of the use of this sort of information a bit daunting for the average grower.
Consultant 7	I have clients who only occasionally look at what the probes are showing if the spring outlook is dry.
NRM 20	Maybe 50% know about network, but barely 20-40% use or have used website.
Consultant 3	Those that actually use it on a yearly basis would be more likely to be < 10% I would estimate

Table 12: *[Informed persons] Reasons why some have not used the website*

Researcher 1	1. They might not know it. Especially in remote areas of the Upper Eyre Peninsula with low to none reception. 2. They might know it, but they have highly variable soil in their paddocks. 3. They might know it, but they do not know which other sites of the soil moisture probe network may have similar soil type. 4. They struggle to make sense out of the soil moisture probe graphs.
Consultant 11	Awareness and time to access
Consultant 2	Don’t know how to use the data. Don’t know the specifics of each site e.g. crop type, sowing date, starting N etc
Consultant 21	lack of confidence in data. possibly don’t know how to read data. used their own methods e.g. rain gauge, shovel and intuition
Consultant 3	Too hard, slow and the information is too "big" or presented in a confusing way. Also inconsistent presentations of data between probes that also can be confusing
Consultant 7	Some of my clients don't look at the website due to a lack of computer/IT skills but mostly because they feel the probes don't represent their soil and moisture levels or they don't understand how to interpret the data.
Consultant 9	Don't know it exists
Farmer 18	Web-based program, not a simple platform. Data of probes doesn't reflect the current PAW status of their individual farm.

Farmer 22	Ease of access and connectivity on the EP
Farmer 5	Just not into it or don't understand it
NRM 12	-Time Poor -Unaware of website -Limited internet connection -Not placing enough emphasis on the importance of soil moisture and retention
NRM 13	Not aware of it or difficulty accessing/interpreting the data. It's not a very user friendly platform.
NRM 14	Does not relate to their property and uncertain how to read/interpret the information.
NRM 15	I think they sometimes struggle to make the link between the scientific data and their own ability to monitor paddock conditions. Possibly they are skeptical it can do more than they can.
NRM 16	May not be good at using technology and may apply seasonal farming practices without looking for sources of information to inform their actions.
NRM 20	Some are technically and technology challenged. Some spend nearly all their time outside working and may look at their phone, but can't find time to have a look at websites.
Other 19	No aware of it? Don't have internet access or too old to use the internet.
Researcher 10	Lack of knowledge of how the information relates to their situation.
Researcher 17	See above.
Researcher 6	A lot of dryland agricultural decisions are made with limited use of measured data?
Researcher 8	They may not understand how to make use of the data and/or have existing rules of thumb that they follow (e.g. I will not sow before ANZAC Day)

Table 13: *[Informed persons] Reasons why some have not used the website*

Researcher 17	A power point tutorial sent out to growers. Explaining the aim's, features and benefits of the moisture probe. Target the region/grower/crop segment better. i.e. there is a lot of sales info out there on probes/makes/types. Most of it is targeted at orchards/vineyards/the likes. I think. Once the grower becomes better educated on soil moisture content (bucket size) in relation to varying soil types. The up take will ten fold. But as I said. This needs more research and better grower education.
Consultant 11	More promotion
Consultant 2	More data regarding operations and timing of the operations
Consultant 21	user friendly., confidence in individual probes and in the soil type probe is located and applicably similar soils/districts
Consultant 3	No login. Consistent format. Figure of the mm of available moisture (in brackets the bucket potential)
Consultant 7	There could be some explanation boxes to help describe to the grower what the information means. Growers just tend to look for this sort of information when they need it. Best time to make them aware of the site is at the start of the season or in a dry spring. the best way of getting it out to them, through all sources of newsletters from govt departments to retail sores and private agronomists and consultants. Advisers and consultants can email the link out plus have data on Twitter.
Consultant 9	Communication that it exists. Smart Phone app to display data

Farmer 18	App based, simpler platform to navigate
Farmer 22	User friendly - make it obvious where to find information on opening up the site. Not too cluttered, responsive.
Farmer 5	Better platform and more probes covering a larger range of soils
NRM 12	Further promotion -Contact via email
NRM 13	Improved user interface
NRM 14	THE NRSAMDB publicise the results/changes in their E-Newsletter. Is their an app that farmers can download?
NRM 15	I'm not sure if that's the issue - getting them to the website. Perhaps just ensuring they see the validity of the data, see how it is genuinely influencing the decisions made by farmers with better outcomes than what could have been achieved through not using it, may get people over the line. Perhaps that could be by altering things on the website to convey that message, but it could also be done through other means like a YouTube video of several interviews with farmers, in the field, with a real soil probe, talking casually about how they have changed particular decisions based on probe insights.
NRM 16	Unsure - can it be accessed as an app from a phone?
NRM 20	Simple un-noisy version and user-friendly interface. Regular promotion/advertising. Maybe SMS prompting, with links to site.
Other 19	Advertising and training if needed.
Researcher 1	I believe the most important thing is communication. I collaborated with NRM giving a small talk about soil moisture probe network at the Water Use on Farm workshop. It was very helpful to see which areas of the Eyre Peninsula growers are aware of the network and its potential application.
Researcher 10	Identification of like conditions and scenarios.
Researcher 8	At the moment, you do NOT have a network; you have a number of discrete soil moisture probes. In my opinion, it will not be a valuable resource until it operates as a network.

