AGRICULTURE ON THE EYRE PENINSULA:

RURAL LANDHOLDER SOCIAL BENCHMARKING REPORT 2020

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Disclaimer

The views expressed in this report are solely the authors', and do not necessarily reflect the views of Southern Cross University, the Soil Cooperative Research Centre or the people engaged with in the research project.

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Finally, we would like to thank all the landholders who took the time to complete the survey. A summary of this report will be prepared and distributed by AIR EP in 2020.

LIST OF ACRONYMS

EP – Eyre Peninsula
AIR EP – Ag Innovation and Research Eyre Peninsula
EPARF – Eyre Peninsula Agricultural Research Foundation Inc.
LEADA - Lower Eyre Agricultural Development Association
SCU – Southern Cross University
CSU – Charles Sturt University
GIS – Geographic Information System
LGA – Local Government Area
NRM – Natural Resource Management
PIRSA – Department of Primary Industries and Regions South Australia
Soil CRC – Soil Cooperative Research Centre

LEGEND

= Significant difference by Farmer Type

*** = Significant difference by Rainfall Zone

FTF = Full-time Farmer

PTF = Part-time Farmer

HF = Hobby Farmer

NF = Non-farmer

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THE CONTEXT

The Soil CRC national survey project, *Surveying On-Farm Practices*, was initiated in 2019 to implement surveys in all six states, in partnership with local farming organisations. The regions were selected to represent a range of different farming systems and bioregions, with a major factor being the willingness of local groups to partner with the survey team to develop the survey and support its implementation. The purpose of the survey was to gain a broad understanding of the drivers of on-farm decision making across, and in-depth understanding within, Australian farming systems.

The 2020 Eyre Peninsula social benchmarking survey is part of this national Soil CRC project led by Dr Hanabeth Luke of Southern Cross University (SCU), jointly funded by the Soil CRC, Ag Innovation and Research Eyre Peninsula (AIR EP, a CRC partner) and the Eyre Peninsula Natural Resource Management (NRM) Board. Data gathered will contribute to wider Soil CRC research efforts. For example, Soil CRC researchers will be able to explore farmer knowledge of soil heath and management; the impact of farmer participation in soil health groups; and the implementation of best practice soil management by farmers.

The overall survey design was developed in the early stages of the national social benchmarking survey project, building on the work of Professor Allan Curtis[1] and team. The general approach is that mail-out surveys are sent out to either a random selection or to all landholdings in a region over ten hectares (10 ha) in size. They include questions on farmers' actual and intended practices, the challenges they face, and aspirations for the future. Important background information is also collected on farm management styles and farmer values, as well as items that focus on self-assessed knowledge of, and confidence in, best practice, and perceptions of risk.

This project will ultimately collate a dataset of national significance, showing both breadth and depth of information on factors involved in on-farm decision-making for Australian farmers. The key strength of this project is that the general survey approach is customised through collaboration with regional partners to ensure regional relevance. Whilst a core of questions remains to enable cross-survey comparisons and the development of the national dataset, each region has different priorities which are built into the survey instrument. In this way, each survey report can directly inform strategic planning and decisions around present and future directions, whilst providing clear pathways toward better engagement between the Soil CRC partners' regional farmer base in their activities

DEVELOPING THE SURVEY

The Soil CRC project team first visited the Eyre Peninsula in 2019. During that visit Lower Eyre Agricultural Development Association (LEADA), Eyre Peninsula Agricultural Research Foundation Inc. (EPARF) and Eyre Peninsula NRM all agreed to participate as local partners in the South Australian component of this national Soil CRC project. David Davenport, previously of Department of Primary Industries and Regions South Australia (PIRSA), provided extensive guidance to the researchers, explaining many elements of the landscape, soils, history and farming systems of the Eyre Peninsula. Mark Stanley of EPARF and LEADA assisted with organising a survey development workshop at Minnipa Agricultural Centre, which included representatives of all three groups, and also including representatives of the Eyre Peninsula NRM Board (Figure 10). Workshop discussion covered the issues faced by farmers

[1] Curtis, A., & Luke, H. (2019). *Social benchmarking for natural resource management: 2019 North Central Victoria*. Southern Cross University, NSW, 2480.

on the Eyre Peninsula, including the plans of LEADA and EPARF to combine their resources into Ag Innovation and Research Eyre Peninsula (AIR EP) to be able to better support farmers in the region.

LEADA and EPARF workshop participants expressed particular interest in gaining a more detailed understanding of farmer needs and challenges, so they can know how to better engage with, and meet the needs of, Eyre Peninsula farmers. A broad range of topics was discussed and distilled into four main areas of focus:

A) a profile of farming on the Eyre Peninsula, including farm management structures and who plays a role in decision-making, to inform engagement with rural property owners;
B) landholder expectations around the formation of AIR EP;
C) factors leading to present and future resilience of Eyre Peninsula farms, including uptake of best-practice; and
D) the future of farming, including support for young farmers and emerging leaders.

A draft survey was subsequently pre-tested, including with a small group of rural landholders. A copy of the final 16-page survey booklet is included as an appendix to this report.

The survey, which included a supplementary section for a second person involved in the land management to complete, was posted to a randomly selected sample of rural property owners (properties of 10 ha and above) identified using spatially referenced landholder contact lists for the Eyre Peninsula region provided by Eyre Peninsula Landscape Board. Surveys were posted to 2055 property owners. After removing return-to-sender, duplicate ownerships, properties that had been sold, owners who were ill or overseas and other acceptable reasons for a non-response, there were 1573 possible respondents. With 478 returned and completed surveys, the response rate was 31%. In addition, 114 supplementary sections were returned.

Checks for non-response bias included a comparison of the mean property size of respondents and non-respondents (no significant difference).

In addition to the collection of background personal and property information (e.g. property size, absentee ownership) and data on land use/enterprise mix, the survey gathered information about respondents' values; beliefs (e.g. in climate change, the primacy of private property rights); issues of concern (i.e. threats to those values); knowledge of best practice; confidence in best-practices; implementation of best-practice; preferred sources of information and modes of engagement with farming and NRM organisations, platforms and processes; and long-term plans for the property, including the progress of succession planning where relevant. With more than 130 survey items across these topics, the report summarises a large data set. The focus in the Executive Summary is on directly responding to the four objectives listed above and identifying key lessons or conclusions.

Figure 1: The survey development workshop participants.

EXECUTIVE SUMMARY

This research employed a survey of all rural landholders in the Eyre Peninsula with a land holding greater than 10 ha. Soil CRC researchers partnered with local groups EPARF and LEADA, who were in the process of merging to form Ag Innovation and Research Eyre Peninsula (AIR EP), as well as Eyre Peninsula Landscape (previously NRM) Board, to develop and undertake the survey. The analysis was focussed on areas highlighted as being of particular importance to the Soil CRC's local research partners.

FARMING STRUCTURES

The Eyre Peninsula was confirmed to be primarily an agricultural landscape, with the majority of landholders reported as either full-time or part-time farmers, except in the more urban LGA of Port Lincoln (n=16). Based on established methodology, survey participants self-identified into one of four groups based on their engagement with farming:

- Full-time farmers: 62%
- Part-time farmers: 14%
- Hobby farmers: 8%
- Non-farming land holders: 16%

The most common land use was for cropping (76%), followed by sheep for wool and meat (both 62%). For all landholders, the median land holding was 1500 hectares, held over two properties on the Eyre Peninsula. The average holding size for full-time farmers was higher, at 3710 hectares. 76% of respondents live on their Eyre Peninsula property, with the median length of family ownership reported as 50 years. Overall, respondents had a median age of 59 years and were 90% male. About one quarter of returned survey responses also included a completed supplementary section that recorded the responses of any other persons with a role in the management and operations of the property on a daily or weekly basis. A large proportion of this group (77%) were also resident on the property, with 31% of supplementary respondents reported to be children of the landholder. 54% were female and the average age was 48 years old, reflecting in part this generational difference.

MANAGEMENT

On-farm management appears to be largely collaborative, with 75% of all respondents and 86% of full-time farmers reporting that they usually include another person or people in their management decisions. Most commonly this was reported as being a family member (e.g. spouse, child, parent), and beyond the family, agronomists were the most common advisor. Continuity was the dominant theme of landholders' long-term plans. The majority (79%) of all respondents indicated that it was likely or highly likely that ownership of the property would stay within the family, rising to 85% of full-time farmers and 74% of part-time farmers.

VALUES

The Eyre Peninsula encompasses landholders with a range of intersecting values, some of which are intrinsic or 'held', while others relate to their landholding. The '*ability to pass on a healthier and more sustainable farm for future generations*' was the most important value attached to the property for both full- and part-time farmers. This group also identified the value of their property as '*a great place to raise a family*' and having a '*sense of accomplishment from building/maintaining a viable business'* as extremely important. On the other hand, we saw a strong trend among hobby farmers and non-farmers

to value the attractiveness and amenity properties of their land most highly, including a strong focus on native vegetation.

With regard to 'guiding life principles', also referred to as 'held values', *'looking after my family and their needs'* was the most important value across all farmer types, followed by the environmental value of '*preventing pollution and protecting natural resources*', though this ranked as even more important for hobby and non-farmers. When looking at the top three values by farmer type, full-time and part-time farmers were united in having the creation of '*wealth and striving for a financially profitable business*' as a highly ranked principle, whereas hobby farmers and non-farmers shared the value '*respecting the earth and living in harmony with nature*' as a more highly ranked value.

EXPECTATIONS OF AIR EP

When looking specifically at knowledge of, and expectations around, the formation of AIR EP, overall 66% of respondents knew of EPARF and/or LEADA, with 15% reported as members (a fifth of full-time farmers). There was a significant difference between farmer types, with the highest awareness and membership amongst full-time farmers (80% had knowledge of, 22% were members), followed by part-time farmers (61%; 7%). 39% of all respondents knew that EPARF & LEADA had amalgamated to form AIR EP. 72% of full-time farmers and 58% of all respondents agreed that EPARF/LEADA provide valuable information about soil agronomy and farm management. Of all respondents, including members and non-members, 53% agreed that they could rely on LEADA and/or EPARF (now AIR EP) to keep landholders' interests in mind when making decisions about research priorities (66% of full-time farmers and 44% of part-time farmers). Again, a very small percentage disagreed (3% overall and 2% of full-time farmers), but 22% were unsure, with part-time farmers the least sure (32%). The 'don't know' rates were highest amongst non-farmers (82%) and hobby farmers (56%).

Across all farmer types, respondents were most likely to seek information and advice on property management from other farmers (89% of full-time farmers and 85% of part-time farmers in particular). This shows a strong reliance on knowledge networks within the Eyre Peninsula and indicates the significant potential of these networks and relationships for knowledge transfer. The top three sources of knowledge for full-time farmers were other farmers, friends/neighbours/relatives, and independent agricultural consultants such as agronomists. For each of the remaining three farmer types, the only difference was that the Bureau of Meteorology replaced independent consultants in the top three sources of knowledge for each farmer type.

FARMING PRACTICES, RISK AND RESILIENCE

Water security ranked in the top three issues for all farmer types. Soil-related issues at the property scale provide important insights into farmer concerns. 43% of all full-time farmers (32% of all respondents) indicate that an area of their land was lost to production due to soil problems. For those issues listed in the survey, we saw strong crossover in concern between the different farmer types regardless of their level of farming, particularly that of soil erosion (68% overall) and low biological activity in soils (63% overall). Indeed, soil-related issues were one of the few survey items in which there were almost no significant differences by farmer type.

The results suggested very strong engagement with issues related to soil health. Almost all full-time and part-time farmers (both 98%) agreed that they feel a personal responsibility to maintain their soil's productive capacity. Clear links between farmer practices, the extent of their knowledge, and their confidence in benefits emerged for several topics, including sowing perennial pastures, minimum or no-tillage and soil testing. However, overall knowledge was quite low for many best-practices, with less than

50% of farmers having sufficient knowledge to act on or implement the majority of listed practices. This suggested a gap in education or knowledge translation amongst respondents.

In terms of practices that were increased over time by full-time farmers, the most notable was a reduction in chemical use (historically 10%, currently 20% and intended practice 24%). There was a small intended rise in organic farming (up to a high of 7% intended practice from 5% historically) and regenerative practices (up to a high of 12% current and intended practice from 9% historically), though these remained a small proportion. All other practices declined. When asked if there was a practice change over the last ten years that had influenced their profitability, the most common response was direct drilling, and decreased and minimum/no tillage.

All landholder types engaged with farming practices indicated a very high degree of openness toward new ideas about farming, with over 90% of all farmers agreeing or strongly agreeing with that statement. That said, only half or less of the same groups self-identified as early adopters, with only moderate agreement that they could financially afford to take risks, and experiment with new ideas. The twin measures of risk avoidance/ risk openness were fairly evenly split amongst full- and part-time farmers. This presented a mixed picture of actual willingness to take on new ideas.

Availability of time did not appear to be an important barrier to change, with only 17% of participants indicating that they do not have enough time to consider changing their practices.

Although water security and changes in weather patterns were deemed to be important regional issues, this did not appear to fully translate to concern about climate change, with less than half of all respondents believing that humans were causing it, and 21% disagreeing that this could be so. This number dropped further for full-time farmers to 40%, and to 35% for the younger generation of farmers.

THE FUTURE OF FARMING

Whilst the following do not represent statistically significant differences, the generations of full- and part-time farmers exhibited the following characteristics:

- Generation Y (born 1981-1996), had the **highest rates of both tertiary education (24%) and other post-secondary education (24%) amongst all full and part-time farmers**, and were the only group for which every respondent had Year 10 education and above. Generation X (born 1965-1980) had 12% tertiary qualification and the Baby Boomer and over generation, 8% (born prior to 1965).
- Generation Y were the **most likely to include another person in their decision-making**, with 97% agreeing that they '*usually include another person or people in my on-farm management decisions'.* Common advisors were listed as consultants such as agronomists, family and friends.
- Generation Y **felt the least supported to conduct farming and land management activities on their property**, with only 56% agreeing that they felt adequately supported and 34% indicating they were unsure. When asked what sort of support would enhance their agricultural and land management activities, the Generation Y group indicated they would like more engagement with grower groups and knowledgeable organisations, including through field trials and extension officers; and financial support, including subsidising the cost of fixing soil challenges.
- In terms of succession planning, 85% of full-time farmers thought it likely that a family member would take over the farm, however only 56% had a family member interested in stepping into this role.

Whilst overall only 54% had some level of succession planning in place, 79% of full-time farmers and 87% of part-time farmers were in at least the early stages of succession planning. Over a third of these were 'well advanced'.

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INTRODUCTION

This research employed a survey of rural landholders to gather data to inform the local grower groups EPARF and LEADA, coinciding with their transition towards the formation of AIR EP (a CRC partner), as well as the Eyre Peninsula Landscape Board as it also transitioned to a new model, previously being an NRM Board.

Local grower groups typically have limited ability (agency) to accomplish their goals without the support of other stakeholders (e.g. Australian and state governments, Non-Government Organisations or NGO), and especially rural property owners who own most rural land and directly influence the condition of soil, wetlands and native vegetation. In turn, the condition of those environmental assets influences their livelihoods, well-being and wealth (including property values).

The 2020 Eyre Peninsula social benchmarking survey is part of a Soil CRC project led by Dr Hanabeth Luke of Southern Cross University (SCU) and is jointly funded by the Soil CRC, AIR EP and the Eyre Peninsula Landmark Board. Data gathered will contribute to the wider Soil CRC research portfolio. For example, Soil CRC researchers will be able to explore farmer knowledge of soil heath and management; the impact of farmer participation in soil health groups; and the implementation of best practice soil management by farmers. Similar surveys funded by the Soil CRC have taken place or are underway in Victoria, New South Wales and Western Australia.

The research team includes social scientists from Southern Cross University and Charles Sturt University. The approach draws on and further develops a widely accepted approach to social benchmarking for regional land and natural resource management developed by Allan Curtis and his team[2]. This survey-based methodology has previously been applied across Australia, including as part of the Australian Government's National Action Plan for Salinity and Water Quality, with case studies in Victoria, New South Wales and Queensland.

STUDY FRAMEWORK

The conceptual framework underpinning this study further builds on the work of Curtis and Luke[3], recognising that changing human behaviour can be difficult, and engaging rural property owners in practice change is no exception. There is a large set of possible factors influencing decisions and these vary according to each technology, property owner, social context and intervention over seasons and years. Without strong and well understood drivers to support the implementation of best-practice farm and land management, supporting practice change can be hampered by a range of factors. This may involve everything from inconsistent governance frameworks, weather, and rising property prices, to demographic factors, including what farmers view as important, their knowledge of 'best-practice' and how they perceive their own role as landholders.

While it is possible that values, beliefs and personal norms (i.e. normal behaviour and decision-making patterns) may mediate or moderate some of these other factors, it is difficult to change these deep-seated personal attributes in the short or medium term. Nevertheless, it is critical to understand the values and

[2] Curtis, A., Byron, I., & MacKay, J. (2005). Integrating socio-economic and biophysical data to underpin collaborative watershed management. *Journal of the American Water Resources Association, 41*(3), 549-563.
[3] Curtis, A., & Luke, H. (2019). *Social benchmarking for natural resource management: 2019 North Central Victoria*. Southern Cross University, NSW, 2480.

beliefs of landowners if they are to be effectively engaged. Values-Belief-Norm Theory (VBN) is a theoretical approach that has been developed and applied to explain the relationship between values and behaviour, particularly in regards to human-environment interactions and land management. It is an important theory that underpins much contemporary social research, including the 2020 Eyre Peninsula social benchmarking survey.

In short, landholder **values** and **beliefs** may be difficult to change but are extremely important for effective engagement. The two main elements of this we explore in the survey are: 'assigned values' and 'held values', both of which are deemed as important for guiding personal action[4] .'Held', or intrinsic values are ideas or principles that people hold as important to them and may be abstract and conceptual[5] whereas we describe 'assigned' or 'attached values' as how landholders relate to or value their land and farm.

Value orientations are the position a person takes when a particular set of held values are more important to them than other held values[6]. It is important to note that individuals can hold more than one value orientation simultaneously[7]. Most landowners have commitments beyond best-practice land management, and the reality is that when there is a conflict between values, family is likely to come first. Beyond knowledge of these values, how should researchers and practitioners proceed? And what topics should be included in a survey setting out to inform engagement of rural property owners in the Eyre Peninsula region?

Effective applications or adoption of best-practice and new innovations can be improved by identifying a number of 'levers' to effect change. If a landholder does not have knowledge of a best-practice approach, then it is unlikely that they will adopt it. If they have some knowledge of it, but little confidence in its effectiveness, then they are unlikely to adopt it. If they view it as too expensive or time consuming to implement, they are also unlikely to take it up. Therefore, the survey must identify both **knowledge** of, and **confidence** in, relevant best-practice land and farm management[7].

It is also helpful to identify **personal 'norms'**, or the level of personal responsibility that landholders feel towards managing their soil, land and farm. Personal norms in relation to **risk**-taking have also been found to be extremely important, with a predisposition to take risks being an important driver of practice change[8].

The next step is identifying the most **effective 'extension'** or 'translation' approaches, processes or platforms for engaging rural property owners in learning, dialogue and action. In identifying these approaches, it is also critical to gain an understanding of how landholders perceive and trust their key

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[4] Lockwood, M. (1999). Humans Valuing Nature: Synthesising Insights from Philosophy, Psychology and Economics. *Environmental Values*, 8(3), 381-401.

[5] McIntyre, N., Moore, J., & Yuan, M. (2008). A place-based, values centred approach to managing recreation on Canadian crown lands. *Society & Natural Resources*, 21, 657-670.

[6] Axelrod, L. J. (1994). Balancing personal needs with environmental preservation: identifying the values that guide decisions in ecological dilemmas. *Journal of Social Issues, 50*(3), 85-104.

[7] Lockwood, M. (1999). Humans Valuing Nature: Synthesising Insights from Philosophy, Psychology and Economics. *Environmental Values*, 8(3), 381-401; Stern, P. C. (2000). Toward a coherent theory of environmentally significant behaviour. *Journal of Social Issues*, 56(3), 407-424.

[8] Curtis, A., & Luke, H. (2019). *Social benchmarking for natural resource management: 2019 North Central Victoria*. Southern Cross University, NSW, 2480.

local and regional organisations, for **trust** is a key builder of confidence in knowledge-sharing organisations[9].

SURVEY DEVELOPMENT

The Soil CRC project team first visited the Eyre Peninsula in 2019. During that visit LEADA, EPARF and Eyre Peninsula NRM all agreed to participate as local partners to the South Australian component of this national Soil CRC project. David Davenport, previously of PIRSA, provided extensive guidance to the researchers, explaining many elements of the landscape, soils, history and farming systems of the Eyre Peninsula. Mark Stanley of EPARF and LEADA assisted with organising a survey development workshop at Minnipa Agricultural Centre, which included representatives of all three groups, and also including representatives of the Eyre Peninsula NRM Board. Workshop discussion covered the issues faced by farmers on the Eyre Peninsula, including the plans of LEADA and EPARF to combine their resources into AIR EP to be able to better support farmers in the region.

Figure 2: The Soil CRC research team developing survey priorities at Minnipa Agricultural Centre with the newly formed AIR EP & EP Landscape Board.

LEADA and EPARF workshop participants expressed particular interest in gaining a more detailed understanding of farmer needs and challenges, so they can know how to better engage with, and meet the needs of Eyre Peninsula farmers. A broad range of topics were discussed and distilled into four main areas of focus:

[9] Luke, H. (2017). Social resistance to coal seam gas development in the Northern Rivers region of Eastern Australia: Proposing a diamond model of social license to operate. *Land Use Policy*, 69, 266–280.

Topics identified by local partners were:

A: FARMING STRUCTURES

What are common farm management structures and who plays a role in decision-making?

- Who is involved in running Eyre Peninsula farms? (farming structures)
- To what extent do farmer decisions depend on other people, and who else is involved in farming?
- Do their views/values differ from the main survey respondents?

B: INFORMATION, ENGAGEMENT AND THE ROLE OF EPARF/LEADA

What are present perceptions of them and their efforts, and how can the newly merged AIR EP best fulfil expectations of farmers on the Eyre Peninsula?

- *Triggers for engagement with EPARF & LEADA and expectations around their merging*
- *Public trust & public perceptions*
- *What would be helpful to better support farmers?*
- *Are there distinct regions on the EP and how do they differ?*
- *Are there perceptions of rural-city divide, a lack of government support?*
- *Change: why is engagement reducing, are farmer numbers dropping? Why?*
- *Off-farm participation - what are motivations/barriers for attending field days etc?*

C: UNDERSTANDING YOUNGER FARMERS

In what ways could young and new farmers be better supported on the Eyre Peninsula?

- *Generational change – how is it happening, how could AIR EP support it?*
- *What are the major challenges young farmers face, and are they different to the older farmers?*
- *Are they implementing notably different practices? Or, are they more or less likely to implement best practice?*
- *What do they view as the main things that could better support them?*
- *How does their level of satisfaction and mental health compare with the older farmers?*
- *Who is involved in on-farm decision-making?*
- *How can young farmers be better engaged with? (Drivers of participation)*
- *How can young leaders be identified and supported?*
- *To what extent is succession-planning underway?*
- *Influences on off-farm & community involvement/participation by age?*
- *Do young farmers in the region need 'skilling up' in particular areas (data/farm management etc)*
- *Financial literacy*
- *How is data being used and managed by farmers of all age groups?*

D: FARMING PRACTICES, RISK AND RESILIENCE

How resilient are EP farmers, and what may be barriers to long-term resilience?

- *What are key influences on EP farmer decisions?*
- *What makes farmers conservative or progressive?*
- *What strategies are being employed to manage calcareous soils?*

- *Are people dry sowing? How's that going?*
- *Are they ripping with inclusion plates?*
- *Are they making plans to improve their resilience? (buying second property, farming practices)*
- *What are threats to farm viability?*
- *To what extent are farmers reliant on chemicals? Is herbicide residue an issue?*
- *Are they resilient to drought or other major impacts?*
- *How do farmers understand accelerated climate change?*
- *To what extent may they be prepared for drought?*
- *What role may on-farm value adding support farm resilience?*
- *What knowledge do they have of farming practices such as Cover crops, Minimum till farming, building organic soil carbon, regenerative agriculture, carbon markets and the Soil moisture probe network?*
- *Is absentee ownership an issue?*
- *How are they going financially? Are farmers satisfied with their productivity? Debt vs equity?*
- *What are the main challenges to productivity and profitability?*
- *What are barriers to adoption and uptake of best-practice (time, money, knowledge)?*
- *Are practices changing? What makes people change?*
- *How much land is lost to production? What are the major issues? E.g. mallee seeps, magnesia patches*

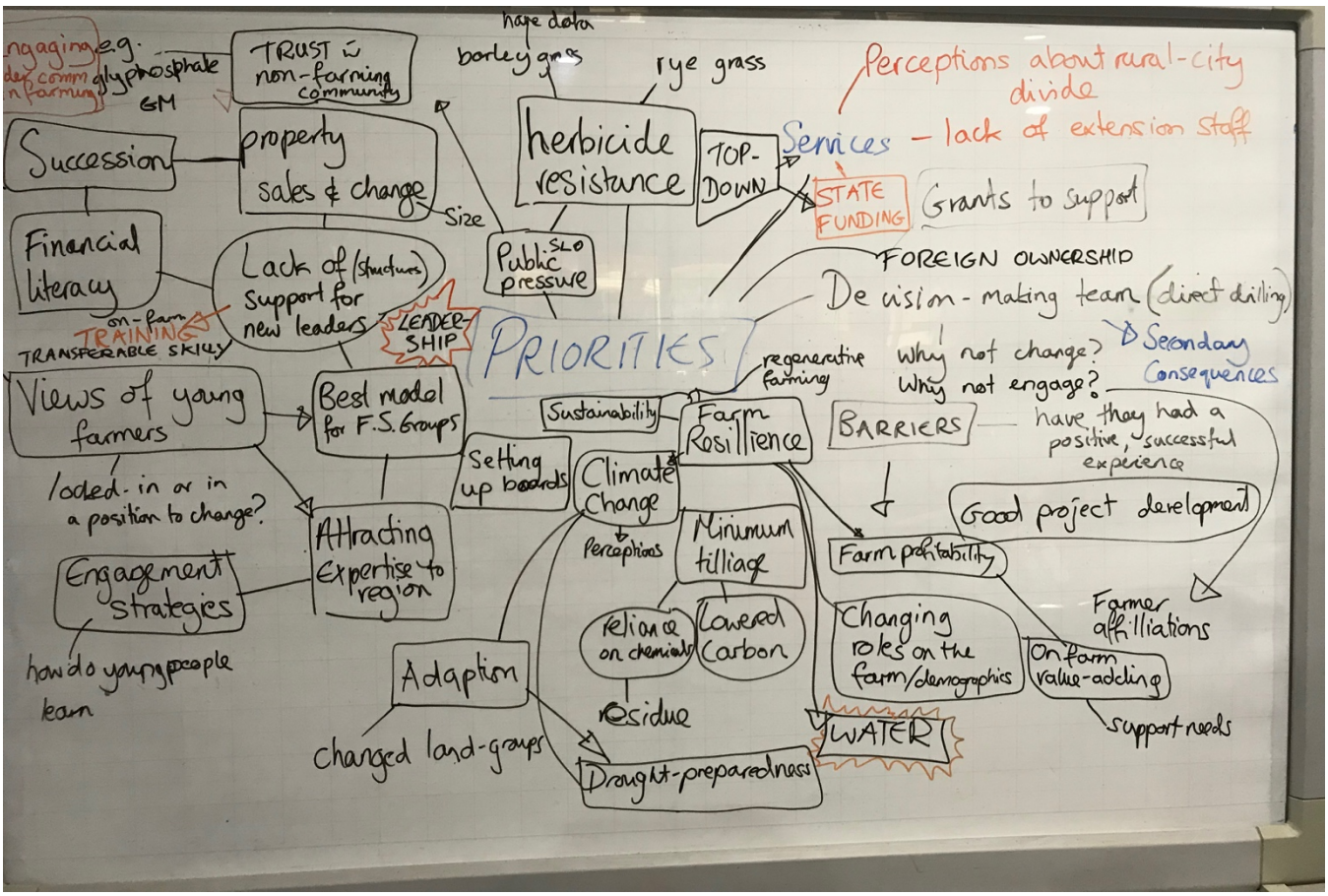

Figure 3: Mapped priorities from the survey-planning workshop at Minnipa Agricultural Centre

The mind-map in Figure 3 was created by workshop facilitator Dr Luke, highlighting some of the key priority areas that were included in the survey.

Following the workshop, the project team built these topics into the existing core survey instrument, with sections on major issues faced by landholders, their values, practices, experience and understanding of various topics, as well as confidence in a range of best practices in soil, farm and land management. The draft survey was sent to all workshop participants for comment and input.

SURVEY ADMINSTRATION AND RESPONSE RATE

In advance of the survey, notices were sent to all Eyre Peninsula properties over ten hectares, which included a link to an online survey. The comprehensive survey booklets and reminder notes were mailed out to all relevant landholders from March-April 2020. Forty-four online surveys were completed and linked to the spatial property identifier, which enables these responses to be included in the total. A 31% response rate was received from 1573 surveys, however, the average number of landholdings per respondent was two. Thus, it can be estimated that our sample represents about half of landholdings on the Eyre Peninsula. The data was spatially referenced, which means that we can show social, economic and environmental trends spatially across the region. We can also cross-reference our findings with other spatial data such as soil type and rainfall.

DATA ANALYSIS

Descriptive statistics such as frequencies, means and medians were used to summarise responses to all survey items ("not applicable" and missing responses were removed from the analysis of means).

Further analyses include examination of data for statistically significant differences between different groups (e.g. full-time farmer, part-time farmer, hobby farmer and non-farmer). Kruskal Wallis Rank Sum Tests were used to test for differences on a continuous variable or a Likert scale variable (e.g. age or agreement with an issue) based on a grouping variable (e.g. farmer identity cohorts). Chi Squared Tests were used to examine dependence between two grouping variables. Similarly, Pearson's Chi-squared test with simulated values was used to test for differences on a Yes/No (i.e. nominal data as for Landcare participant) based on a grouping variable (e.g. the farmer identity cohorts).

To explore relationships between variables in the survey, pairwise comparisons were conducted between each item and all other items in the survey. Kruskal Wallis Rank Sum Tests were used to test for relationships between Likert-type response and a grouping variable (e.g. full-time farmer, part-time farmer, hobby farmer and non-farmer) (results in an H value). Chi Squared Tests were used to examine dependence between two categorical (or grouping) variables (e.g. between Yes/No for management action implemented and EPARF/LEADA member/non-membership).

Pairwise comparisons tested for relationships (positive and negative) between variables expected to influence adoption (i.e. independent variables) of best-practice management (i.e. the dependent variables). Those practices consisted of sustainable or regenerative agricultural practices and ecological management. Most practices were thought to be relevant to most property contexts. However, respondents were given the opportunity to choose Don't know/ Not applicable. As might be expected, the proportion selecting this option varied across the best-practice items.

In all analyses the p statistic represents the significance level where a value below 0.05 is considered to be statistically significant. A p value below 0.05 means that it is unlikely (probability of less than five percent) that the observed relationship or difference has occurred purely by chance. All statistical analyses were performed using SPLUS software and Microsoft Excel.

Interpretation of the results of the pairwise comparisons (e.g. to eliminate significant relationships that were irrelevant/nonsense) allowed the research team to identify a small number (approximately 27) of independent variables to include in the modelling for each best-practice. Some variables were included

in most models. The selected variables were then entered by Simon McDonald in a stepwise modelling process using Akaikes Information Criterion (AIC) as the step criteria.

Logistic regression modelling was used to explore the extent a small number of independent variables contribute to the presence or absence of best-practice implementation. For logistic regression modelling, a model is considered useful if it correctly predicts at least 70% of responses to the dependent variable (i.e. each best-practice).

Regression modelling also addresses the thorny question of multicollinearity between independent variables (i.e. where two variables essentially have the same impact). However, experiences with social benchmarking data suggests that those efforts may lead to important variables being excluded from models. For example, pairwise comparisons may reveal a significant relationship between implementation of a best-practice and both participation in a soil health group and property size. If participation in a soil health group and property size are also correlated, regression modelling may exclude one of these variables. There are sophisticated statistical techniques that can help to further tease out causality but these are beyond the scope of this research project.

The following sections A-D provide information related to these topics under section headings, though some of the issues are addressed across the different sections.

SECTION A: FARMING STRUCTURES

AN AGRICULTURAL LANDSCAPE

Survey results provided evidence that agriculture was a significant part of the regional economy, with 78% of respondents having earned income from their property in the 2018/2019 financial year. 70% of these respondents reported an income greater than $50,000 in the same period, which sits just above the national average of 69% of agricultural enterprises that have a turnover of $50,000 or above[10]. The most common land use was for cropping (76%), followed by sheep for wool and meat (both 62%). For all landholders the median land holding was 1500 hectares, held over two properties within the Eyre Peninsula. The average holding size for full-time farmers was higher at 3710 hectares, which sat closer to the national average of 4,331 hectares[11]. (For a further breakdown of land use and enterprise type, see Table X1 in Appendix 1).

76% of respondents resided on their Eyre Peninsula property (91% of full-time farmers), with the median length of family ownership sitting at 50 years. Overall, respondents had a median age of 59 years and 90% of respondents were male. This was slightly older than the national median farmer age of 54 years, which itself sat well above the national general workforce median age of 40 years, and suggested lower female participation (at least in terms of respondent gender) than the national average of 32% female agricultural workers[12].

FARM MANAGEMENT AND LANDHOLDER PROFILE

51% of enterprises had bought additional land in the last 20 years and only a small proportion (16%) subdivided or sold part of their property in the same period. This aligns with broader national trends toward increasing holding size[13]. Full-time farmers worked an average of 53 hours on-property per week and 59% of respondents had another member of the family working on the property. Off-property income was received by 34% of respondents and 23% of their partners, with 43% reported as greater than $50,000 in the 2018/2019 financial year. 78% had completed secondary school or higher, with 16% holding tertiary qualifications.

Farmer types present a useful way to see how different priorities influence landholder management practices. This typology was developed by Groth et al. (2014) and has been published in peer-reviewed academic journals[14] and used in previous phases of this Soil CRC project[15]. Survey participants self-identify into one of four groups based on their engagement with farming: 62% of respondents identified as **full-time farmers**, 14% as **part-time farmers**, 8% as **hobby farmers** and **16% as non-farmers**. While some of these types may have much in common, important and significant differences were often

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[10] National Farmers Federation, (2017), *Food, Fibre & Forestry Facts — A Summary of Australia's Agriculture Sector*. NFF https://nff.org.au/wp-content/uploads/2020/01/171116-FINAL-Food-Fibre-Food-Facts.pdf

[11] Jackson, T., Zammit, K., & Hatfield-Dodds, S. (2020), *Snapshot of Australian Agriculture 2020*, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra.

[12] Binks, B., Stenekes, N., Kruger, H., & Kancans, R. (2018), *Snapshot of Australia's Agricultural Workforce*, Australian Bureau of Agricultural and Resource Economics and Sciences.

[13] Jackson, T., Zammit, K., & Hatfield-Dodds, S. (2020), *Snapshot of Australian Agriculture 2020*, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra.

[14] Groth, T. M., Curtis, A., Mendham, E., & Toman, E. (2014). Farmer identity in multifunctional landscapes: using a collective identity construct to explore the nature and impact of occupational identity. *Australian Geographer,* 45(1), 71-86; Groth, T., Curtis, A., Mendham, E. A., & Toman, E. (2016). The utility of a collective identity construct to explore the influence of farming identity on natural resource management. *Society and Natural* Resources 29(5) 508-602; Groth, T., and Curtis, A. (2017). Mapping farmer identity. Why? How? What it tells us? *Australian Geographer,* 48:3, 365-383.

[15] Curtis, A., & Luke, H. (2019). *Social benchmarking for natural resource management: 2019 North Central Victoria*. Southern Cross University, NSW.

found between the groups. For example, part-time farmers were an important cohort, distinct from hobby farmers and closer to full-time farmers in that they typically had a strong business focus, and it was generally more likely that hobby farmers and non-farmers leant towards more environmental values. Some important characteristics of each type on the Eyre Peninsula were as follows:

Full-time farmers represent the majority of respondents (62%), had the highest rate of male respondents (95%) and an average age of 54 years. As a group they had the highest rates of residency, with 91% living on their Eyre Peninsula property. They had the largest individual landholdings, with an average holding of 3710 hectares. They also had the longest family ownership of the property, with the median length sitting at 70 years, and were most likely to have another member of family working on the farm (79%). 78% had secondary school education and higher, including 12% at tertiary level. Their most likely land use was cropping (97%), sheep for wool and meat (both 74%) and pasture (54%).

The second most common type was the **non-farmer** (16%). This group had the highest rate of female respondents (27%), had an average age of 62 years and was also the most highly formally educated group, with 40% of respondents holding tertiary qualifications. Average property size in this group was 939 hectares. The median length of ownership was 20 years, and this group was most likely to use the land as an area of remnant native vegetation, for example trees, grasslands or wetlands (50%). They had the lowest rates of principal residency on their Eyre Peninsula property (41%) and least likely to have had another member of the family working on the property (8%).

Part-time farmers make up 14% of respondents. The average age of this group was 60 years and 90% of respondents were male. Average property-size was the second highest, with an average holding of 1156 hectares. 57% live on the property and the length of family connection was the second highest at a median of 40 years, with 40% having reported that other members of the family also work on the property. The most common land use was for cropping (83%), sheep for wool (64%) and pasture (63%). Similar to full-time farmers, 80% of part-time farmers had completed secondary school and higher and 9% had completed tertiary education, the lowest rates of tertiary completion amongst the four types.