Table 14: *[Farmers/consultants] Examples of using data generated by the moisture probe network*

Eastern EP Consultant 14	Actual soil moistures used in 2017 to aid secessions on whether to sow or not
Western EP Farmer 16	Advice from agronomist on stored moisture for nitrogen application
Multi-regions Consultant 22	checked stacked moisture at several times throughout the year
Central EP Farmer 7	Estimating target yields and applying fert to achieve it.
Eastern EP Farmer 37	have looked at data out of interest, rather than to help decision making.
Eastern EP Farmer 50	Have tried to compare year to year for planting decisions (canola), for N decisions and for washing out grain contracts
Central EP Farmer 36	Haven't used it
Central EP Farmer 33	Haven't used the data for decision making but it can be a useful guide.
Western EP Farmer 62	I have a moisture probe installed which is part of the network. I use the data to inform myself of cropping risk and potential. This allows me to make informed fertiliser and timing decisions

Eastern EP Consultant 5	I have one client with a probe on limestone-based soil type near the coast that has soil constraints between 40 and 50 cm. We looked at it last year and use it to make nitrogen topdressing decisions. You could watch the crop draw down on the moisture in the top 40cm and while the crop still looked OK you knew it wasn't far off running out of moisture so no additional N was applied.
Southern Eyre Farmer 49	Look at soil moisture b4 urea spreading on marginal events. No stored moisture = less likely to spread.
Multi-regions Consultant 1	Look at weather stations first for rainfall. Look at stored moisture levels in spring if I know what crop is in the paddock with the probe. Might influence N decisions if we have confidence there is a reasonable amount of water in the profile.
Central EP Farmer 39	No data
Central EP Farmer 40	No i haven’t seen any data from the soil moisture probe network
Central EP Farmer 10	Prior to owning own probe, checked other 'so-called' representative probes in my area to get some idea of what might be there in the soil profile. Currently use own, but occasionally check the network
Eastern EP Farmer 12	Really just had a squizz at it a few times. Haven't used the information
Multi-regions Consultant 2	Reducing growers planned N inputs when low soil moisture levels. Vice versa too Not sown canola in some years or reduced due to low soil moisture
Western EP Farmer 4	Sowing early crops with subsoil moisture present.
Eastern EP Farmer 52	The FDI data from the weather stations has been probably the most useful so far.
Southern Eyre Farmer 20	Urea application decisions
Eastern EP Farmer 45	Used probes to gauge weather crops are moisture or N limited
Central EP Farmer 6	Useful when making decisions to top-dress urea. Can also see how much summer weeds are drawing. They stop drawing moisture on the day of spraying.
Eastern EP Farmer 58	We decided to not plant canola for the last 2 years due to low sub soil moisture
Eastern EP Farmer 53	We use the moisture readings as a guide to N application. We use wind, info for spraying decisions as well as delta T information and also regularly check FDI in summer and in particular harvest activities
Eastern EP Farmer 31	What sow based on soil moisture, and whether to spread urea on the profile moisture provided, or not spread needing to leave moisture there to finish crops in September
Eastern EP Farmer 51	when I have enough data I will use it to decide on spreading urea

Table 15: *[Informed persons] Example of growers/producers using data generated by the moisture probe network*

Consultant 11	Farmers have commented on the seasonal variability accurately reflected by the probes
Consultant 2	Yield targets have been influenced by soil moisture probe data - esp in 2019 when we could see there was less moisture in the profile in spring than other years. This in turn influenced N rates applied, and may have influenced marketing decisions
Consultant 21	using the moisture probe network has caused us to ground truth with digstick which assists in formulating incrop N decisions
Consultant 3	N decision making

Consultant 7	Many years ago a client used moisture probe data from a moisture probe that was only 4km from one of his farms to make a decision managing his wheat crop. It was a dry spring and we knew the soil moisture was getting to critically low levels plus we calculated how much further rain would be required to enable the crop to reach its potential yield. With a bleak spring rainfall outlook we decided to cut down the majority of wheat on one farm for hay. It was a decision the grower has never regretted as the forecast was correct with low spring rainfall and they were able to cut the crop before it became stressed with the gross margin being better than the wheat they left for harvest.
Farmer 22	AgByte and Alpha Group both provide good farmer focused services in SA.
Farmer 5	Many farmers use the probes on nearby farms for making seeding decisions, especially those with farms isolated from where they are based
NRM 15	I am not aware of any simply because it has just not come up in conversation. That may not be a reflection of the presence of any benefits or not.
NRM 20	I myself and some of our grower group have used it often to discover the abundance or deficit of moisture available to the crop (but equally being unsure of soil PAW, WHC and soil characteristics/constraints at depth and subsequent crop root depth) to enable guidance for N requirements, machinery purchasing, yield potentials/harvest estimates and grain marketing.
Researcher 1	At Elliston and Port Kenny for example, or around Minnipa/Wudinna. Soil moisture probes are used to control summer weeds and also to check soil moisture in the profile at the beginning of the season to make decisions on what crops to grow.
Researcher 10	I am aware that some growers have become aware of water carryover during the summer that gave increased confidence in their crop choices.
Researcher 17	Understanding current soil moisture & then spraying summer weeds to conserve it. Having the confidence to put out N knowing there was soil moisture at depth.