Hobby farmers make up just 8% of respondents and had the lowest average property size of 186 hectares. They had an average age of 60 years and 82% of respondents were male. This group had a similar level of residency as the part-time farmer group, with 59% living on the property as their principal place of residence. Hobby farmers had the shortest length of ownership or management of the property, with a median length of 15 years, and 37% had another family member working on the farm. This group used their land for a range of activities, including sheep for meat (53%), pasture (33%) and set aside areas for remnant native vegetation (33%).

There was no significant difference in distribution of farmer types by rainfall zone.

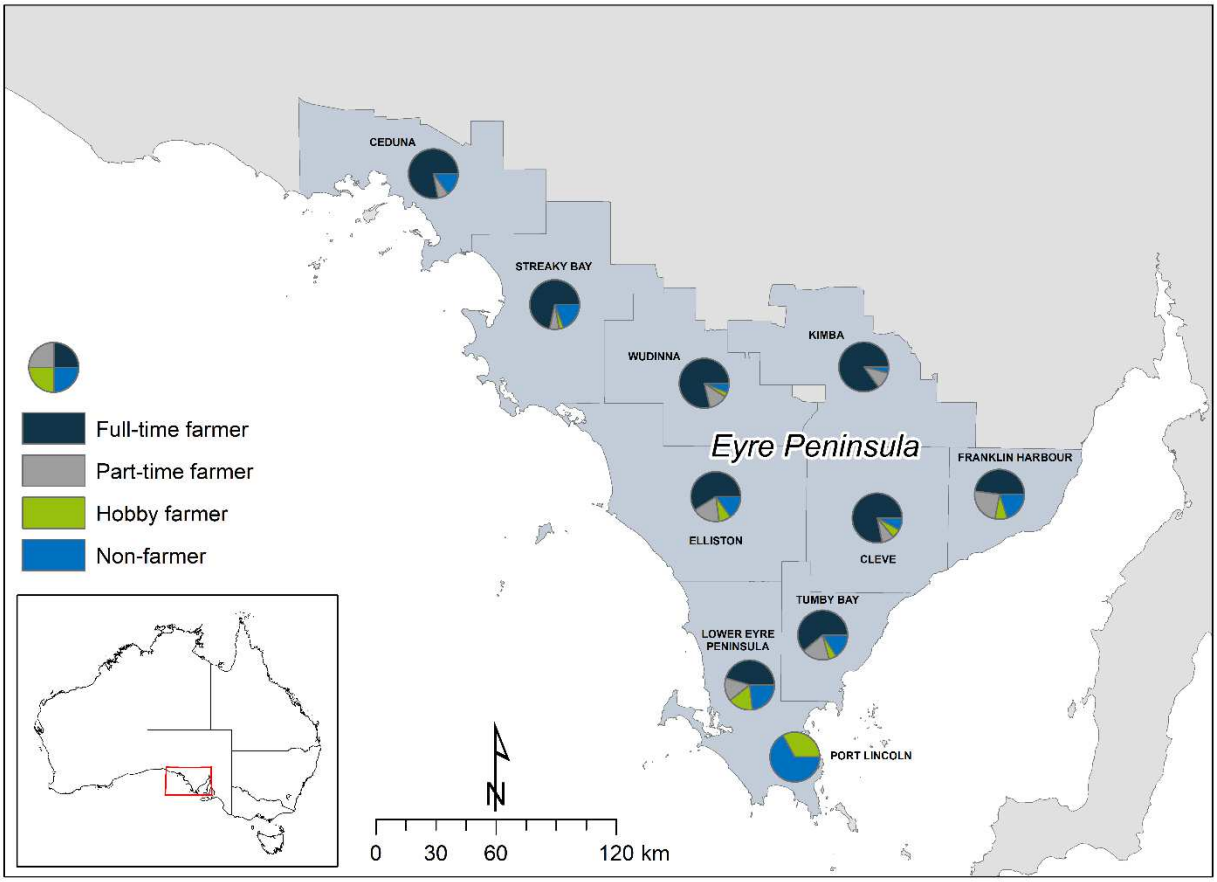

Figure 4: Diagram showing distribution of farmer type by local government area, 2020

As Figure 4 shows, full-time farmers dominated most local government areas across the Eyre Peninsula, except the Port Lincoln LGA, which was defined by hobby and non-farmers, likely given its inclusion of the city of Port Lincoln and the related impact of peri-urban zoning.

VALUES, BELIEFS AND DECISION-MAKING

A key element of the conceptual basis for our social research is that farmer behaviour is derived from "core elements of personality and belief structures"[16], where these can be seen through underlying values, beliefs and norms. Prior research has shown the usefulness of this Values-Belief-Norm (VBN) theory of understanding environmental behaviours, by suggesting that individuals were more likely to act when something that they value may be threatened[17]. In this section, we explored both values connected to the property by the landholder ('attached values') and underlying values and principles held by the landholder ('held values'). This informs understanding of the complex priorities and considerations that landholders contend with, and that may in turn drive land management behaviours, by showing what is considered to be important.

The different types of landholders attach different values to the land that they own and manage. The Eyre Peninsula, whilst dominated by full- and part-time farmers (together making up 76% of respondents), encompassed landholders with a range of intersecting 'attached values', the values attached to the property (Table A). The values landholders attached to their property were measured across environmental or biospheric (green shading), social or altruistic (blue shading) and economic or egoistic

[16] Curtis, A., & Luke, H. (2019). *Social benchmarking for natural resource management: 2019 North Central Victoria. Southern Cross University*, NSW, p28.
[17] Ibid, p28.

(orange shading) realms. These different groupings reflect the links between agriculture and the natural and social landscapes in which it occurs, particularly given the high levels of on-farm residency expressed earlier. Farms provide a range of value to those that live, work and recreate on the land.

The top three values by farmer type are indicated with grey shading. This data reveals some grouping of shared values across farmer types. Both full-time and part-time farmers rated the '*ability to pass on a healthier and more sustainable farm for future generations*' as their most important value attached to the property. Predictably, they both also placed a higher importance on other items related to income and business values. On the other hand, we saw a strong trend amongst hobby farmers and non-farmers to have valued the attractiveness and amenity properties of their land most highly, including a strong focus on native vegetation.

Table A: Attached Values 2020 (n = 454 to 461), both overall and by full-time farmer (FTF), part-time farmer (PTF), hobby farmer (HF) and non-farmer (NF.) Grey shading indicates the top 3 responses for each farmer type.

ATTACHED VAUES – Why your property is important to you	% INDICATING IMPORTANT/ VERY IMPORTANT				
	% OVERALL	% FTF	% PTF	% HF	% NF
Ability to pass on a healthier and more sustainable farm for future generations ###	87%	96%	90%	76%	49%
A great place to raise a family ###	84%	95%	77%	77%	52%
Sense of accomplishment from building/maintaining a viable business ###	82%	93%	88%	48%	38%
An attractive place/area to live ###	80%	79%	75%	97%	82%
The productive value of the soil on my property ###	79%	88%	85%	67%	33%
Creating wealth and striving for a financially profitable business ###	78%	87%	72%	59%	55%
An important source of household income ###	76%	94%	71%	44%	24%
Sense of accomplishment from producing food and fibre for others ###	76%	87%	80%	56%	37%
Opportunity to learn new things ###	71%	77%	75%	59%	50%
The native vegetation on the property provides habitat for birds and animals ###	68%	64%	71%	79%	84%
Provides a sense of belonging to a community ###	66%	74%	60%	61%	45%
An asset that will fund my retirement ###	65%	71%	64%	63%	44%
Native vegetation makes the property an attractive place to live ###	65%	60%	68%	88%	76%
A place where I can escape the pressures of life ###	61%	56%	67%	82%	73%
A place or base for recreation ###	52%	50%	45%	76%	65%

In addition to the values attached to the property examined above, the survey also considered the principles that guide a respondent's life, as represented by the underlying values held by respondents ('held values'). Table B shows incorporated items built upon a typology measuring egoistic (orange shading), biospheric (green shading) and altruistic (blue shading). There was an overwhelming response that the most important value was '*looking after my family and their needs'* across the farmer types, and the environmental value of '*preventing pollution and protecting natural resources'* reported as the second most important value. When looking at the top three issues by farmer type, again there was a grouping

across types, with full-time and part-time farmers united in their greater valuation of *'creating wealth and striving for a financially profitable business'*, whereas hobby farmers and non-farmers shared the value '*respecting the earth and living in harmony with nature*' as their third most highly ranked value.

Table B: Principles that guide your life, both overall and by farmer type, including full-time farmer (FTF), part-time farmer (PTF), hobby farmer (HF) and non-farmer (NF) 2020 (n= 458 TO 467)

PRINCIPLES THAT GUIDE YOUR LIFE	% INDICATING IMPORTANT/ VERY IMPORTANT				
	% OVERALL	% FTF	% PTF	% HF	% NF
Looking after my family and their needs	97%	98%	95%	100%	93%
Preventing pollution and protecting natural resources	86%	81%	84%	97%	96%
Creating wealth and striving for a financially profitable business	77%	87%	74%	55%	49%
Respecting the earth and living in harmony with nature	74%	71%	66%	85%	88%
Caring for the weak/vulnerable and correcting social injustice	57%	56%	51%	70%	57%
Fostering equal opportunities for all community members	50%	51%	43%	53%	50%
Being influential and having an impact on people and events	37%	38%	33%	52%	27%

WHO ELSE IS ON THE FARM?

About one quarter of returned survey responses (n = 114) also included a completed supplementary section that recorded the responses of any other person with a role in the management and operations of the property on a daily or weekly basis. A large proportion of this group (77%) were also resident on the property, with 31% of supplementary respondents children of the landholder who intend to take on management of the farm at some stage. 54% of supplementary respondents were female and the average age was 48 years old, reflecting in part this generational difference. On average, respondents earned 68% of their income from work on the farm, though the median was 90%. As a group these respondents reported relatively high levels of education, as 25% held tertiary qualifications and a further 17% had other post-secondary qualifications. This placed them more in alignment with the younger farmer cohorts. On average they worked 45 hours per week on the farm (median of 30 hours per week).

A selected group of items were included in the supplementary section, incorporating items from across the sections of the full survey. Important observations of this group include:

- The overwhelming value of this group was '*Looking after my family and their needs'*, with 94% of respondents agreeing with this statement, followed by '*Creating wealth and striving for a financially profitable business*' (81%).
- They expressed lower levels of openness to new ideas about farming than the main survey respondents.

SECTION B: ENGAGEMENT AND EXPECTATIONS OF AIR EP

The provision of information, support and education are important ways to increase knowledge and confidence in farm management practices. Understanding the ways in which landholders engage with processes of knowledge sharing and education, as well as with industry and land management groups, provides useful insights into how information can best be shared and landholders can be meaningfully engaged with. Well-developed engagement approaches, aiming to support improved productivity, land management and soil stewardship can be informed by a better understanding of landholder views, beliefs and experiences.

ACCESS TO INFORMATION

Respondents were asked what their top sources of information were in regards to topics related to the management of their property. Across all farmer types, respondents were most likely to have sought information and advice on property management from other farmers (89% of full-time farmers and 85% of part-time farmers). Table C shows that while the Bureau of Meteorology was in the top three, the most important information sources were other people they know, including farmers, friends/neighbours/relatives and independent consultants, agronomists or stock agents.

This strong reliance on knowledge networks within the Eyre Peninsula indicates the significant potential of these networks and relationships for knowledge transfer. Combined with the fact that 'Field Days' was the highest ranked mode of receiving information for full-time farmers (71%) and second for part-time farmers (57%), the benefits of combining networking and communication/education activities will likely continue to be a useful mode of knowledge transfer in the region. For the full table, see Table X9 in Appendix 1.

Table C: Top 10 information sources and modes of information for all survey respondents, 2020 (n = 461 – 462)

MODE OF INFORMATION	% YES
Field days ###	56%
Websites ###	54%
Newspapers ###	53%
Magazines ##	49%
Email ###	49%
Local Radio ###	42%
Brochures/leaflets/newsletters ###	37%
EP Farming Systems Summary ###	35%
Television	34%
Books	25%
Journals (research papers) ###	25%

SOURCE OF KNOWLEDGE	% YES
Other farmers ###	77%
Friends/neighbours/relatives ###	67%
Bureau of Meteorology ###	59%
Independent agricultural consultants, agronomists or stock agents ###	55%
PIRSA/SARDI ###	50%
EPARF (25%)/LEADA (19%) ###	44%
Commercial agricultural consultants, agronomists or stock agents ###	40%
Local farming groups (e.g. Ag Bureau, Landcare) ###	35%
Eyre Peninsula NRM	33%
Rural R&D organisations (e.g. GRDC, MLA, AWI, SANTFA) ###	30%

In terms of skilling-up, almost three quarters (73%) of respondents reported to have completed a short course/ workshop relevant to property management in the past 5 years (22% of their partners). Respondents were asked to respond to a series of open questions relating to their sources of support for

agricultural and land management practices. This qualitative data complements the aggregated quantitative data above, reinforcing the strong reliance on friends/neighbours/other farmers, family, grower groups and consultants such as agronomists. Two thirds of full-time farmers felt adequately supported in their agricultural endeavours, and when asked what sort of support would enhance their agricultural and land management activities, there was a strong response around locally-based field trials and experiments, both grants or financial support for conducting trials, or research driven by local grower groups/AIR EP.

A strong call was made for more extension officers, or independent (non-industry based) consultants/experts, the costs of which could be subsidised, as well as on-farm advice, field days and seminars. Government support to fund local research and demonstrations of management options, as well as funding for revegetation, fencing and training of young farmers, were also common suggestions. The provision of tax-free periods to fund land management improvements or to provide relief during periods of drought, was also a popular response. When asked which groups or organisations they would like to see provide support, local groups such as EPARF/LEADA/AIR EP and federal and state government departments such as Department of Agriculture, PIRSA, SARDI and their Minnipa Agricultural Centre, and GRDC were the most common responses, and Landcare was a popular suggestion as well.

For all respondents, 43% were members of an industry group (56% of full-time farmers). Amongst full-time farmers, there was strong agreement that *'grower groups are the best way to drive and direct local research, development and extension'*, and 77% expressed strong/very strong agreement with this statement. Across all farmer types, less than half of respondents felt they had a personal responsibility to engage with a local research and development group. Only a third said they had the time available to be involved in the wider agricultural community (e.g. field days, meetings). For further detail, see Table X5 in Appendix 1.

Just over half of all respondents (53% and 66% of full-time farmers) reported to have attended field days/farm walks/demonstrations focused on soil health and productivity in the past 12 months. When asked what had prevented them from attending field days, the most common answer was not having enough time, including being too busy or having work commitments both on- and off-farm. Other responses were the timing of the event (bi-annually); health problems; slowing down; farmers being 'anti-social' or not liking crowds; not applicable topics; lost interest/no interest/ 'been there, done that'; care commitments; money; 'price seemed high for that additional knowledge.'

RESULT FOCUS: EPARF/LEADA (NOW AIR EP)[18]

Overall, 65% of respondents knew of EPARF and/or LEADA and 15% were currently members. There was a significant difference between farmer types, with the highest awareness and membership amongst full-time farmers (80% had knowledge of, 22% were members), followed by part-time farmers (61%; 7% members). 38.5% of all respondents knew that EPARF & LEADA had amalgamated to form AIR EP.

58% of respondents agreed that EPARF/LEADA provide valuable information about soil agronomy and farm management, importantly including 72% of full-time farmers. Only a small proportion disagreed (3% overall and only 1% of full-time farmers), however overall 22% stated that they 'don't know' and 17% were unsure. The largest proportion of those who were unsure were part-time farmers (32%). The rates of 'don't know' were highest in non-farmers (76%) and hobby farmers (52%).

[18] n = 302-442 for this section.

Of all respondents, including members and non-members, 53% agreed that they could rely on LEADA and/or EPARF (now AIR EP) to keep landholders' interests in mind when making decisions about research priorities (66% of full-time farmers and 44% of part-time farmers). Again, a very small percentage disagreed (3% overall and 2% of full-time farmers), but 22% were unsure, with part-time farmers the least sure (32%). The 'don't know' rates were highest amongst non-farmers (82%) and hobby farmers (56%).

These results indicate a strong base upon which further engagement can be built as AIR EP establishes itself. The fact that the majority of results indicated an agreement that the associated groups can be relied on for valuable information and to keep landholder's interests in mind were very promising and a solid foundation, however the rates of respondents indicating that they either don't know or are unsure was evidence of a significant opportunity to increase AIR EP's profile and engagement, particularly with part-time farmers.

When it came to views on whether AIR EP should play an advocacy role/lobby on behalf of the EP agricultural community's needs in regard to research, development and extension, 61% of all respondents agreed, including 72% of full-time farmers. Conversely, 25% of all respondents (including 28% of full-time farmers) agreed that AIR EP should drive local research, development and extension but nothing more. These results suggested that there was strong support, particularly among full-time farmers, for AIR EP to play an advocacy role for the EP agricultural community's needs beyond the provision of research, development and extension.[19]

A model was built to determine the most important relationships between factors that may lead to farmers being or not being a member of their local grower group, taking into account 26 independent variables. The modelling found that farmers were more likely to be members of LEADA/EPARF/AIR EP if they had a high level of trust in the group; view them to provide valuable information about soil agronomy and farm management; had completed at least year 10; and were not averse to risk. Compared to non-members, they also appear to have a stronger belief that humans are influencing changes in climate. This model predicts 87% yes to membership.

[19] For a detailed list of responses to the open question 'What would you most like to see from AIR EP to drive farmer-led research and innovation' see the earlier update '*Eyre Peninsula Regional Profile: Soil CRC Survey Preliminary Results', available from AIR EP.*

REGIONAL AND ON-FARM CHALLENGES

Respondents were asked to rate the importance of a set of issues at the district and property scale. Issues at this scale can be seen to indicate a threat to the values expressed in Section A, and therefore play a role in land management behaviours as a possible driver of action. Given that there were significant differences between farmer types within the aggregated results, it is useful to look to the most important issues by farmer type and to consider not just the differences, but also the consistencies and similarities between groups, shown in Figure 5. Infrastructure was rated as very important for farmers, as was support for new and young farmers, and water security. Impacts on native plants and animals were very important for the hobby farmer and non-farmer groups. Whilst '*changes in weather patterns*' was in the top five for the other groups, it ranked only as sixth for full-time farmers, as only 65% of this group ranked it as an important issue.