Table 16: *[Farmers/consultants] What would you like to see from the soil moisture probe network to maximise its benefit for you*

Central EP Farmer 10	Representative soil characterisations Probe validations and calibrations Cropping history and up to date N strategies Effective rooting depth and subsoil constraints N
Central EP Farmer 15	Critical the gaps in the network are filled in if we are to get any benefit. If the probe network was relevant to us, education around what the implications for crops are from the results provided by the probes – to assist understanding and decision making
Central EP Farmer 27	Complement it with salt tolerant varieties
Central EP Farmer 33	Fill in some location gaps in the network.
Central EP Farmer 36	Easier reading of data
Central EP Farmer 39	More of them
Central EP Farmer 40	Not sure what is on there already but easy to find soil moisture data across the central ep as we have farms well spread apart and are aware they vary a lot with rainfall and soil moisture, but having it on hand to make critical decisions through the year and possibly stocking decisions before the year kicks off would help immensely!!
Central EP Farmer 54	Have an easier way to read the data, maybe in mm of rain in soil
Central EP Farmer 6	Need to know how the calibration of soil moisture in the soil type with crop yield
Central EP Farmer 7	More in the district across different soil types

Eastern EP Consultant 14	Confident in their accuracy and give actual value of available moisture
Eastern EP Consultant 5	Getting additional probes included into the network so we have better coverage over the EP. There are plenty of privately owned probes that farmers would allow to be put up if it could be easily done. If these probes were also calibrated to show available moisture that would be even better.
Eastern EP Farmer 19	More accurate PAW reading for individual farms and their particular soil type s more accurate management decisions can be made.
Eastern EP Farmer 31	More probes in the district
Eastern EP Farmer 43	Understand the information After a few years would like to see trends
Eastern EP Farmer 50	My ultimate would be to have accurate live data on an app similar to that of CliMate. Ready access to data that I have high confidence in will assist me in a wide range of decision as described above. Get this right, and I game changer for our business
Eastern EP Farmer 52	Ideally we'd like to know exactly how much moisture we have in the soil, whether that be in millimetres or available days or some other data type. In addition whether that moisture is plant available. For example a wet summer might show a nearly full profile but a dry autumn may mean that crops will not germinate until there is sufficient moisture in the upper layer.
Eastern EP Farmer 53	Confidence that the readings/ data is accurate and calibrated
Eastern EP Farmer 58	I would like to see an app that utilises all probes, including both Oster and Wilsch's networks as well as an app that shows weather station data from all platforms. We use weather station data (wind speed for spraying etc) on a daily basis and only use soil moisture data every 6 months.
Eastern EP Farmer 59	Expand the number of probes. Recent years have shown marked variance in rainfall across neighbouring areas
Multi-regions Consultant 1	More detail on what the farmer has done in the paddock eg summer weed control timing, sowing date, sowing density, starting N (eg yield profit type info)
Multi-regions Consultant 2	Ease of access and consistency across each probe mm Available moisture figure (above CLL)
Multi-regions Consultant 22	more probes. Accurate description of soils location and rotation impact on probe
Multi-regions Farmer 18	Inversion conditions for spraying (recognise need additional monitoring g capability at most sites)
Southern Eyre Consultant 47	Well calibrated network with user friendly interface that provides real time information on which to make decisions
Southern Eyre Farmer 13	I'd like to see one on our property that measures all weather parameters as well as soil moisture.
Southern Eyre Farmer 20	Better soil characterisation and linking with yield prophet for better nitrogen management.
Southern Eyre Farmer 48	Expand probes and stations
Southern Eyre Farmer 49	More probes
Southern Eyre Farmer 55	Wider range of moisture probes and more soil types classified.
Southern Eyre Farmer 57	More probes and user-friendly interface
Western EP Farmer 11	a inexpensive hand held and mobile soil moisture probe that I can use throughout my farm
Western EP Farmer 16	If it could generate an automatic text / email with updated information regularly during the winter months

Western EP Farmer 24	maybe soil temperature as well as soil moisture
Western EP Farmer 29	Put more probes around our area and promote them to make farmers aware.
Western EP Farmer 4	Better platform with maps that can accurately show to a reasonable degree moisture levels over a wider area.
Western EP Farmer 60	More management information uploaded to give relevance to probe data
Western EP Farmer 62	Area summaries i.e., ep vs western EP vs Wudinna council. Put alongside yield prophet predictions

Table 17: *[Informed persons] What the soil moisture probe network could do to maximise its benefit for the region*

Consultant 11	Where probes indicate poor water use efficiency more detailed analyses of the causes (agronomic or soil) could lead to improved management.
Consultant 2	APSIM modelling against a number of sites. Calibration to know how much moisture is actually available to plants and when. A reference page where soil moisture by date is plotted against moisture at the same time in the previous 5 seasons.
Consultant 21	as discussed in our meeting having confidence in the probe is essential
Consultant 3	Easy to use, consistent format
Consultant 7	For the growers that I look after a couple more probes in areas and soil types that are not represented. Monthly reports on what the status of each probe is and alerts to growers when there are significant events or movements in moisture levels.
Consultant 9	Information and data easily accessed.
Farmer 18	Interpolation so PAW is more accurate for each farmers specific spot type and location.
Farmer 22	The network needs to provide accurate and credible information that is easy to access for decision making. Generate region wide maps of soil moisture availability that are updated in real time.
Farmer 5	This network could be the next big thing in agriculture on EP if it is completed properly. There are so many different aspects and pulling it all together is going to be a mammoth task but hopefully it can reach its potential. The platform needs to be world class and the trials need to hit the mark.
NRM 12	Further promotion
NRM 14	Farmers need to be confident that the data is real time and how to use it on their property. Need a good network across the wide range of soil types across EP.
NRM 20	General soil characterisations that are transferrable/translatable to regions are going to be essential to determine how those soils behave. A simpler modelling output, given localised parameters that can be inputted to give scenarios and or estimated results would be interesting and valuable. This would require more soil probes, more specific soil characterisations (expensive, but should be able to be shared for soil types), generalised on farm soil characterisations, workshops and training farmers to recognise their soil types, soil characteristics (e.g. DUP/WHC, CLL, BD and PAW), data input for modelling and the decision making opportunities that are available to them. This ideally would be localised and available to all that are interested. For most farmers, time is a limitation and many entities compete for that time, hence would have to be delivered in a time efficient manner.
Researcher 1	I would like to see a decision-making application that could maximise the benefit of the region by using non-calibrated soil moisture probe readings.

Researcher 10	A good understanding of how the soil water data relates to the soils on other EP farms, what level of confidence the data has around it and how the information could be used to support a decision.
Researcher 17	I'd like to see all probes linked to one point. Categorized into soil types, showing all relevant information. Available by subscription to anyone who feels they could use the data.
Researcher 6	For me, some estimate of the reading and error in mm would assist, especially if the promise is a network rather than a single probe in a paddock.
Researcher 8	It needs to be run as a network with the data interpolated using appropriate covariates, so that it gains genuine coverage
Researcher 17	I'd like to see all probes linked to one point. Categorized into soil types, showing all relevant information. Available by subscription to anyone who feels they could use the data.
Researcher 6	For me, some estimate of the reading and error in mm would assist, especially if the promise is a network rather than a single probe in a paddock.
Researcher 8	It needs to be run as a network with the data interpolated using appropriate covariates, so that it gains genuine coverage

Table 18: *[Farmer/consultant] Use of satellite imagery for landscape management*

Eastern EP Farmer 19	9	It seems quite accurate, we traditionally use it to identify poor performing areas in season. Before imagery we historically had to wait until the yield data at the end of the season, by which time it was too late to impact on the current crop.
Western EP Farmer 4	8	There is so much info available but what do we achieve with it all??
Central EP Farmer 10	7	Web based 'Decipher' to identify areas needing N
Central EP Farmer 6	7	Can see soil types relatively clearly
Multi-regions Consultant 2	7	Good for an overview, but need to be ground truthed. Better for identifying issues in the paddock in my opinion (retrospectively quite often!)
Central EP Farmer 54	6	Haven't used it much
Eastern EP Farmer 12	6	Good for showing where the frost hit and when
Central EP Farmer 36	5	Haven't used it very much
Multi-regions Consultant 22	5	have used NDVI
Southern Eyre Farmer 20	4	More of general interest rather than helpful for management. Probably need more time/seasons to look at the data
Eastern EP Consultant 5	3	Too hard to look at whole farms - tend to be used to identify areas that require soil remediation work like delving and spading etc

Table 19: *[Farmer/consultant] Use of Seasonal weather forecasting tools from the Bureau of Meteorology (BOM)*

Central EP Farmer 30	7	They give you a rough idea but don't seem to have a high level of accuracy in the longer outlooks
Central EP Farmer 10	6	Useful for some understanding of seasonal trends and likelihood of a finish N Decisions
Multi-regions Consultant 2	6	Use water and land website

Western EP Farmer 16	6	Often unreliable long term information
Southern Eyre Farmer 48	5	Very inaccurate at times
Western EP Farmer 29	5	Not always accurate
Central EP Farmer 54	4	Not accurate enough
Central EP Farmer 36	3	Not at all useful
Western EP Farmer 4	3	When the weather can be forecasted accurately to 7 days I will take more note of long term forecasts!

Table 20: *[Farmer/consultant] Use of yield mapping*

Central EP Farmer 15	10	Information that is fundamental to managing the productivity of each paddock
Eastern EP Farmer 44	10	Especially for P replacement
Multi-regions Consultant 2	9	Excellent for P replacement maps, identifying and ground truthing problem areas of the paddock and comparing to best parts.
Eastern EP Farmer 19	8	Accurately maps the performance of the crop and soil types for the particular season. This is used for variable nutrition and identifying areas with yield limiting characteristics.
Western EP Farmer 4	8	Awesome way of backing up ingrained knowledge and using them for decisions around planning rotations and fertiliser use.
Eastern EP Farmer 53	7	This has been useful but can be distorted by weather events such as frost and heat stress reducing yields but not necessarily the amount of vegetation
Southern Eyre Farmer 20	7	Good retrospective look at how management and soil type/soil water holding capacity interact
Central EP Farmer 10	6	Data there, but not used that much as use intuition and experience as to what does well and what doesn't
Eastern EP Consultant 5	5	Different seasons will show up different soil types and I have used wet and dry years to identify zones
Southern Eyre Farmer 57	5	I think I don’t use my maps to their potential

Table 21: *[Farmer/consultant] Other decision-support tools used*

Southern Eyre Consultant 47	All useful. Soil Moisture Probe network only applies to Victoria.
Central EP Farmer 15	CliMates long historical data makes its output quite robust/reliable. Graincast has the potential to be very powerful but has teething issues to resolve, being new.
Central EP Farmer 40	Not as relevant to our area or useful enough to make or change major decisions before and through the season!
Eastern EP Farmer 58	Not localised enough
Multi-regions Consultant 2	pH mapping is in my eyes the best $ spent on the farm. Identifies a major constraint that is cheaply and easily rectified.
Central EP Farmer 10	Seasonal forecasts based on models that are no where near 100% accurate. More like 50% many times.
Eastern EP Consultant 5	Soil tests - Time consuming to do but provide a good base line to make nitrogen decisions from for the season.