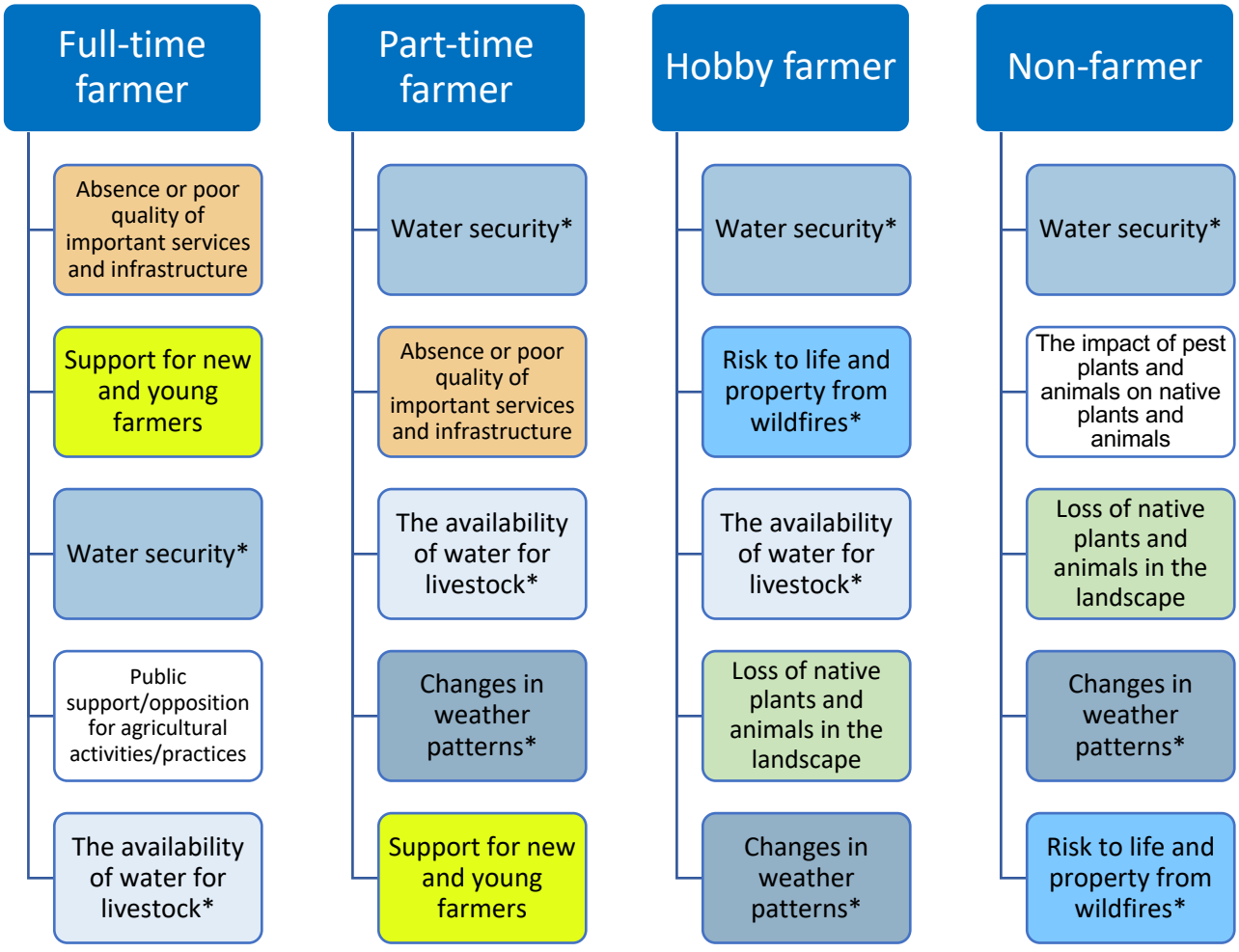

*Figure 5: Top 5 most important regional issues by farmer type. Coloured shading indicates items common across farmer types. Note that three social issues feature in the top four for full-time farmers. * relates to factors potentially influenced by accelerated climate-change (see section below).*

Soil-related issues at the property scale provide important insights into landholder priorities. The top five soil-related issues are shown in Figure 6, which shows that low biological activity, low soil carbon, chemical residue and the effects of pesticide use on soil biota as all being very important soil-related

issues. We saw strong crossover in concern among the different farmer types regardless of their level of farming, particularly that of soil erosion (68% overall) and low biological activity in soils (63% overall). Indeed, soil-related issues were one of the few survey items in which there were almost no significant differences by farmer type. When asked what they saw as having the most important influence on soil health, popular responses between full- and part-time farmers were the use of fertiliser, medic pastures, stubble retention, organic matter, timing, grazing levels and crop rotations. Of full-time farmers, 43% (32% of all respondents) indicated that an area of their land was lost to production due to soil problems. Of those who responded to an open-ended question asking them to specify the issue that caused this loss of area, the most prevalent responses were salinity, magnesia patches, non-wetting soils and sand drift, as well as soil and wind erosion.

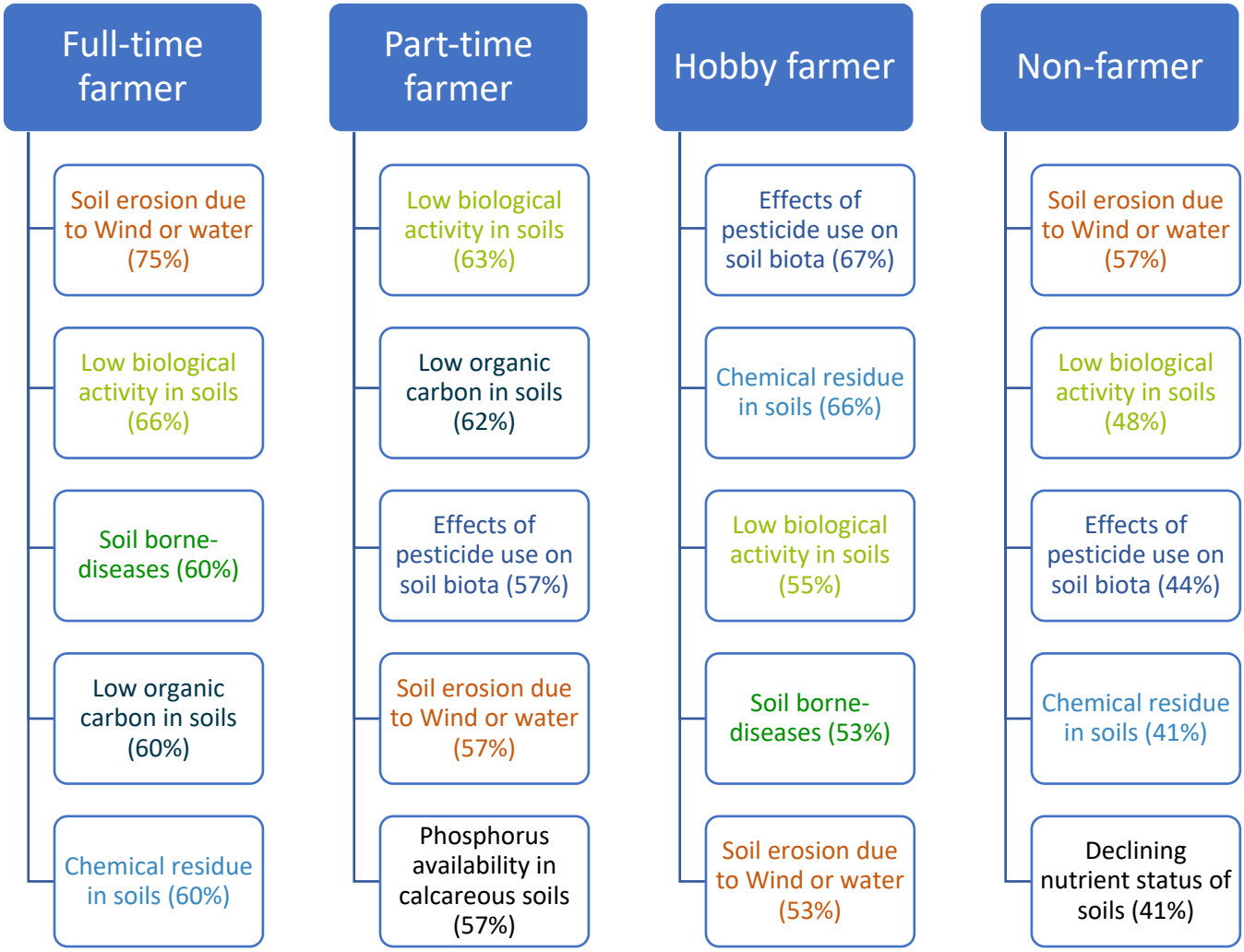

Figure 6: Top 5 most important soil-related issues on the property by farmer type, with the issues appearing to be important for multiple landholder groups highlighted by the use of colour.

In an open-ended question, landholders were asked to nominate what they saw as their biggest challenge or opportunity in the next ten years. The strongest emergent theme was soil health and fertility, which included better understanding of their own soils; putting soil amelioration strategies in place; building soil carbon and preventing erosion. The second strongest theme was that of retirement and succession-planning, followed by weather challenges, including rainfall variability and climate change. Other issues included chemical resistance of weeds (rye grass in particular); rising input costs and land values; volatile markets, as well as the social license to farm. Many of the opportunities included were positive responses

to the above challenges, such as ‘restoring soil health and monitoring the results,’ and ‘implementing sustainable agronomic and economic practices’, with improving soil health and working with their children to support farm-succession both reported as important themes. The following word cloud lists the responses, with each word made larger, the more often it was reported (Figure 7).

Figure 7: Wordle™ representation of responses to the open question: 'In the next 10 years, what would you see as likely being your biggest challenge and/or opportunity?', with each word emphasised in relation to times used in responses.

FARM MANAGEMENT: KNOWLEDGE, VIEWS, PRACTICE AND RISK

PRACTICES

The actual practices that farmers incorporate in their management – both historically, currently and those that they intend to undertake – are themselves important outcomes of decision-making. The data with regard to land management practices demonstrates the low levels of confidence expressed above, with a decline in almost all of the stated practices over time by full-time farmers. Some of this indicates that there has been an investment over time that will not need to be repeated soon, for example fencing or the planting of trees and shrubs, but others are perhaps better explained through the trial of, and reduced confidence in, the practice when aligned with the views expressed earlier in this section. In each of the practices included below, there has been a decrease in intention to undertake these practices over the next five years. It should also be noted that less than half of all full-time farmers reported current practice of these items, reducing to less than a quarter intending to implement over the next five years. The practice with the greatest drop was that of dry sowing.

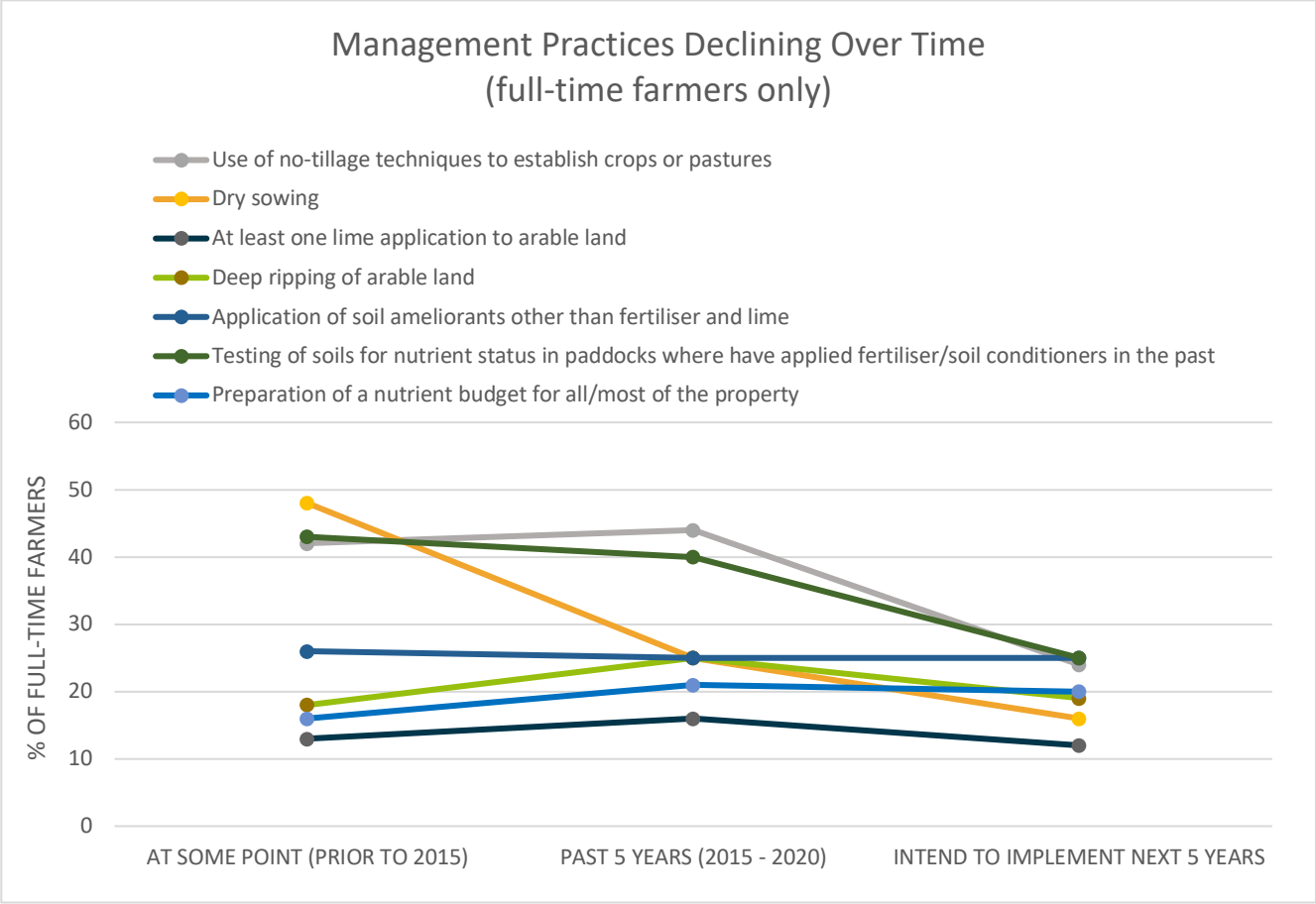

Figure 8: Full-time farmer management practices declining over time, 2020 (n = 463 - 466)

In terms of practices that were increased over time by full-time farmers, the most notable was reducing chemical use (historically 10%, currently 20% and intended practice 24%). There was a small rise in organic farming and regenerative practices, though these remain a very small proportion (5% historically, 6% currently and 7% intended practice for organic farming, and 12% currently and intended for regenerative practices from a low of 9% historically) other practices declined (see Table X6 in Appendix 1). When asked if there was a practice change over the last ten years that had influenced their profitability, the most common response was direct drilling, and decreased and minimum/no tillage.

Modelling found that farmers were more likely to view chemical residue in soils as an issue if they were confident that the costs of establishing perennial pasture are justified by the returns; were more likely to view soil-testing as important, and viewed that the cost of deep-tillage and subsoil modification were justified by increased production. Interestingly, those concerned about chemical residue were also more likely to be predisposed to 'caring for the weak and correcting social injustice', as well as being concerned about the lack of sufficient support for young farmers and the absence of important services and infrastructure (R^2= >0.21).

Respondents were asked to assess their level of knowledge on various farm management practices. Table D shows the mean and percentage of each farmer type that indicate a 'sound' or 'very sound' level of knowledge of the listed topics. Overall, levels of self-assessed knowledge were highest amongst full-time farmers across almost all of the knowledge topics. There were relatively low levels of self-assessed knowledge across the majority of items, with 12 of the 15 items measuring rates of 50% or less (shaded grey) of sound knowledge by any farmer type. This suggests a gap in education or knowledge translation amongst respondents.

Table D: Significant relationships between farmer identity cohorts and self-assessed knowledge of management practices, 2020 (n=411 TO 457). Mean is out of 5. Percentage results are for those landholders rating their knowledge as 'Sound' or 'Very Sound'. Grey shading indicates agreement of 50% or less of respondents.

KNOWLEDGE TOPIC	FULL-TIME FARMER	PART-TIME FARMER	HOBBY FARMER	NON-FARMER
Strategies to maintain ground cover to minimize erosion in this area ###	4.2 86%	3.9 83%	3.5 52%	3.1 34%
Preparing a farm/property plan allocating land use according to land class ###	3.8 68%	3.7 59%	3.0 38%	2.3 18%
How to build soil organic matter/soil carbon ###	3.6 58%	3.5 52%	3.1 28%	2.7 18%
How to identify the main constraints to soil productivity on your property ###	3.6 56%	3.4 47%	2.9 38%	2.3 15%
The processes leading to soil structure decline in this area ###	3.5 50%	3.4 47%	3.1 34%	2.6 18%
How to use soil testing to prepare a nutrient budget that will increase soil productivity ### ***	3.3 46%	3.0 30%	2.5 19%	2.1 15%
How to establish perennial pastures (e.g. Lucerne or native grasses) in this area ### ***	3.3 42%	3.4 48%	3.0 34%	2.2 11%
The production benefits of applying biological soil supplements (e.g. compost, manure, microbial inoculants) ###	3.3 37%	3.1 28%	3.4 47%	2.7 23%
Time controlled, cell or rotational grazing strategies ### ***	3.1 32%	3.1 30%	2.7 31%	1.9 7%
The extent and type of biological activity in soils on your property ###	2.9 26%	3.0 22%	2.8 22%	2.2 13%
Regenerative agriculture and holistic farm management ### ***	2.8 25%	2.8 21%	2.6 19%	2.2 12%
The EP Soil moisture probe network ###	2.8 24%	2.3 9%	1.6 3%	1.4 3%
Farming practices that can lead to more nutrient-dense food ### ***	2.7 20%	2.6 14%	2.2 13%	1.8 7%
Potential applications of 'virtual fencing' ###	2.6 20%	2.3 9%	1.9 13%	1.7 7%
How to support the persistence of native grasses in this area ### ***	2.7 17%	2.8 12%	2.6 16%	2.2 13%

Apart from degree of knowledge, an equally important element of decision-making in farm management practice is the set of views that farmers hold toward particular practices, otherwise understood as the level of confidence in a particular practice. Table E presents a set of views related to soil and soil management practices, with the mean (out of 5) and percentage of respondents who agree or strongly agree with the view statement listed, with the top three for each farmer type shaded grey. The results suggested very strong engagement with issues related to soil health. Almost all full-time and part-time farmers (both 98%) agreed that they feel a personal responsibility to maintain their soil's productive capacity. The second strongest element of agreement that was well distributed across farmer types, was

the view that fencing to manage stock access is an essential part of protecting waterways and native vegetation. Of note was the moderately low level of agreement with the return on costs for certain practices, including the application of gypsum (52%), deep-tillage and sub-soil modification (48%), establishment of perennial pastures (43%), and the application of lime (43%).

Table E: View statement agreement by farmer type, 2020 (n=354 – 449). The top 3 for each group are shaded grey.

VIEWS & EXPERIENCE: STATEMENT	OVERALL	FTF	PTF	HF	NF
I feel a personal responsibility to maintain my soil's productive capacity	4.4 91%	98%	98%	91%	53%
Fencing to manage stock access is an essential part of the work required to protect the health of waterways and native vegetation	4.2 85%	86%	79%	91%	82%
The benefits of stubble retention outweigh problems arising from the practice	4.3 84%	92%	91%	72%	51%
Soil testing is an essential first step in understanding soil condition	4.2 83%	84%	93%	84%	65%
Biological activity is an important indicator of the productive capacity of soils	4.2 81%	84%	88%	78%	68%
I would like to use less chemicals on my farm but it is too difficult in practice	3.9 67%	77%	67%	57%	28%
The costs of applying gypsum to address soil sodicity are justified by increased production	3.9 52%	57%	58%	49%	27%
The cost of deep-tillage and subsoil modification are justified by increased production	3.7 48%	54%	52%	42%	23%
The costs of establishing perennial pasture are justified by the returns	3.7 43%	44%	53%	56%	23%
The costs of applying lime to address soil acidity are justified by increased production	3.8 43%	45%	51%	42%	23%
I am interested in learning more about alternative/holistic farming approaches	3.3 40%	37%	48%	63%	31%
Fundamental changes are required to make our region's farming systems sustainable	3.3 40%	39%	45%	52%	34%

Overall, the data indicates a strong alignment between self-assessed knowledge level, confidence in a practice and actual practice. For example, perennial pastures had a low self-assessed knowledge level (42% of full-time farmers indicating sound/very sound knowledge), low confidence (44% of full-time farmers) and low practice (24% of full-time farmers). Table F indicates the complex relationship between these items. Statistical modelling showed that farmers were more likely to understand soil testing as an essential first step in understanding soil condition if they were also knowledgeable about a few other key things, including how to prepare a property plan allocating land according to land class; the processes leading to soil structure decline; and how to identify the main constraints to soil productivity. These farmers were more likely to self-identify as an early adopter. They also were more likely to have applied soil ameliorants other than fertiliser and lime in the past five years (R^2 >4).

Another model identified that farmers were more likely to have applied lime within the last five years if they were confident that applying lime was justified by increased production; had been testing soils for

nutrient status in paddocks where they had previously applied fertiliser/soil conditioners; and had completed high school. They were also likely to be risk averse (predicts 92% yes).

Table F: Implementation of management practice compared with related knowledge and confidence in the practice for full-time farmers only, 2020 (n = 428 – 466)

Management Practice	Implemented in the last 5 years	**Confidence**	Agree or strongly agree	**Knowledge**	Sound or very sound
Use of no-tillage techniques to establish crops or pastures	58%	The benefits of stubble retention outweigh problems arising from the practice	92%	Strategies to maintain ground cover to minimize erosion in this area	86%
Testing of soils for nutrient status in paddocks where have applied fertiliser/soil conditioners in the past	49%	Soil testing is an essential first step in understanding soil condition	84%	How to use soil testing to prepare a nutrient budget that will increase soil productivity	46%
Application of soil ameliorants other than fertiliser and lime (e.g. gypsum, organic manure)	31%	Biological activity is an important indicator of the productive capacity of soils	84%	The production benefits of applying biological soil supplements (e.g. compost, manure, microbial inoculants	37%
Sowing perennial pastures	24%	The costs of establishing perennial pasture are justified by the returns	44%	How to establish perennial pastures (e.g. Lucerne or native grasses) in this area	42%

In complement to the quantitative data presented above, farmers were asked to nominate the most important influence on profitability in the last twelve months, in an open-text question. Of those full- and part-time farmers who responded, two broad areas of importance emerged besides weather-related influences such as rain or frost, and these results were spread across all rainfall zones. The first and most prevalent is the impact of markets. Similar to the influence of weather, prices for both yield and inputs are beyond the farmer's control, and were cited as important influences on profitability. Beyond this, management practices were reported as having an influence on profitability, and included the following, in order of importance:

- timing of operations, particularly around sowing;
- the decision to move to (more) sheep and wool production;
- livestock management including changing breeds, feeding plans and long-term nutrition strategies and records;
- weed and pest issues;
- soil health and related measures, including no-till; precision-planting; disc seeding; deep-ripping; effective nutrient management and localised monitoring (by paddock); cover-crops; crop diversity and rotation.

More specifically, respondents were asked to nominate any particular practice change over the last ten years that had had a major influence on their farm's profitability. Across all rainfall zones, the most common reported practice change for full- and part-time farmers was the introduction of no- or low-till farming. Second to this in medium rainfall zone was direct drilling, and early and dry sowing. For the low rainfall zone, the second most reported practice changes were dry sowing and summer spraying.

RISK AND OPENNESS TO CHANGE

All landholder types engaged with farming practices indicated a very high degree of openness toward new ideas about farming, with 95% of full-time farmers, 92% of part-time farmers and 90% of hobby farmers agreeing or strongly agreeing with that statement. That said, the same groups had only moderate agreement that '*financially, I can afford to take a few risks and experiment with new ideas*' (46% of full-time farmers, 50% of part-time farmers, 44% hobby farmers) or that they were early adopters of new agricultural practices and technologies (46% of full-time farmers and 43% of part-time farmers and only 20% of hobby farmers). This presents a mixed picture of actual willingness to take on new ideas.

The twin measures of risk avoidance/ risk openness were fairly evenly divided amongst full-time and part-time farmers, for example 58% of full-time farmers indicated they prefer to avoid risks, and 56% indicated they view risks as a challenge to embrace. Availability of time was not an important barrier to change, with only 17% of participants indicating that they don't have enough time to consider changing their practice. For further detail, see Table X8 in Appendix 1.

The modelling showed that those who self-identified as early adopters were more likely to embrace risks, plus have the financial capacity to experiment with new ideas. A higher level of concern about changes in weather patterns and water security was more likely for this group, who was also more likely to be a member of either EPARF or LEADA (R^2=0.23).

BELIEFS ABOUT CLIMATE CHANGE

We draw out a section specifically related to accelerated climate change because of the notable differences in views between the landholder/farmer types. In terms of the level of concern expressed by respondents, the survey included three regional issues related to climate change: '*Water security*', '*Changes in weather patterns*', and '*Risk to life and property from wildfires'*. Results for these three items are shown in Table G.

Table G: Issues affecting local region, 2020 (n=461 - 463). Mean is out of 5 (with 5 being Very Important).

ISSUE AFFECTING LOCAL REGION	Mean	% Imp/ Very imp	Highest concern by farmer type
Water security	4.3	81%	PTF 90%
Changes in weather patterns	3.9	65%	PTF & NF 69%
Risk to life and property from wildfires ### ***	3.4	48%	HF 82%

Water security ranked in the top three issues for all groups (see Figure 5), including as the most important issue for three of the four farmer types. Although rainfall in the Eyre Peninsula has been relatively stable over the last 30 years, it is seasonal, with rainfall reliability for winter rated as moderately reliable across the region, but summer rainfall rated as unreliable to very unreliable across the region over the last 30 years [20]. Along with a decrease in rainfall in the autumn and spring months, the Eyre Peninsula has also experienced fewer frosts and more hot days over the past 30 years[21]. As an example of this change, Figure 9 from the Bureau of Meteorology shows the increase in the number of days hotter than 38°C over the last 30 years at Ceduna. Changes in weather patterns ranked in the top five issues across three of the farmer types (see Figure 5). Relatedly, the risk related to wildfires was in the top five concerns for

[20]Bureau of Meteorology & CSIRO, (2019), *Regional Weather and Climate Guide – Eyre Peninsula*. Bureau of Meteorology, CSIRO and FarmLink.

both hobby farmers and non-farmers. This fits with the earlier finding that there was a high value placed on native vegetation by these groups, as these holdings may be more likely to have high coverage of vegetation compared with farming properties, and therefore be at higher fire risk.

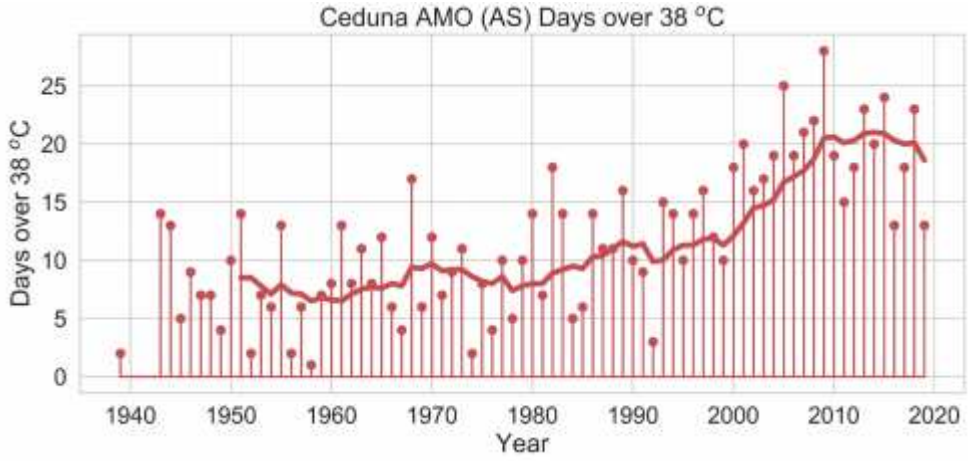

Figure 9: Days over 38°c at Ceduna, SA. Source: Bureau of Meteorology & CSIRO, 2019, Regional Weather and Climate Guide – Eyre Peninsula. Bureau of Meteorology, CSIRO and FarmLink.

Despite the high levels of concern for water security, this was not necessarily linked to accelerated climate change, and did not seem to have a clear influence on action around climate change. Among all respondents, we saw a relatively high level of uncertainty about climate change, though there was a strong believe in the capacity of local landholders to adapt. About a third of all respondents responded that they neither agreed nor disagreed with these statements (see Figure 10).

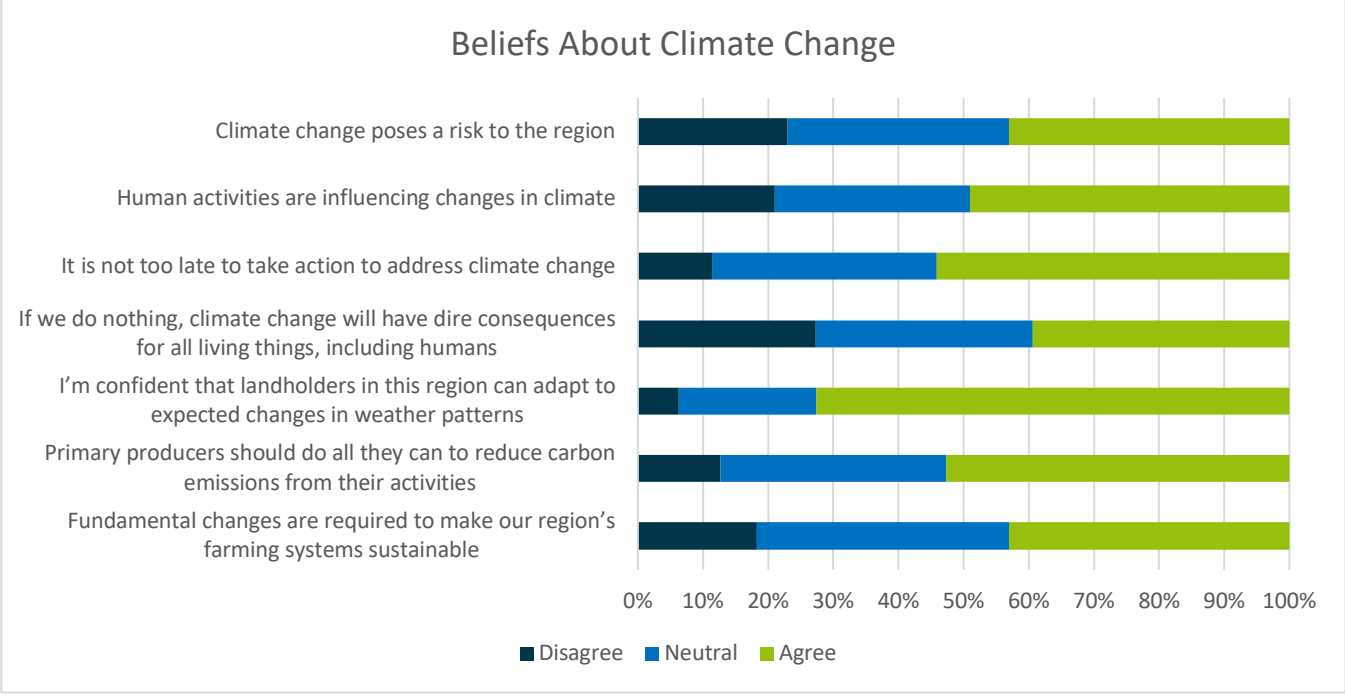

Figure 10: Landholder beliefs about climate change, 2020 (n = 431 – 452)

The group with the highest level of belief in climate change and its impacts was the non-farmer group. Overall, less than half of the respondents agreed with the statements '*Human activities are influencing changes in climate*' (49% agree), *'Climate change poses a risk to the region*' (43% agree) or '*If we do*

nothing, climate change will have dire consequences for all living things, including humans' (39% agree). Across all farmer types, only half agreed with the statement '*Primary producers should do all they can to reduce carbon emissions from their activities*', and only 45% of full-time farmers. On the other hand, there was moderately strong confidence in the statement '*I'm confident that landholders in this region can adapt to expected changes in weather patterns*', with an overall agreement across farmer types of 69%, with greater confidence aligned with greater engagement in farming (77% full-time farmers, 71% part-time farmers, 58% hobby farmers, 41% non-farmers). The modelling showed a strong relationship between farmers believing that 'climate change is caused by humans' and being highly concerned about changes in weather patterns; considering that it would have 'dire consequences for all living things; including humans'; and being a member of either EPARF or LEADA (R^2= 0.56). For further breakdown see Table X3 in Appendix 1.

In terms of how views on climate change may be evolving through the generations, of the three age groups, Generation Y (born 1981-1996) had the lowest level of agreement (35%) that human activities are influencing changes in climate, and were the most likely to be unsure about this statement (38% unsure, 28% disagree). Similarly, they were least likely to agree that *'Climate change poses a risk to the region*' of any of the age groups (30% agree, 45% unsure) and had the highest level of disagreement with the statement *'If we do nothing, climate change will have dire consequences for all living things, including humans*.' (34% disagree, 37% agree, 29% unsure).

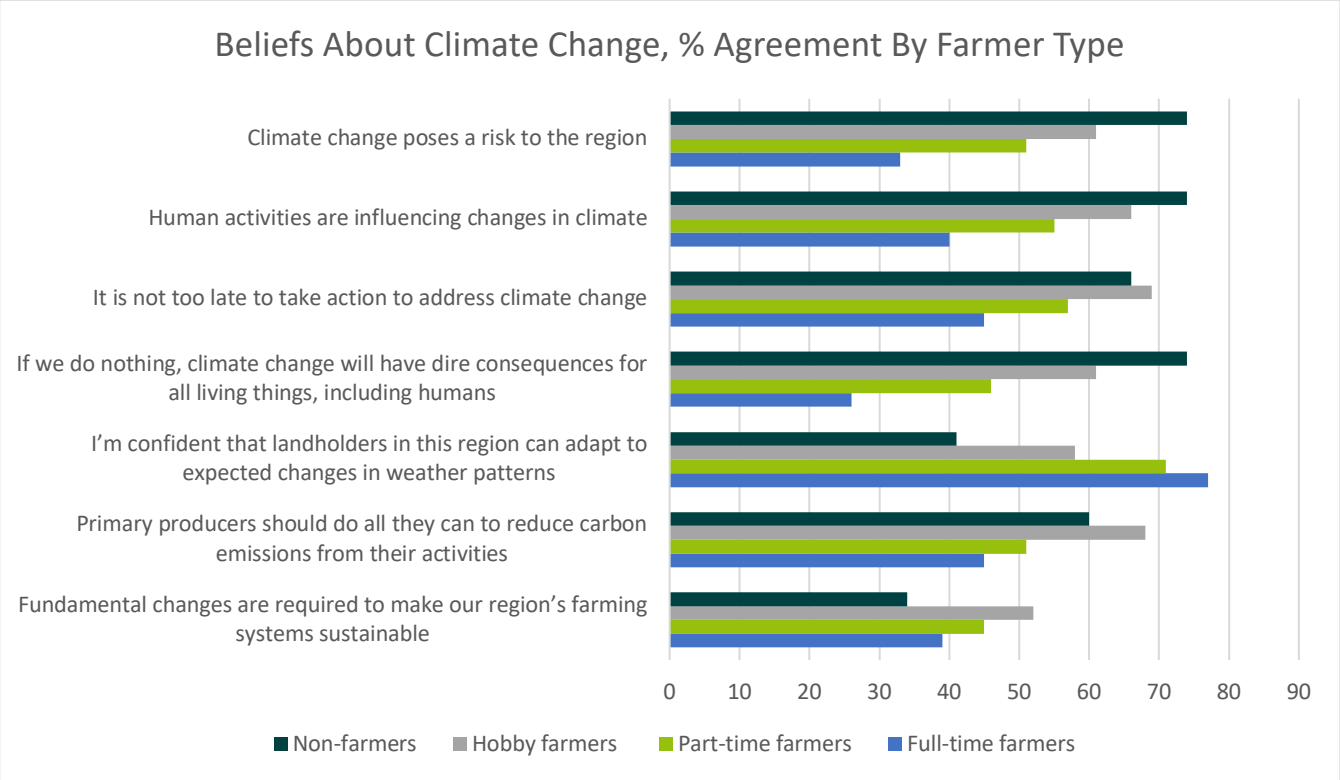

Figure 11: Beliefs about climate change by farmer type, 2020 (n = 431 – 452)

This set of views and beliefs translated into similarly low levels of action on practice items related to climate change, both in terms of current practice and future plans. As can be seen from the following Table H and I, there was little action planned to mitigate climate change issues.

Table H: Practice change related to climate change issues, 2020 (n=404 – 442)

CURRENT PRACTICE	% Yes TOTAL	% Yes FTF	% Yes PTF	% Yes HF	% Yes NF
In the past 12 months have you changed your operations to increase the soil carbon on your property (e.g. by revegetation, soil management) ###	28%	32%	35%	14%	10%
In the past 12 months have you changed your financial or on-property operations as a result of seasonal changes in weather patterns? ### ***	27%	34%	23%	12%	5%
In past 12 months have you changed your on-property operations as a result of considering opportunities to reduce carbon emissions (e.g. generating solar and/or Wind power, increased power use efficiency, improved grazing practices, improved nitrogen use efficiency) ### ***	24%	25%	26%	16%	11%

Table I: Long-term plans related to climate change, 2020 (n=425 TO 427)

LONG-TERM PLANS	% LIKELY	% UNSURE	% UNLIKELY
Some part of my property will be set aside for conservation purposes ###	20%	21%	54%
Buying property outside of my current area to mitigate increased seasonal variability ***	8%	17%	67%

SECTION D: THE FUTURE OF FARMING

SUPPORTING YOUNGER FARMERS

Age can be an important influence on farmer decision-making, both through the impact of changing life stages and associated priorities, as well as the level of experience of landholders. The respondent data from full-time and part-time farmers was broken down into three age categories, as determined by established definitions of generations[22]: Generation Y (born 1981-1996), Generation X (born 1965-1980) and Baby Boomer and older (born prior to 1965, referred to as Baby Boomer+). Given the age demographics of the cohort, the Baby Boomer + group (aged 57 years and older group) was the largest group, so tests for significance were undertaken, where significance was set $p<0.05$ on a selected number of items. From these, some interesting differences emerged:

- For the item *'I would like to use less chemicals on my farm but it is too difficult in* practice', agreement was stronger the older the group;
- Agreement was stronger the older the group to the item '*I am coping well with the associated stresses & challenges of managing my farm'*, suggesting higher stress levels amongst younger farmers;
- The group with the strongest level of agreement with the statement '*fundamental changes are required to make our region's farming systems sustainable',* was the Baby Boomer and older generation, followed by Generation Y. Generation X had the lowest level of agreement with this statement;
- For the item '*primary producers should do all they can to reduce carbon emissions from their activities'*, agreement was stronger with age, thus the Baby Boomer+ were most likely to view this as important;
- The Baby Boomer+ had the strongest agreement with '*I prefer to avoid risks'*, and Generation Y had the lowest agreement.