Southern Eyre Farmer 20	Still learning
Eastern EP Farmer 53	Still need to understand/ground truth what is giving these results
Central EP Farmer 7	Use to make Variable rate maps -zone low producing areas in paddock

Table 22: *[Informed persons] Percentage using - Use of satellite imagery for landscape management*

NRM 20	30	Probably between 20-40% use. Eg. Google Earth for Land Classes, mapping and planning, distance/altitude etc measurements and platforms such as Decipher are of interest for crop/pasture ground cover, erosion risks, N content and requirements etc.
NRM 15	20	I'm really not sure though. But it would appear that many don't even check their emails. I just assume their online activity must be low.
NRM 13	10	Not quite sure what you mean by this. 'Satellite imagery' is a broad statement and could relate to anything.

Table 23: *[Informed persons] Usefulness - Use of satellite imagery for landscape management*

Other 19	8	I would assume very useful to those who know how to use it
Researcher 6	7	Not sure, but suspect that people who are using this are skilled at its use
Consultant 7	6	I assume this means Satellite NDVI imagery. Its useful information if the growers knows how to use the data and has a good understanding of their soil types.
NRM 20	6	Find it interesting and useful to compare results yoy. Limited by 'ground-truthing' of what we are seeing and what actually happening.
Consultant 11	2	I think farmers know the relative performance of areas of the farm. They have other tools such as yield mapping that are at a greater level of definition.

Table 24: *[Informed persons] Percentage using - Use of Seasonal weather forecasting tools from the Bureau of Meteorology (BOM)*

Consultant 11	80	I suggest farmers are gaining confidence in BOM seasonal forecasting.
NRM 20	40	Some would actively search out, but many would discover what BoM are forecasting via medias like Stock Journal, Country Hour, Twitter, pub.
NRM 15	30	I have had a number of farmers/livestock producers who are extremely up to date with these forecasts and are open to changing large parts of their operations due to that (such as moving from crops to livestock) however these are concentrated in areas that are hit the most with poor conditions (Cowell). I also think there is a correlation between people who are more academically experienced/capable and their interest in this. Such individuals are the kind of people who don't have trouble reading extensive written information, guidelines to grants and articulating their own goals and applying for grants. It would seem the literacy levels of farmers, generally, is a barrier. I would say many are very reluctant to read a paragraph, even when they ask for information. I think there is an issue with literacy levels - sorry to say that, but this is the pattern I've noticed. Not finishing school doesn't mean a person can't go on to learn as much as anyone else can and people without any further education can make a bigger contribution than someone with further education can. However it is just the extensive under-valuing of reading in the Australian population, especially it would seem among farmers that is a direct barrier to accessing more technical things such as this. I think online

		connections with farmers is great, but I Think to be effective it has to be so concise and ensure it is obviously relevant, focus on visual conveying of data quickly and effectively. Having 'one of their own' or a few, tell the story about how the soil probe has assisted them would also help.

Table 25: *[Informed persons] Usefulness - Use of Seasonal weather forecasting tools from the Bureau of Meteorology (BOM)*

NRM 20	6	Most treat forecasts of some indication of what potentially could happen, but also most maintain a healthy dose of scepticism given these things can change direction quite quickly and have done so in the past.
Researcher 6	2	Forecasts have value on occasion - when there are big changes in the climate drivers

Table 26: *[Informed persons] Percentage using - Use of yield mapping*

Researcher 6	60	My understanding is that it is increasingly available on headers
Farmer 18	50	Most farmers would have yield monitoring but only a small portion would use the data to assist decision making.
Researcher 8	50	Massively under-utilized
Consultant 3	20	Way too low. Nearly all headers would be recording the information, there is just a huge gap in producing it into a yield map. Farmers have not been happy to pay what it is worth to get the maps done and most do not have the knowledge to be able to process themselves
NRM 20	20	Up to between 60 and 80% create yield maps due to machinery technology, but whether or not they use them is significantly lower (maybe10-30%) due to machinery/technology/training limitations

Table 27: *[Informed persons] Usefulness - Use of yield mapping*

NRM 15	10	I think this would be an extremely valuable tool as it is linked to so many other things (ie: weed infestations, soil conditions etc).
Researcher 17	9	Most growers should be using this. You can address so many problems in a paddock when you can see where the yields are coming from.
Consultant 7	8	This information is extremely powerful if its used in the correct manner. Too many growers just print them off or look at them on a screen. But what does it all mean? There needs to be some ground truthing or interpretation to help explain the yield variation and look to see if there are way to manage those zones.
NRM 20	8	Most farm soil types vary greatly within farms, let alone within paddocks. Identifying hi, med, lo yielding zones is evident in paddocks with experience, but prescription farming requires identified zones that have certain application requirements.
Researcher 6	8	This is useful information - but not always clear to know how to use it
Consultant 11	5	Yield maps are useful in determining relative production but unless coupled with VRT and/or actions to target constraints provide limited benefit.

Table 28: *[Informed persons] Other decision-support tools used*

Consultant 11	EM and pH mapping are used by a relatively small number of farmers. EM mapping data can be difficult to interpret and the appropriate management actions can be difficult to implement. pH mapping is very useful in areas of acid soils and is being increasingly adopted but further promotion would be beneficial.
Consultant 3	Major limitation on lower ep that is cheaply and easily rectified
NRM 20	Yield Prophet as a model has great potential if we can 'ground-truth' it and we get useful outputs from it.
Researcher 8	Too restricted in the attributes that they canvass; no current ability to incorporate sensor data.