Interestingly, there was only one regional or on-farm issue which had a significant difference by age group, and that was a higher importance placed on the issue of '*The impact of pest plants and animals on native plants and animals'* by the older generation. Whilst the following do not represent statistically significant differences, the generations of farmers exhibited the following characteristics:

As a group, Generation Y had the highest rates of both tertiary education (24%) and other post-secondary education (24%) amongst all full- and part-time farmers, and were the only group for which every respondent had Year 10 education and above, which may be why they were also most confident with numbers and with the management of their farm accounts. In comparison, 12% of Generation X and 8% of the Baby Boomer+ generation had tertiary qualifications.

Generation Y reported to be more open to risk, as the most likely to agree with the statement '*I usually view risks as a challenge to embrace*'. 100% of Generation Y respondents reported to be open to new ideas about farming, and were more interested than the older groups in taking up some sort of study/activity to improve their farm management skills. They and/or their partner were also the most likely to have had completed a short course/workshop relevant to property management in the last five years

[22] Dimock, M. (2019). Defining generations: *Where Millennials end and Generation Z begins.* Pew Research Centre. Washington. https://www.pewresearch.org/fact-tank/2019/01/17/where-millennials-end-and-generation-z-begins/

(96%), and the most likely of all age groups to have had attended field days/farm walks/demonstrations focused on soil health and productivity in the past 12 months.

Generation Y were the most likely to include another person in their decision-making, with 97% agreeing that they '*usually include another person or people in my on-farm management decisions'.* The most common advisors were agronomists, followed by their spouse, father or brother. For both older generations, spouses were reported to have had as much input as agronomists into on-farm decision making.

Generation Y were most likely to have prepared or been preparing a property management or whole farm plan that involves a map or other documents that address the existing property situation and include future management and development plans, at a rate of 60%. However, they also felt the least supported to conduct farming and land management activities on their property, with only 56% agreeing that they felt adequately supported and 34% indicating they were unsure. Overall, 67% of full-time farmers felt adequately supported to conduct farming and land management activities on their property.

For all age groups, the most important sources of farmer support were consultants and friends, followed by grower groups and agronomists. When asked what sort of support would enhance their agricultural and land management activities, the younger group indicated they would like more engagement with grower groups and knowledgeable organisations, including through field trials and extension officers. They also called for financial support, including subsidising the cost of fixing soil constraints.

Along with the Baby Boomer+ generation, Generation Y agree strongly with the statement that *'Grower groups are the best way to drive and direct local research, development and extension'*, but as a group were slightly less likely than the other age groups to be a member or involved with any industry group (46% Generation Y, 53% Generation X, 52% Baby Boomer +). Overall, Generation Y reported to have had less time available to be involved in the wider agricultural community, however, they were more likely to disagree with the statement '*I don't have enough time to consider changing my practices*'.

Generation Y group listed the following responses (grouped into topics to reduce duplication) to the question *'In the next 10 years, what would you see as likely being your biggest challenge and/or opportunity?':*

- Succession planning, changing hands
- The social licence to farm
- Optimising potential in soil, soil amelioration, soil nutrition, soil work with clay/sand, fixing soil constraints
- Work-life balance
- Increasing sheep numbers using the same land, increasing pasture production and lambing percentage, improving sheep feed, continue improving the sheep flock to improve turn off
- Weather, and weather technologies, variable climate and seasons
- Paperwork
- Lack of finance
- Expansion whilst maintaining profitability, growth
- Foreign Investment
- New varieties and tech
- Dry years, weed control, pest control
- Starting new market, grain and stock prices
- Chemical resistance, weed control, pest control
- Casual labour

Statistical modelling found that farmers who felt 'adequately supported to conduct farming and land management activities' on their property were also more likely to have the financial capacity to be

experimenting with new ideas. Having the ability to pass on a healthier and more sustainable farm for future generations was more likely to be important to them. While they were more likely to report that they feel adequately supported for conservation activities on their farm, they were also more likely to hold the view that a lack of support for new and young farmers was an important regional issue. Interestingly, LEADA emerged as an important information source for these farmers (R^2 =0.24).

BUSINESS MANAGEMENT AND LONG-TERM PLANS

Business management at the farm level will have a direct impact on land management decisions and has important consequences for profitability. On-farm management appears to be largely collaborative, as 75% of all respondents and 86% of full-time farmers reported that they usually include another person or people in their management decisions. Most commonly this was reported as a family member (e.g. spouse, child, parent), and alongside the family, agronomists were the most common advisor. Overall there were high levels of confidence both in terms of being able to manage farm accounts (85% of full-time farmers and 80% of part-time farmers) and a relatively strong sense that farmers were dealing well with the associated stresses and challenges of managing the farm (70% overall, 75% of full-time farmers and 76% of part-time farmers).

When it comes to farm income this confidence drops, with 71% of full-time farmers and 58% of part-time farmers reporting they were satisfied with farm income. This drops further when asked more directly, as 51% of full-time farmers and only 29% of part-time farmers agreed with the statement '*Our on-farm income is enough for about everything we want with some left over for savings*'. Modelling showed that farmers who were satisfied with their farm income were more likely to feel confident with managing their accounts and were at a point where they could save money. They also felt that their farm was a great place to raise a family and were less likely to be concerned about the absence of regional services or chemical residue in soils (R^2 >0.4).

Profitability of course turns on many factors, and when asked in an open-ended question as to the most important influence on profitability, full- and part-time farmers responded that apart from those factors outside farmer control, such as weather (including rainfall, drought, frost and wind), commodity prices and cost of inputs (including water and council rates), important influences include management decisions about timing of crops, weed control, and stock management.

There were moderate levels of confidence in data management systems, as 61% of full-time farmers and 56% of part-time farmers agreed that they have good systems in place to manage farm data, which represents an area for development. Interestingly, only around a quarter of all respondents (29% of full-time and part-time farmers) agree with the statement 'I would like to do some sort of study/activity to improve my farm management skills'. For a more detailed breakdown, see Table X10 in Appendix 1.

Continuity was the dominant theme of landholders' long-term plans. The majority (79%) of all respondents indicated that it was likely or highly likely that ownership of the property would stay within the family, rising to 85% of full-time farmers and 74% of part-time farmers. Conversely, hobby farmers (29%) and non-farmers (25%) were most likely to indicate that they plan to sell the property. Full-time farmers were most likely planning to purchase (43%) and lease (31%) additional land, again in line with broader industry trends to larger holding sizes[23].

[23] Jackson, T., Zammit, K., & Hatfield-Dodds, S. (2020), *Snapshot of Australian Agriculture 2020*, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra.

Of all of the farmer types, full-time farmers were most likely (37%) to move off the property at retirement. Part-time farmers were the group most likely (34%) to lease or share farm their property, though this was also an option for 33% of non-farmers and 22% of hobby farmers. Part-time farmers were also the group most likely to have had a family member seek additional off-property work to support the farm. Long-term plans to change production to either a less or more intensive enterprise mix were low across all groups (average 9%), though 22% of full-time and 21% of part-time farmers were likely to change the enterprise mix to diversify income sources. For more detail see Table X11 in Appendix 1.

A growing body of evidence demonstrates the benefits of whole-farm planning, for long-term farm viability, resilience and succession planning[24]. For full-time farmers, 53% reported to have had a property management or whole-farm plan in place (44% of all respondents). Modelling (of 29 independent but likely related variables) showed that growers who already have a property management or whole farm in place were more likely to be confident with managing their accounts and have systems in place to manage their farm data. They were also more likely to have tertiary education qualifications, were not averse to risk and usually involved another person in their on-farm decision making. They were less likely to feel that some sort of study could improve their farm-management skills. They also had a strong belief that grower groups are the best way to drive and direct local research, development and extension (correctly predicts >70% yes).

Farmers were more likely to have prepared a farm management plan according to land class if they had confidence that the costs of applying lime to address soil acidity are justified by increased production; knew how to identify soil constraints and had tested the nutrient status of their soils within the past five years. Interestingly, they were also likely to be older and risk averse (predicts >85% yes).

Given the very high number of full- and part-time farmers planning for their property to stay in the family, it was important to examine the succession planning status of respondents. Despite the intentions toward family ownership, there seems to be a relative lack of corresponding options. Figure 12 indicates the difference between plans for long-term family ownership compared with those that had family members interested in taking on the farm. This indicates a shortfall across all farmer types.

[24] Dominati, E., Mackay, A., Rendel, J. & Smale, P. (2016). Looking to the future of land evaluation and farm planning. *Journal of New Zealand Grasslands* 78: 67-72; Kingwell, R. S., Pannell, D. J. & Robinson, S. D. (1993). Tactical responses to seasonal conditions in whole-farm planning in Western Australia. *Agricultural Economics* 8: 211-226; Rosburg, B. & Griffin, T. (2018). Whole-Farm Planning Models for Assessing Inter-Generational Transition. *Journal of the NACAA* 11; Stimpson, K., Luke, H. & Lloyd, D. (2018). Understanding grower demographics, motivations and management practices to improve engagement, extension and industry resilience: a case study of the macadamia industry in the Northern Rivers, Australia. *Australian Geographer*: 1-22.

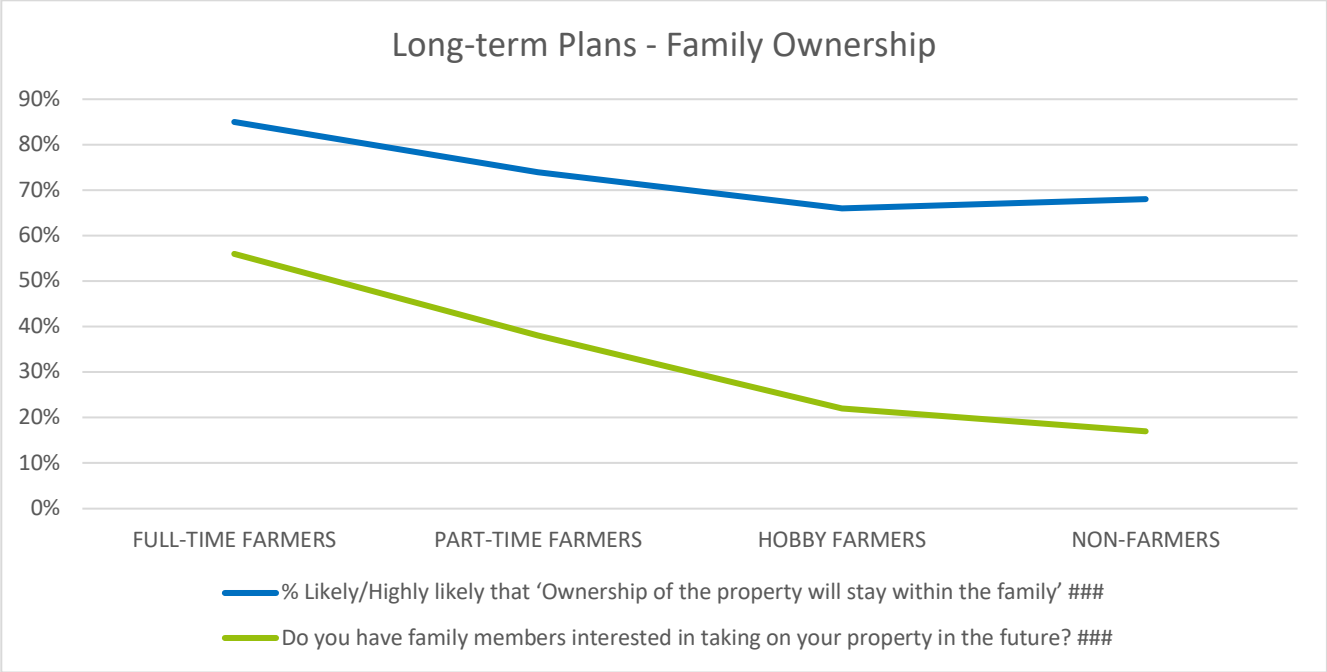

Figure 12: Long-term plans - family ownership, 2020 (n = 440 – 447)

When asked what the biggest challenge and/or opportunity might be over the next ten years, retirement and succession planning featured prominently in the responses. For the 54% of respondents who nominated that they had agreed to a succession plan (n=256), progress was mixed, with hobby and non-farmers less likely to have made progress (Figure 13). Across all landholder types, 74% of respondents with an identified family successor stated they were in the process of completing a succession plan. Of full-time farmers, 79% had succession-plans underway, with 37% being well-advanced. Of part-time farmers, 46% had well-advanced plans and only 13% had not yet started a succession plan.

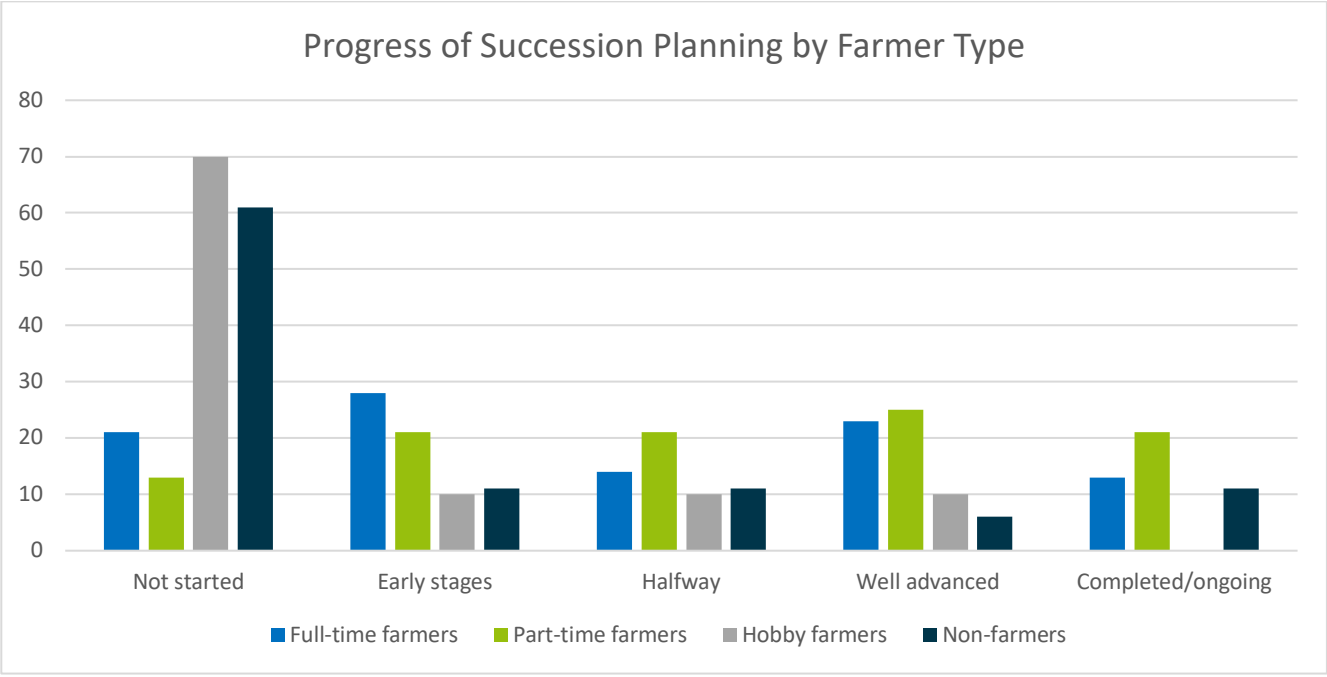

Figure 13: Progress of succession planning by farmer type, 2020 (n = 256)

The supplementary survey form, described earlier, was designed to capture the views of others involved in on-farm decision-making, besides the primary decision-maker/survey respondent. A high

proportion of those who completed the supplementary section may also represent the younger cohort involved in decision-making, with the mean age reported as 49 years (n=113). 25% reported that they had completed tertiary education as their highest level of education. 77% lived on the farm as their primary place of residence, and 81% worked on the farm for a median of 30 hours per week (mean=45). For those who identified as a child of the present property manager (n=50), 70% were interested in taking on management of the property in the future. These findings indicate that those farmers who have children actively involved on the farm now may have an improved chance of finding a willing person to take over the farm in the future.

When asked to list what would be most useful to support their agricultural and land management activities into the future, popular responses centred on greater government support, both through financial support for research and soil amelioration costs, and on increased education. The overwhelming message was a call for more support from locally-focussed and well-supported research and development groups, including LEADA, GRDC, local government, PIRSA, Minnipa Agricultural Research Centre, EP NRM, and the Department of Agriculture.

CONCLUSION

This report has given a broad range of insights into a number of farming practices being undertaken on the Eyre Peninsula of South Australia. The results show that while there were a range of enterprises and land use mixes, the dominant land use is for agriculture under the management of full-time farmers. The Eyre Peninsula farming community appears to be collaborative, as farmers tend to rely on knowledge sharing between farmers, friends, neighbours and agronomists that work locally. Field days also emerge as an important element of knowledge transfer. However, with less than 50% of farmers considering themselves to have a sufficient knowledge-level to act on a range of topics and practices, there remains substantial opportunity to improve farmer knowledge on a range of topics.

While the majority of respondents were male, with an average age of 59 years, this study shows that there were a number of other people who play a major role in on-farm decision-making. For many farmers, several family members may have an important influence in on-farm decision-making, however independent agronomists also emerged as having an important role in decision-making across the Eyre Peninsula. As raised by the community representatives at our survey development workshop, younger farmers on the Eyre Peninsula do indeed appear to feel less well supported than their older counterparts, and our findings suggests a range of ways that this support could be improved, including more government support to train young farmers and to fund local research and demonstration sites.

In terms of farmer values, whilst '*looking after my family and their needs*' was the most important intrinsic value across all farmer types, the '*ability to pass on a healthier and more sustainable farm for future generations*' was the most important value attached to the property for both full- and part-time farmers. Valuing the farm as '*a great place to raise a family'* and having a '*sense of accomplishment from building/maintaining a viable business*' were also extremely important for farmers. On the other hand, we saw a strong trend amongst hobby farmers and non-farmers to value the attractiveness and amenity properties of their land most highly, including a strong focus on native vegetation.

Overall, landholders appeared to be coping well with the associated stresses and challenges of managing their farm, however 25% of full-time farmers indicated that they were not. 71% of full-time farmers reported to be satisfied with the income from their farm.

Continuity appeared to be a dominant theme, with a relatively low proportion of farmers considering themselves to be early adopters. Similar proportions considered themselves as more or less likely to embrace risk or change. Challenges for the region were reported to be a lack of adequate infrastructure, insufficient support for young farmers, and climate-related issues like water security, changing weather patterns and risks from wildfire. Full-time farmers were also concerned about threats to their ongoing social license to operate.

While about half of respondents believed that climate change is caused by humans, about a third were 'unsure' about climate change impacts, what may be causing them and what the impacts to the region may be. 36% were unsure about whether fundamental changes may be required to make the region's farming systems sustainable. This high proportion without strong views either way would be an interesting group to engage with to understand their ambivalence on these issues.

Succession planning appears to be an important consideration for many farmers, with succession plans being underway for the majority of part time and full-time farmers. The results indicate that farmers who are already working with younger family members on the farm may have a better chance of identifying a successor.

APPENDIX 1 – DATA TABLES

TABLE X1: LAND USE AND ENTERPRISE MIX, 2020 (n= 474 TO 476)

LAND USE/ ENTERPRISE TYPE	% Yes 2020	Difference by rainfall zone	Difference by farmer type (highest response group)
Cropping	79%	Nil	### (FTF 98%)
Sheep for wool	62%	Nil	### (FTF 74%)
Sheep for meat	62%	Nil	### (FTF 74%)
Pasture	54%	Nil	### (FTF 65%)
Area of remnant native vegetation (e.g. trees, grasslands, wetlands)	36%	***	Nil (NF 50%)
Other tree planting (e.g. shelter, habitat, erosion or recharge control, carbon)	21%	***	Nil (HF 28%)
Area set aside for living/recreation (e.g. gardens, pets, water bodies, vehicles)	20%	Nil	### (NF33%)
Conservation covenant attached to property title (e.g. Trust For Nature)	13%	Nil	Nil (NF 19%)
Beef cattle	9%	Nil	### (FTF 12%)
Other commercial livestock enterprises (e.g. goats, pigs, deer, horse studs, poultry, alpaca, dogs)	3%	Nil	### (HF 11%)
Irrigated agriculture	3%	Nil	Nil (PTF 3%)
Horticulture	2%	Nil	Nil (PTF 3%)
Farm forestry	2%	Nil	### (HF 8%)
Farm-based tourism (e.g. farm stays, B&B)	2%	Nil	Nil (HF 8%)
Dairying	0%	n/a	n/a
Viticulture	0%	n/a	n/a

TABLE X2: MOST IMPORTANT ISSUES 2020, (n = 416 - 463)

REGIONAL ISSUES	% IMPORTANT/ VERY IMPORTANT				
	OVERALL	FTF	PTF	HF	NF
Water security	81%	77%	90%	88%	82%
Absence or poor quality of important services and infrastructure (e.g. health, schools, internet)	79%	87%	76%	66%	55%
Support for new and young farmers	72%	78%	64%	61%	57%
Public support/opposition for agricultural activities/practices, e.g. pesticide use, soil loss mulesing	67%	77%	60%	55%	52%
The availability of water for livestock	67%	68%	74%	72%	48%
Changes in weather patterns	65%	65%	69%	67%	70%
Herbicide resistance	59%	65%	58%	47%	40%
Uncertain/low returns limiting capacity to invest in my property	58%	68%	57%	41%	30%
The impact of feral animals or over-abundant native animal species on productivity	57%	63%	57%	38%	38%
The impact of weeds or over-abundant native plant species on productivity	57%	58%	60%	32%	49%
The impact of pest plants and animals on native plants and animals	56%	49%	53%	64%	77%
Risk to life and property from wildfires	48%	37%	60%	82%	60%
Loss of native plants and animals in the landscape	43%	31%	47%	69%	73%
Long-term negative impacts of property purchased by absentees	43%	43%	41%	41%	33%
Dry salinised land (magnesia patches) undermining long-term productive capacity	38%	41%	35%	39%	23%
Non-agricultural land use (e.g. residential, solar, Mining) encroaching on farming land	32%	33%	40%	42%	22%
ON-FARM SOIL ISSUES					
Soil erosion due to wind or water	68%	75%	57%	53%	57%
Low biological activity in soils	63%	66%	63%	55%	48%
Declining nutrient status of soils	57%	60%	56%	48%	41%
Low organic carbon in soils	57%	60%	62%	41%	35%
Chemical residue in soils	56%	60%	47%	66%	41%
Soil borne-diseases	56%	60%	53%	53%	31%
Effects of pesticide use on soil biota	55%	55%	57%	67%	44%
Phosphorus availability in calcareous soils	53%	58%	57%	38%	21%
Low permeability of sub soil	46%	51%	39%	40%	27%
Soil sodicity	39%	43%	33%	37%	19%
Soil acidity (lower pH) undermining productive capacity of soils	37%	38%	43%	35%	23%
Secondary impact of previous amelioration strategies	29%	35%	24%	30%	12%

TABLE X3: VIEWS AND BELIEFS REGARDING CLIMATE CHANGE, 2020 (n=431 TO 452)

VIEW	Mean	% Agree	% Unsure	% Disagree	% Don't Know/ N/A	Strongest Agreement by Farmer Type
I'm confident that landholders in this region can adapt to expected changes in weather patterns ### ***	3.9	69%	20%	6%	5%	FTF – 70%
Primary producers should do all they can to reduce carbon emissions from their activities ### ***	3.5	50%	33%	12%	5%	HF – 68%
Fundamental changes are required to make our region's farming systems sustainable ###	3.3	40%	36%	17%	7%	HF – 52%
BELIEF						
It is not too late to take action to address climate change ###	3.6	52%	33%	11%	4%	HF – 66%
Human activities are influencing changes in climate ###	3.4	49%	30%	21%	0%	NF – 74%
Climate change poses a risk to the region ###	3.3	43%	34%	22%	1%	NF – 74%
If we do nothing, climate change will have dire consequences for all living things, including humans ###	3.2	39%	32%	27%	2%	NF – 74%

TABLE X4: SIGNIFICANT DIFFERNCES IN VIEWS AND BELIEFS ABOUT CLIMATE CHANGE BY FARMER IDENTITY, 2020 (n= 431 – 452)

VIEW	Mean & % Agree FTF	Mean & % Agree PTF	Mean & % Agree HF	Mean & % Agree NF
I'm confident that landholders in this region can adapt to expected changes in weather patterns ### ***	4.0 77%	3.9 71%	3.8 58%	3.4 41%
Primary producers should do all they can to reduce carbon emissions from their activities ### ***	3.4 45%	3.5 51%	3.8 68%	4.0 60%
Fundamental changes are required to make our region's farming systems sustainable ###	3.3 39%	3.4 45%	3.8 52%	3.6 34%
BELIEF				
It is not too late to take action to address climate change ###	3.4 45%	3.7 57%	3.8 66%	3.8 66%
Human activities are influencing changes in climate ###	3.2 40%	3.6 55%	3.7 69%	3.9 74%
Climate change poses a risk to the region ###	3.1 33%	3.5 51%	3.5 61%	3.9 74%
If we do nothing, climate change will have dire consequences for all living things, including humans ###	3.0 26%	3.4 46%	3.8 61%	4.0 74%

TABLE X5: VIEW STATEMENT AGREEMENT BY FARMER TYPE, 2020 (n= 354 – 452)

STATEMENT	OVERALL	FTF	PTF	HF	NF
I feel a personal responsibility to maintain my soil's productive capacity	4.4 91%	98%	98%	91%	53%
Fencing to manage stock access is an essential part of the work required to protect the health of waterways and native vegetation ###	4.2 85%	86%	79%	91%	82%
The benefits of stubble retention outweigh problems arising from the practice ###	4.3 84%	92%	91%	72%	51%
Soil testing is an essential first step in understanding soil condition ###	4.2 83%	84%	93%	84%	65%
Biological activity is an important indicator of the productive capacity of soils	4.2 81%	84%	88%	78%	68%
I feel confident working with numbers and managing my farm accounts ###	4.1 76%	85%	80%	68%	32%
I usually include another person or people in my on-farm management decisions ###	4.1 75%	86%	77%	67%	33%
I am coping well with the associated stresses & challenges of managing my farm ###	3.9 70%	75%	76%	71%	39%
I'm confident that landholders in this region can adapt to expected changes in weather patterns ###	3.9 69%	77%	71%	58%	41%
I would like to use less chemicals on my farm but it is too difficult in practice ###	3.9 67%	77%	67%	57%	28%
Grower groups are the best way to drive and direct local research, development and extension ###	3.9 66%	77%	62%	55%	27%
Most years I am satisfied with the income from my farm ###	3.6 61%	71%	58%	50%	17%
I feel adequately supported to conduct farming and land management activities on my property ###	3.7 59%	67%	65%	55%	17%
I have good systems in place to manage my farm data ###	3.5 53%	61%	56%	50%	8%
The costs of applying gypsum to address soil sodicity are justified by increased production ###	3.9 52%	57%	58%	49%	27%
Primary producers should do all they can to reduce carbon emissions from their activities ###	3.5 50%	45%	51%	68%	60%
The cost of deep-tillage and subsoil modification are justified by increased production ###	3.7 48%	54%	52%	42%	23%
The costs of establishing perennial pasture are justified by the returns ###	3.7 43%	44%	53%	56%	23%
The costs of applying lime to address soil acidity are justified by increased production ###	3.8 43%	45%	51%	42%	23%
I feel a personal responsibility to be part of a local research and development group	3.4 40%	43%	47%	41%	22%
I am interested in learning more about alternative/holistic farming approaches ###	3.3 40%	37%	48%	63%	31%
Fundamental changes are required to make our region's farming systems sustainable ###	3.3 40%	39%	45%	52%	34%
Our on-farm income is enough for about everything we want with some left over for savings ###	3.1 40%	51%	29%	23%	2%

I have the time available to be involved in the wider agricultural community (i.e. field days, meetings) ###	3.1 35%	39%	39%	44%	12%
I would like to do some sort of study/activity to improve my farm management skills ###	3.1 26%	29%	29%	25%	25%
There is adequate compensation or support for conservation activities on my farm ###	2.8 23%	24%	25%	24%	24%

TABLE X6: MANAGEMENT PRACTICES OVER TIME, 2020 (n= 463 – 466)

MANAGEMENT PRACTICE	At some point (prior to 2015)		Past 5 years (2015-2020)		Intend to implement in next 5 years	
	FT	PT	FT	PT	FT	PT
Lethal control of pest animals	62%	34%	64%	51%	42%	20%
Planting legumes or pulses	46%	36%	52%	42%	33%	20%
Testing of soils for nutrient status in paddocks where have applied fertiliser/soil conditioners in the past	54%	39%	49%	48%	32%	20%
Use of no-tillage techniques to establish crops or pastures	54%	36%	58%	44%	30%	22%
Planting of trees and shrubs	69%	56%	31%	22%	30%	19%
Dry sowing	38%	19%	56%	44%	30%	15%
Use of precision farming techniques	39%	19%	50%	39%	29%	20%
Reduction of chemical use	11%	9%	21%	27%	28%	25%
Application of soil ameliorants other than fertiliser and lime (e.g. gypsum, organic manure)	33%	20%	31%	31%	26%	15%
Deep ripping of arable land	27%	5%	33%	17%	25%	19%
Preparation of a nutrient budget for all/most of the property	20%	15%	26%	22%	25%	19%
Sowing perennial pastures	25%	17%	24%	31%	20%	22%
Fencing of native bush/grasslands to manage stock	53%	48%	26%	20%	19%	9%
Use of time controlled, cell or rotational grazing	18%	15%	25%	29%	18%	25%
At least one lime application to arable land	17%	14%	19%	22%	14%	19%
Farming activities that you consider to be regenerative	9%	9%	14%	14%	14%	10%
Increase in chemical use	25%	7%	35%	17%	8%	7%
Organic farming	5%	10%	3%	9%	5%	9%

TABLE X7: VIEW STATEMENT AGREEMENT ON ORGANISATIONAL RELATIONSHIPS BY FARMER TYPE, 2020 (n = 429 – 446)

VIEW STATEMENT	OVER ALL	FTF	PTF	HF	NF
Grower groups are the best way to drive and direct local research, development and extension	3.9 66%	77%	62%	55%	27%
I feel adequately supported to conduct farming and land management activities on my property	3.7 59%	67%	65%	55%	17%
I feel a personal responsibility to be part of a local research and development group	3.4 40%	43%	47%	41%	22%
I have the time available to be involved in the wider agricultural community (i.e. field days, meetings)	3.1 35%	39%	39%	44%	12%
There is adequate compensation or support for conservation activities on my farm	2.8 23%	24%	25%	24%	24%

TABLE X8: VIEWS ABOUT RISK AND TUST BY FARMER TYPE, 2020 (n= 412 – 445)(shading indicates top 3).

VIEW STATEMENT	OVERALL	FTF	PTF	HF	NF
I am open to new ideas about farming	4.2 90%	95%	92%	90%	60%
I prefer to avoid risks	3.4 58%	58%	60%	66%	61%
I usually view risks as a challenge to embrace	3.5 57%	56%	53%	67%	47%
You can't be too careful when dealing with people	3.4 55%	52%	63%	53%	56%
People are almost always interested only in their own welfare	3.3 48%	48%	49%	44%	48%
Financially, I can afford to take a few risks and experiment with new ideas	3.2 44%	46%	50%	44%	37%
I really dislike not knowing what is going to happen	3.2 44%	40%	49%	48%	49%
I am usually an early adopter of new agricultural practices and technologies	3.2 41%	46%	43%	20%	21%
This may not be the best farm around but there is no real need to change	2.7 26%	28%	19%	29%	22%
I don't have enough time to consider changing my practices	2.6 17%	16%	20%	20%	15%

TABLE X9: SOURCE OF KNOWLEDGE AND MODE OF INFORMATION ALL RESPONDENTS, 2020 (n = 461 – 462)

SOURCE OF KNOWLEDGE	% YES
Other farmers ###	77%
Friends/neighbours/relatives ###	67%
Bureau of Meteorology ###	59%
Independent agricultural consultants, agronomists or stock agents ### ***	55%
PIRSA/SARDI ###	50%
EPARF (25%)/LEADA (19%) ### ***	44%
Commercial agricultural consultants, agronomists or stock agents ###	40%
Local farming groups (e.g. Ag Bureau, Landcare) ### ***	35%
Eyre Peninsula NRM	33%
Rural R&D organisations (e.g. GRDC, MLA, AWI, SANTFA) ###	30%
Direct contact with researchers/extension officers ###	14%
Local Council	13%
Commodity groups ###	12%
Environmental organisations, e.g. Greening Australia ###	8%
Universities/CSIRO	7%
Soil CRC	5%

MODE OF INFORMATION	% YES
Field days ###	56%
Websites ###	54%
Newspapers ###	53%
Magazines ##	49%
Email ###	49%
Local Radio ###	42%
Brochures/leaflets/newsletters ###	37%
EP Farming Systems Summary ### ***	35%
Television ***	34%
Books	25%
Journals (research papers) ###	25%
National/State radio	22%
Twitter ###	17%
YouTube ###	13%
Facebook	10%
Podcasts	6%
Instagram	2%
Whatsapp or Messenger groups	2%

TABLE X10: VIEW STATEMENT AGREEMENT ABOUT FARM SYSTEMS BY FARMER TYPE, 2020 (n = 354 – 452)

VIEW STATEMENT	% AGREE				
	OVERALL	FTF	PTF	HF	NF
I feel confident working with numbers and managing my farm accounts	4.1 76%	85%	80%	68%	32%
I usually include another person or people in my on-farm management decisions	4.1 75%	86%	77%	67%	33%
I am coping well with the associated stresses & challenges of managing my farm	3.9 70%	75%	76%	71%	39%
Most years I am satisfied with the income from my farm	3.6 61%	71%	58%	50%	17%
I have good systems in place to manage my farm data	3.5 53%	61%	56%	50%	8%
Our on-farm income is enough for about everything we want with some left over for savings	3.1 40%	51%	29%	23%	2%
I would like to do some sort of study/activity to improve my farm management skills	3.1 26%	29%	29%	25%	25%

TABLE X11: LONG TERM PLANS BY FARMER TYPE, 2020 (n = 420 – 440)

LONG TERM PLANS	OVERALL	FTF	PTF	HF	NF
Ownership of the property will stay within the family ###	79%	85%	74%	66%	68%
Additional land will be purchased ###	32%	43%	19%	16%	5%
I will move off the property around/soon after reaching retirement age	30%	37%	20%	16%	13%
Additional land will be leased or share farmed ###	23%	31%	15%	9%	3%
All or most of the property will be leased or share farmed ###	21%	14%	34%	22%	33%
The enterprise mix will be changed to diversify income sources	18%	22%	21%	16%	3%
A family member will seek additional off-property work to support the farm ###	17%	17%	25%	14%	13%
The property will be sold ###	14%	8%	15%	29%	25%
The enterprise mix will be changed to more intensive enterprises ###	14%	16%	15%	6%	7%
The enterprise mix will be changed to less intensive enterprises	8%	8%	8%	13%	2%
The property will be subdivided and a large part of the property sold ###	6%	5%	4%	9%	7%

APPENDIX 2 – SURVEY

SURVEY NO.

AGRICULTURE ON THE EYRE PENINSULA

RURAL LANDHOLDER SURVEY 2020





Southern Cross University · Charles Sturt University · Government of South Australia Eyre Peninsula Natural Resources Management Board · LEADA

SUPPORTING LANDHOLDERS ON THE EYRE PENINSULA

his regional survey is a vital part of efforts by local farming groups to understand the important social and economic factors shaping landholder decision making. Information you provide will guide decision-making by Agricultural Innovation & Research EP (AIR EP, which is the new entity driving farmer-driven research, development and extension on the Eyre Peninsula, formed from a merger of EPARF & LEADA (Eyre Peninsula Agricultural Research Foundation and Lower Eyre Agricultural Association) and Eyre Peninsula Natural Resource Management Board. Aggregated information arising from this survey will be used to inform the research activities of the Australian Government and industry funded Soil CRC, of which AIR EP is a partner.

There is no other way to obtain this property level information. We plan to follow up this survey in five years, to provide insights into trends over time.

We recognise that you may not be involved in decision making for this property. We are seeking the views of the persons primarily responsible for managing the property. If you are not involved in the management of the property, please forward the survey to the property manager or return the survey in the stamped return envelope. We ask that you only provide information for property/s within the Eyre Peninsula region.