Table 29: *[Farmers/consultants] Greatest needs related to decision-making assistance around best management of soil moisture and climate forecasts*

Central EP Farmer 10	A stop light system for a number of parameters with a dedicated app. As long as it is useful and will get used by farmers
Central EP Farmer 15	Climate forecasts need a better than 50/50 chance of being accurate to be any use - and that is not evident to me at the moment. Soil moisture information firstly needs to be relevant to our properties, and then it needs to be calibrated for soil types because they vary so much in a single paddock. The information provided by the probes then needs to be translated into potential actionable steps to inform the farmer's decision processes.
Central EP Farmer 30	Accuracy of forecasts
Central EP Farmer 33	More accurate and reliable climate forecasts.
Central EP Farmer 34	The beauro getting their forecasts a lot better/ closer
Central EP Farmer 36	Need to know weather forecasts at least 3 months out so we can make good decisions.
Central EP Farmer 40	Having the most up-to-date data and seasonal forecast available, along with a really good agronomist and consultant to assist with planning and major decision making!
Central EP Farmer 42	Reliable data
Central EP Farmer 54	More accuracy each farm can vary a lot from another even each paddock
Central EP Farmer 6	Getting appropriate management zones identified.
Central EP Farmer 61	much more accurate short term forecasts are needed. Understand long term is difficult, but just short term accuracy would be of big benefit. short term being 2-5 days
Central EP Farmer 7	Using the data consistently to make decision to take the yearly emotions out. Hopefully this will increase production while also reducing risk
Eastern EP Consultant 14	Confidence in the moisture probes and yield prophet to give whole of farm decision making
Eastern EP Consultant 5	More accurate short term weather forecasts. That the probes are calibrated and we know what the bucket is. A web site that is easy to access and easy to read
Eastern EP Farmer 12	More training so we understand the information better. More trust in the BOM to get it right
Eastern EP Farmer 19	Every farmer will use the data differently to suit their particular system. Receiving accurate data relevant to the individuals farm is the first step. From this accurate data there are many possibilities for the use of the probes.

Eastern EP Farmer 31	Just use what is in front of you at the time. Don't look too deeply into what might be, because 9 times out 10 it doesn't happen
Eastern EP Farmer 38	more accuracy to long term climate forecasts
Eastern EP Farmer 43	Climate forecast - more accuracy & understanding the data
Eastern EP Farmer 44	Would love to see improved accuracy of the long-range forecast so we could make more confident decisions. Also would like probes to be more accurate/calibrated.
Eastern EP Farmer 50	Accurate data is the greatest need, followed by an interface that allows growers to interrogate that data to inform decisions. This data could be supported by models to make predications around what that PAW number is likely to achieve under various conditions
Eastern EP Farmer 51	education
Eastern EP Farmer 52	As mentioned earlier we just need the data to be more user friendly and then some training around how to best interpret it. It would also be good to expand the network onto some of the poorer soil types (red flats & sand) as I assume most are currently on growers better soils
Eastern EP Farmer 53	Confidence in the information and to be able to understand them
Eastern EP Farmer 58	Need more accurate long term forecasts. Anything out from 7 days is too variable
Eastern EP Farmer 59	Accuracy. More accurate data around soil conditions (more probes) and forecasting (will we get the rainfall forecast)
Multi-regions Consultant 2	Climate forecasts are too far out and too inaccurate for me to have confidence in using. Soil Moisture probes - mm Available moisture as a figure, how big the bucket is
Multi-regions Consultant 22	confidence to specific region
Multi-regions Farmer 18	Learning from yield prophet and other models enhanced with probe data and weather station triangulation capability combined with accurate soil whc
Southern Eyre Consultant 47	User friendly tools that provide real time information and are easy to acess.
Southern Eyre Farmer 20	More years of looking at the data to work out what is and is not valuable.
Southern Eyre Farmer 23	Good agronomy advice relevant to our area A local radar would be beneficial as well
Southern Eyre Farmer 46	Rotations , Seeding timing and purchasing of fertilizer.
Southern Eyre Farmer 49	accuracy of forecasts is the main issue
Southern Eyre Farmer 55	Improved accuracy of forecasts and more detail of what is coming in. Another radar and weather station somewhere on the coast of lower Eyre peninsula. Maybe installing a few of our own weather stations/ moisture probes on different properties.
Southern Eyre Farmer 57	I have a basic plan for the year based on an average of historical data and facts, I don't believe long term forecasts are accurate enough for decision making, I use shorter term forecasting for varying this plan either way on the fly
Western EP Farmer 16	Soil Moisture Probes We hope long range forecasts can become more reliable/accurate
Western EP Farmer 24	reliable long range weather forecasts
Western EP Farmer 28	Should have a agronomist to work with
Western EP Farmer 29	More accurate and long range forecasts (at least 2-4 weeks in advance)

Western EP Farmer 4	More accurate information
Western EP Farmer 62	More data with soil characteristics

Table 30: *[Informed persons] Greatest needs related to decision-making assistance around best management of soil moisture and climate forecasts*

NRM 16	A better understanding of their soils capacity and how many farming actions can degrade soils ability to perform. Linking information with on ground actions and instigating practice change on farm to remain soil cover.
Consultant 11	Agronomic options are generally well understood and promoted. However there is limited understanding on issues such as N and P mineralisation and hence there is an opportunity to enhance fertiliser efficiency. The capacity of different soils on EP to allow rainfall infiltration, store soil water and enable plants to access moisture is only partially understood.
Consultant 21	understanding of how forecasts are made. understanding of how to read probe output
Consultant 3	An easier network to access and monitor. Simpler formats to easily comprehend the information
Consultant 7	Understanding their soils.
Consultant 9	Weather Radar on Lower EP Better Understanding of growers' own soil profiles in order to relate soil probe data to their own farm
Farmer 18	Showing farmers different ways the data (PAW) can help with decision making, this may be as simple as a stop light system for early sowing canola.
NRM 12	Consistent and accurate climate forecasting/modelling Promotion of soil retention practices/technologies
NRM 13	Education and awareness
NRM 14	Managing cover on non wetting sands. Dry sowing crops may not result in good germination and soil cover. Encouraging farmers to be prepared to select the right soil types/moisture to start cropping.
NRM 20	Education (time efficient) Also the perceived relevance to farmers bottom-line, their yoy farm profitability, which affects their long-term viability and hence their resilience.
Other 19	Information and access to that information.
Researcher 1	The greatest need will be to determine when to and how much nutrients to add in the paddock given the soil moisture available and predicted seasonal rainfalls. On the Lower Eyre Peninsula, it will be a matter of fine-tuning the extra fertilisation to maximise yield potential. On the Upper Eyre Peninsula, it will be more about reducing the fertiliser input to match the low soil water availability and forecasted seasonal rainfall.
Researcher 10	Good knowledge of what level of accuracy is needed to support a decision and which decisions can extract the most value from these tools.
Researcher 17	Strong research that provides sound, accurate data. That becomes the base for effective grower education.
Researcher 6	Important to gain a deep understanding of grower needs and the project is well set up to achieve this. Decision making, by definition is about the future and so there is an unavoidable need to extrapolate the measurements of the past (eg a probe showing a drying profile) into the future and then make a decision (put on less N). Using probabilistic forecasts of the future is certainly harder than using measurements of the recent past (like soil moisture probes). Thinking clearly about the decision will benefit both.

Researcher 8	Technical expertise in the advisory and farmer cohort

Table 31: *[Farmers/consultants] Other comments/insights into decision support and improving management decisions*

Central EP Farmer 15	A set of 'brochures' like GRDC produces on many subjects, produced over time based on the findings from research based on the probe/weather station network, would be a valuable reference source (and educative) to build our decision making and management skills. Managing frost risk remains an important issue with many gaps in terms of information and timely data.
Eastern EP Farmer 12	Being able to find the right people to assist in educating for use of these tools can be difficult
Eastern EP Farmer 31	Ways to improve profits without increasing yields, more on crop grazing
Eastern EP Farmer 53	We need to get all this information into a easy to use guide/tool without having bits and pieces here and there
Eastern EP Farmer 58	We need collaboration between all platforms to create one EP network
Multi-regions Consultant 2	Give me more time or make the information available on one site where I don't have to shift from screen to screen/site to site to get all of the information.
Southern Eyre Consultant 47	Need to be driven from the user end to ensure they are relevant and usable.
Western EP Farmer 28	Account and agronomist
Western EP Farmer 29	Promotion of weather stations and soil probes in our area to provide us with informative and accurate information to help growers understand soil and optimise yield potential

Table 32: *[Informed persons] Other comments/insights into decision support and improving management decisions*

Researcher 17	App: Emergency +. A safety app. Connects to the right operator & utilizes the phones GPS to provide location to emergency services.
NRM 20	Delivery will require an app with a simple output/message for many. Likewise, there is a need for something further for those farmers that want to extend their knowledge and understanding of the whole soil moisture/climate forecasting system to enable fine-tuning of their on-farm decision making using the tools available to them.
Consultant 11	Historically most research has taken a reductionist approach to understanding plant and soil systems. There is increasing evidence that a "whole of system" analysis is required. This is particularly relevant to soil systems where biological processes (one of the major drivers of PAW) are rarely measured. This has largely been due to cost and lack of valid benchmarks. However, there are analytical methods that provide indications of biological health that are now affordable and can be accessed, i.e. enzymes involved in N and P mineralisation. In combination with physical and chemical analyses these provide greater opportunities for better understanding of water cycling in agricultural systems.
Researcher 6	It is good that this set of questions has a focus on decisions.
NRM 15	Let's get more regenerative ag and certified organic representation. The herbicides which are used extensively across fields do have an impact on wildlife. None of this is addressed in current agricultural research.

APPENDIX 2: FARMERS AND CONSULTANTS SURVEY FORM

1) Respondent type

( ) Farmer

( ) Consultant

( ) Other: _____

2) Region

( ) Central EP

( ) Western EP

( ) Eastern EP

( ) Southern Eyre

( ) Multi-regions

( ) Unsure

( ) Other:: _____

3) Overall, how much attention do you give to seasonal forecasts and their implications for farm or property decisions?

( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10

Comments:

4) How important do you consider understanding soil moisture levels are on making decisions on your property?

( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10

Comments:

5) To what extent do you measure soil moisture on the farm/property and base cropping or management advice/decisions on the levels found?

( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10

Comments:

6) Are you aware of the Eyre Peninsula soil moisture probe network?

( ) Yes

( ) No

Comments:

7) Do you currently use (or have previously used) the Soil Moisture Probe Network website which shows live data from the probes and weather stations has been established across the Eyre Peninsula?

( ) Yes

( ) No - Unaware of the website

( ) No - Aware of the website but haven't used it

If you are aware of the website but haven't used it, what are the reasons?

_____

_____

_____

_____

If yes, how useful do you find the website in terms of assisting your/farmers' decision making?

( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10

What could be improved to make the website (even) more useful?

_____

_____

_____

_____

8) Please provide any examples of how you have used data generated by the moisture probe network, including any benefits or impacts you have seen as a result:

_____

_____

_____

_____

9) Going forward, what would you like to see from the soil moisture probe network to maximise its benefit for you?

_____

_____

_____

_____

10) Do you use (or have previously used) any of the following tools/forecasts to assist on-farm decision making relevant to making best use of available soil water and yield potential; ground cover management; feed on offer; crop management; options to optimise dry matter production; and/or reduce erosion risk.

a. Use of satellite imagery for landscape management

( ) Yes

( ) No

If Yes, how useful would rate its usefulness?

( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10

Comments:

b. Use of Seasonal weather forecasting tools from the Bureau of Meteorology (BOM). Use of satellite imagery for landscape management

( ) Yes

( ) No

If Yes, how useful would rate its usefulness?

( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10

Comments:

c. Use of yield mapping?

( ) Yes

( ) No

If Yes, how useful would rate its usefulness?

( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10

Comments:

d. Other decision-support tools used and their usefulness in decision-making?

0 1 2 3 4 5 6 7 8 9 10

Comments on the usefulness or limitations of any of these tools:

_____

_____

_____

_____

11) What do you see as your greatest needs when it comes to assistance with decision-making (or supporting decision-making) around best management of soil moisture and climate forecasts?

_____

_____

_____

_____

12) Any other comments/insights into decision support and improving management decisions?

_____

_____

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APPENDIX 3: INFORMED PERSONS SURVEY FORM

1) Respondent type

( ) Farmer

( ) Consultant

( ) Researcher

( ) Industry representative

( ) Other:: _____

2) Any comments explaining the experience/perspective/source of the informed person:

_____

_____

_____

_____

3) Overall, what percentage of growers/producers would you estimate pay attention to seasonal forecasts and their implications for farm or property decisions?

( ) 0

( ) 10%

( ) 20%

( ) 30%

( ) 40%

( ) 50%

( ) 60%

( ) 70%

( ) 80%

( ) 90%

( ) 100%

( ) Don't know enough to estimate

Comments:

4) What percentage would you estimate monitor soil moisture on the farm/property and base cropping or management advice/decisions on the levels found?

( ) 0

( ) 10%

( ) 20%

( ) 30%

( ) 40%

( ) 50%

( ) 60%

( ) 70%

( ) 80%

( ) 90%

( ) 100%

( ) Don’t know enough to estimate

Comments:

5) How would you estimate the percentage of growers who are aware of the Eyre Peninsula soil moisture probe network?

( ) 0

( ) 10%

( ) 20%

( ) 30%

( ) 40%

( ) 50%

( ) 60%

( ) 70%

( ) 80%

( ) 90%

( ) 100%

( ) Don’t know enough to estimate

Comments:

6) What percentage of growers/producers would you estimate currently use (or have previously used) the Soil Moisture Probe Network website which shows live data from the probes and weather stations That have been established across the Eyre Peninsula?

( ) 0

( ) 10%

( ) 20%

( ) 30%

( ) 40%

( ) 50%

( ) 60%

( ) 70%

( ) 80%

( ) 90%

( ) 100%

( ) Don’t know enough to estimate

Comments:

a. Why do you think some have not used the website?

_____

_____

_____

_____

b. What could be improved to make the website (even) more useful to them or make them aware of it in the first place?

_____

_____

_____

_____

7) Please provide any example you are aware of where growers/producers have used data generated by the moisture probe network, including any benefits or impacts reported as a result:

_____

_____

_____

_____

8) Going forward, what would you like to see from the soil moisture probe network to maximise its benefit for the region?

_____

_____

_____

_____

9) What percentage of growers/producers would you estimate are using the following tools/forecasts to assist on-farm decision making relevant to making best use of available soil water and yield potential; ground cover management; feed on offer; crop management; options to optimise dry matter production; and/or reduce erosion risk.

a. Use of satellite imagery for landscape management

( ) 0

( ) 10%

( ) 20%

( ) 30%

( ) 40%

( ) 50%

( ) 60%

( ) 70%

( ) 80%

( ) 90%

( ) 100%

( ) Don’t know enough to estimate

Comments:

How useful do you think this is to those who use it?

( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10

Comments:

b. Use of Seasonal weather forecasting tools from the Bureau of Meteorology (BOM)

( ) 0

( ) 10%

( ) 20%

( ) 30%

( ) 40%

( ) 50%

( ) 60%

( ) 70%

( ) 80%

( ) 90%

( ) 100%

( ) Don’t know enough to estimate

Comments:

How useful do you think this is to those who use it?

( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10

Comments:

c. Use of yield mapping?

( ) 0

( ) 10%

( ) 20%

( ) 30%

( ) 40%

( ) 50%

( ) 60%

( ) 70%

( ) 80%

( ) 90%

( ) 100%

( ) Don't know enough to estimate

Comments:

How useful do you think this is to those who use it?

( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10

Comments:

d. Other decision-support tools used and their usefulness in decision-making?

0 1 2 3 4 5 6 7 8 9 10

Comments on the usefulness or limitations of any of these tools:

_____

_____

_____

_____

10) What do you see as the regions greatest needs when it comes to assistance with decision-making (or supporting decision-making) around best management of soil moisture and climate forecasts?

_____

_____

_____

_____

11) Any other comments/insights into improving decision support and their usefulness:

_____

_____

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