Survey forms have been sent to all landholders on the Eyre Peninsula (with properties bigger than 10Ha). It should take approximately 25-40 minutes to complete. There are no right or wrong answers and you do not have to answer every question. If you have any questions about the survey, please phone Dr Hanabeth Luke on **1800 317 503** or by email at Hanabeth.Luke@scu.edu.au

You are assured of complete confidentiality. Your name will never be placed on the survey form or used in any of the reports. No group outside the research team will have access to the survey data. Information is published at the regional scale and individual data is never published.

Thank you for your assistance,

Dr. Hanabeth Luke

1. OCCUPATIONAL IDENTITY

Please **circle** the descriptor/term that best describes your **occupational identity**:

Full-time farmer Part-time farmer Hobby farmer Non-farmer

2. ENTERPRISE/ LAND USE MIX

This topic is seeking information about your current land use/enterprise mix on the land you own and manage within the Eyre Peninsula region. *Please **tick** any correct response in the 'Situation Now' column.*

ENTERPRISES / LAND USE ON YOUR PROPERTY IN 2020	SITUATION NOW	ENTERPRISES / LAND USE ON YOUR PROPERTY IN 2020	SITUATION NOW
Cropping	○	Irrigated agriculture	○
Pasture	○	Remnant native vegetation (e.g. trees, grasslands, wetlands)	○
Dairying	○	Farm forestry	○
Beef cattle	○	Other tree planting (e.g. shelter, habitat, erosion or recharge control, carbon)	○
Sheep for wool	○	Farm-based tourism (e.g. farm stays, B&B)	○
Sheep for meat	○	Heritage agreement/covenant	○
Other commercial livestock enterprises (e.g. goats, pigs, deer, horse studs, poultry, alpaca, dogs)	○	Area set aside for living/recreation (e.g. gardens, pets, ocean access)	○
Viticulture	○	**Other - please specify**	○
Horticulture	○		

Please indicate your rainfall zone:

○ Low ○ Medium ○ High

3. YOUR ASSESSMENT OF ISSUES

This set of statements seeks your opinion about the importance of a range of issues that may be affecting your property and your local district. *Examine each statement in the table, then place the number of your response option in each space provided for **'Your view'**.*

RESPONSE OPTIONS:

NOT IMPORTANT	MINIMAL IMPORTANCE	SOME IMPORTANCE	IMPORTANT	VERY IMPORTANT	NOT APPLICABLE
1	2	3	4	5	6

IMPORTANCE OF ISSUES AFFECTING YOUR LOCAL REGION	YOUR VIEW
Absence of important services and infrastructure (e.g. health, schools, internet, phone coverage)	
Support for new and young farmers	
Uncertain/low returns limiting capacity to invest in my property	
Herbicide resistance	
Risk to life and property from wildfires	
The availability of water for livestock	
Dry salinised land (magnesia patches) undermining long-term productive capacity	
Long-term negative impacts of properties being owned by absentees or corporate farms	
The impact of pest plants and/or animals on native plants and animals	
Loss of native plants and animals in the landscape	
Water security	
Changes in weather patterns	
Public support/opposition to agricultural practices (e.g. pesticide use, soil loss, mulesing)	
The impact of weeds or over-abundant native plant species on productivity **Please indicate the most important species:**	
The impact of feral animals or over-abundant native animal species on productivity **Please indicate the most important:**	
Non-agricultural land use (e.g. residential, solar, wind farms, mining) encroaching on farming land **Please specify:**	

3. YOUR ASSESSMENT OF ISSUES (CONT.)

IMPORTANCE OF SOIL RELATED ISSUES ON YOUR PROPERTY	YOUR VIEW
Soil erosion due to wind or water (circle either if one is more important)	
Low permeability of subsoil	
Declining nutrient status of soils	
Soil acidity (lower pH) undermining productive capacity of soils	
Soil sodicity	
Low organic carbon in soils	
Low biological activity in soils	
Soil borne-diseases	
Phosphorus availability in calcareous soils	
Chemical residue in soils	
Effects of pesticide use on soil biota	
Secondary impacts of previous amelioration strategies **If important, please indicate amelioration strategy:**	

4. THE PRINCIPLES THAT GUIDE YOUR LIFE

The next set of statements seeks information about the **principles that guide your life**. *Please number.*

RESPONSE OPTIONS:

NOT IMPORTANT	MINIMAL IMPORTANCE	SOME IMPORTANCE	IMPORTANT	VERY IMPORTANT
1	2	3	4	5

THE PRINCIPLES THAT GUIDE YOUR LIFE	YOUR VIEW
Looking after my family/loved-ones and their needs	
Preventing pollution and protecting natural resources	
Being influential and having an impact on people and events	
Fostering equal opportunities for all community members	
Respecting the earth and living in harmony with nature	
Caring for the weak/vulnerable and correcting social injustice	
Creating wealth and striving for a financially profitable business	

5. WHY YOUR PROPERTY IS IMPORTANT TO YOU

The next set of statements seeks information about the reasons your property is important to you. *Examine each statement in the table and place the number for your response in the space provided for* ***'Your View'.***

RESPONSE OPTIONS:

NOT IMPORTANT	MINIMAL IMPORTANCE	SOME IMPORTANCE	IMPORTANT	VERY IMPORTANT
1	2	3	4	5

WHY YOUR PROPERTY IS IMPORTANT TO YOU	YOUR VIEW
Sense of accomplishment from producing food and fibre for others	
Ability to pass on a healthier and more sustainable farm for future generations	
Sense of accomplishment from building/maintaining a viable business	
Opportunity to learn new things	
A place or base for recreation	
An asset that will fund my retirement	
A great place to raise a family	
A place where I can escape the pressures of life	
The native vegetation on the property provides habitat for birds and animals	
An important source of household income	
An attractive place/area to live	
Provides a sense of belonging to a community	
The productive value of the soil on my property	
Native vegetation makes the property an attractive place to live	
An asset that is an important part of family wealth	
Other? Please specify:	

6. YOUR KNOWLEDGE OF DIFFERENT TOPICS

In this section we would like you to provide **an assessment of your knowledge** for a number of different topics. *Examine the response options. For each choice in the table, place the number of your response in the **'Your view'** column.*

RESPONSE OPTIONS:

NO KNOWLEDGE	VERY LITTLE KNOWLEDGE	SOME KNOWLEDGE	SOUND KNOWLEDGE (sufficient to act)	VERY SOUND KNOWLEDGE (can give a detailed explanation)
1	2	3	4	5

YOUR KNOWLEDGE OF DIFFERENT TOPICS	YOUR VIEW
Preparing a farm/property plan allocating land use according to land class	
Which Aboriginal group is connected to the area where your property is located	
The role of understorey plants in supporting the natural ecosystem	
The extent and type of biological activity in soils on your property	
Strategies to maintain ground cover to minimise erosion in this area	
How to establish perennial pastures (e.g. Lucerne or native grasses) in this area	
How to identify the main constraints to soil productivity on your property	
The production benefits of applying biological soil supplements (e.g. compost, manure, microbial inoculants)	
The processes leading to soil structure decline in this area	
How to build soil organic matter/soil carbon	
The extent of native vegetation cover in the Eyre Peninsula region before European settlement	
How land in your district was used and managed before European settlement	
How to use soil testing to prepare a nutrient budget that will increase soil productivity	
Regenerative agriculture and holistic farm management	
How to support the persistence of native grasses in this area	
Potential applications of 'virtual fencing'	
The EP Soil moisture probe network	
Farming practices that can lead to more nutrient-dense food	
Time controlled, cell or rotational grazing strategies	

7. YOUR VIEWS & EXPERIENCE

We would like to know **how closely the statements presented below reflect your views**. *Examine each statement in the table, then place the number for your response in the space provided for **'Your view'**.*

RESPONSE OPTIONS:

STRONGLY DISAGREE	DISAGREE	UNSURE	AGREE	STRONGLY AGREE	DON'T KNOW	NOT APPLICABLE
1	2	3	4	5	6	7

STATEMENTS	YOUR VIEW
The cost of deep-tillage and subsoil modification are justified by increased production	
The benefits of stubble retention outweigh problems arising from the practice	
The costs of applying lime to address soil acidity are justified by increased production	
The costs of applying gypsum to address soil sodicity are justified by increased production	
The costs of establishing perennial pasture are justified by the returns	
Soil testing is an essential first step in understanding soil condition	
I'm confident that landholders in this region can adapt to expected changes in weather patterns	
Fencing to manage stock access is an essential part of the work required to protect the health of waterways and native vegetation	
Biological activity is an important indicator of the productive capacity of soils	
I feel a personal responsibility to be part of a local research and development group	
I feel a personal responsibility to maintain my soil's productive capacity	
There is adequate compensation or support for conservation activities on my farm	
I usually include another person or people in my on-farm management decisions **If yes, please indicate who** (i.e. spouse, agronomist):	
I am interested in learning more about alternative/holistic farming approaches	
I have the time available to be involved in the wider agricultural community (i.e. field days, meetings)	
I have good systems in place to manage my farm data	
I would like to do some sort of study/activity to improve my farm management skills	

7. YOUR VIEWS & EXPERIENCE (CONT.)

STATEMENTS	YOUR VIEW
I would like to use less chemicals on my farm but it is too difficult in practice	
I am coping well with the associated stresses & challenges of managing my farm	
Most years I am satisfied with the income from my farm	
Fundamental changes are required to make our region's farming systems sustainable	
Our on-farm income is enough for about everything we want with some left over for savings	
Grower groups are the best way to drive and direct local research, development and extension	
I feel confident working with numbers and managing my farm accounts	
Primary producers should do all they can to reduce carbon emissions from their activities	
I feel adequately supported to conduct farming and land management activities on my property	

QUESTIONS

What is your main source of support for your agricultural and land management activities (e.g. grower groups, friends, consultants)?

What sort of support would enhance your agricultural and land management activities?

Which group/organisation/department do you think would be most appropriate to provide this support?

Are you aware of the existence of EPARF and/or LEADA? ○ Yes ○ No ○ I'm a member

Do you know that EPARF & LEADA have amalgamated to form AIR EP to drive farmer-led research and innovation? ○ Yes ○ No

STATEMENTS (please indicate the extent to which you agree with the following)	YOUR VIEW
EPARF/LEADA provide valuable information about soil agronomy and farm management	
I can rely on LEADA and/or EPARF (now AIR EP) to keep landholders' interests in mind when making decisions about research priorities	
AIR EP should play an advocacy role/lobby on behalf of the EP agricultural community's needs in regards to Research, Development & Extension (R, D & E)	
AIR EP should drive local R,D & E but nothing more	

What would you most like to see from AIR EP?

8. TOP SOURCES OF INFORMATION

In the past 12 months what have been your sources of **information about topics related to the management of your property on the Eyre Peninsula?** *Please place a tick besides relevant sources in the table below.*

SOURCE OF INFORMATION		SOURCE OF INFORMATION	
Television	○	PIRSA/SARDI	○
Books	○	LEADA	○
Magazines	○	EPARF	○
Newspapers	○	Local farming groups (e.g. Ag Bureau, Landcare)	○
Email	○	Other farmers	○
Local Radio	○	Local Council	○
National/State radio	○	Universities/CSIRO	○
Field days	○	Eyre Peninsula NRM	○
Websites	○	Bureau of Meteorology	○
Instagram	○	Rural R&D organisations (e.g. GRDC, MLA, AWI, SANTFA)	○
Twitter	○	Direct contact with researchers/extension officers	○
Brochures/leaflets/newsletters	○	Environmental organisations, eg. Greening Australia	○
YouTube	○	Commodity groups	○
Podcasts	○	Friends/neighbours/relatives	○
Journals (research papers)	○	**Independent** agricultural consultants, agronomists or stock agents	○
Facebook	○	**Commercial** agricultural consultants, agronomists or stock agents	○
Whatsapp or Messenger groups	○	Soil CRC	○
EP Farming Systems Summary	○	**For your selection/s above, please indicate the title/ name of your preferred top source** (e.g. radio station, paper, organisation or website)	
Other – please specify	○		

9. YOUR VIEWS ABOUT RISK, TRUST AND CLIMATE

In this section we would like to explore your **views about the taking risks, trusting others, and climate change**. *For each statement in the table, place the number of your response in the '**Your view**' column.*

RESPONSE OPTIONS:

STRONGLY DISAGREE	DISAGREE	UNSURE	AGREE	STRONGLY AGREE	NOT APPLICABLE
1	2	3	4	5	6

STATEMENTS	YOUR VIEW
People are almost always interested only in their own welfare	
I am usually an early adopter of new agricultural practices and technologies	
You can't be too careful when dealing with people	
I prefer to avoid risks	
This may not be the best farm around but there is no real need to change	
I really dislike not knowing what is going to happen	
I am open to new ideas about farming	
I usually view risks as a challenge to embrace	
Financially, I can afford to take a few risks and experiment with new ideas	
I don't have enough time to consider changing my practices	
Climate change poses a risk to the region	
Human activities are influencing changes in climate	
It is not too late to take action to address climate change	
If we do nothing, climate change will have dire consequences for all living things, including humans	

10. MANAGEMENT PRACTICES ON YOUR PROPERTY

This section asks about **practices undertaken** on your main or 'home' property in the Eyre Peninsula region previously, as well as those intended for the future. *Tick all where relevant: Some actions may not be relevant to your situation; please ignore those topics.*

PRACTICES IMPLEMENTED ON YOUR MAIN OR "HOME" PROPERTY IN THE EYRE PENINSULA REGION	AT SOME POINT (prior to 2015)	PAST 5 YEARS (2015-2020)	INTEND TO IMPLEMENT IN NEXT 5 YEARS
Planting of trees and shrubs (incl. direct seeding)	○	○	○
Fencing of native bush/grasslands to manage stock access	○	○	○
Use of time controlled, cell or rotational grazing	○	○	○
Sowing perennial pastures	○	○	○
Use of no-tillage techniques to establish crops or pastures	○	○	○
Use of precision farming techniques	○	○	○
At least one lime application to arable land	○	○	○
Deep ripping of arable land	○	○	○
Application of soil ameliorants other than fertiliser and lime (e.g. gypsum, organic manure)	○	○	○
Testing of soils for nutrient status in paddocks where have applied fertiliser/soil conditioners in the past	○	○	○
Preparation of a nutrient budget for all/most of the property	○	○	○
Planting legumes or pulses	○	○	○
Lethal control of pest animals	○	○	○
Dry sowing	○	○	○
Reduction of chemical use	○	○	○
Increase in chemical use	○	○	○
Organic farming (whether certified or not)	○	○	○
Farming activities that you consider to be regenerative practice/s **For example:**	○	○	○

What is the most important influence on your soil health?

In the last 12 months, what was the most important influence on your profitability?

What was the most important non-weather related influence on your profitability, in the last 12 months?

11. YOUR PROPERTY AND YOU

BACKGROUND INFORMATION	PLEASE TICK OR FILL IN YOUR RESPONSE
What is the total area of rural land you own on the Eyre Peninsula? (excluding land you manage but do not own)	_____ total Ha owned
Is your Eyre Peninsula property your principal place of residence?	◯ Yes ◯ No
What area of additional land do you manage (lease/sharefarm/agist from others) on the Eyre Peninsula (additional to the figure you provided above)?	_____ additional Ha managed
How long have you or your family owned or managed all/some part of your property?	_____ yrs
What area of your property is leased, share farmed or agisted by others?	_____ Ha
How many rural properties do you own? (within and outside of the Eyre Peninsula)?	_____ No. of properties
How many of these properties are on the Eyre Peninsula?	_____ No. of properties

INFORMATION ABOUT YOU AND YOUR MAIN OR 'HOME' PROPERTY	PLEASE TICK OR FILL IN YOUR RESPONSE
Has this enterprise bought **additional land** in this region in the past 20 years?	◯ Yes ◯ No
Have you **subdivided or sold** part of your property in this region in the past 20 years?	◯ Yes ◯ No
Are other **family members** working on your property on a **daily or weekly basis**? If yes, please indicate who they are (e.g. daughter) **1.** _____ **2.** _____ **3.** _____	◯ Yes ◯ No
What is your gender? ◯ Male ◯ Female	◯ Non-binary
What is your age?	_____ yrs
What is the highest level of formal education you have completed?	
What is your main occupation (e.g. farmer, teacher, investor, retiree)?	
In the past 5 years have you or your partner/spouse completed a short course/workshop relevant to property management? (e.g. financial planning, integrated pest management)	◯ Me ◯ My partner
Estimate the number of **hours per week** that you worked on farming/property related activities (average over the past 12 months).	
Have you prepared/are you preparing a property management or whole farm plan that involves a map or other documents that address the existing property situation and include future management and development plans?	◯ Yes ◯ No
Are you a member or involved with any industry group? (e.g. Livestock SA, Grain Producers SA)	◯ Yes ◯ No
In the past 12 months have you changed your financial or on-property operations as a result of seasonal changes in weather patterns?	◯ Yes ◯ No

In the past 12 months have you changed your operations to increase the soil carbon on your property (e.g. by revegetation, soil management)	◯ Yes ◯ No
In past 12 months have you changed your on-property operations as a result of considering opportunities to reduce carbon emissions (e.g. generating solar and/or wind power, increased power use efficiency, improved grazing practices, improved nitrogen use efficiency)	◯ Yes ◯ No
Is any part of your land presently lost to production due to soil problems? a) If yes, what is the approximate proportion of your property? _____ **b) Please specify the issue/s:**	◯ Yes ◯ No
Did you earn income from agriculture on your Eyre Peninsula property during the 2018/2019 financial year?	◯ Yes ◯ No
If yes, did your Eyre Peninsula property return a net profit during the 2018/2019 financial year? (i.e. income exceeded all expenses before tax)	◯ Yes ◯ No
If yes, was your net 2018/2019 agricultural income above $50,000?	◯ Yes ◯ No
Did you or your spouse/partner receive a net off-property income (after expenses and before tax) last financial year (2018/2019)?	◯ Yes, me ◯ Yes, my partner ◯ No
If yes, was the total off-property income for you or your partner above $50,000?	◯ Yes ◯ No
Estimate the number of days that you were involved in paid off-property work in the past 12 months	
Has your Eyre Peninsula property returned a net profit over the last 10 years? (i.e. income exceeded all expenses before tax, on balance, over the 10 year period)	◯ Yes ◯ No
In the last financial year, what percentage of you (and your spouse's) income was earned off-farm? (eg from shares, rental income, employment, other business)	
Did you attend field days/farm walks/demonstrations focused on soil health & productivity in the past 12 months?	◯ Yes ◯ No

If you ticked no to attending field days/farm walks/demonstrations, what may have prevented you from attending?

What has been the most important influence on your **profitability** over the last **ten years**?

Over the last 10 years, is there a particular **practice change** that has played a major role in your farm's profitability? **Please describe:**

In the **next 10 years**, what would you see as likely being your **biggest challenge and/or opportunity**?

12. LONG-TERM PLANS FOR YOUR PROPERTY

Please indicate the possibility that your **long-term plans** for your property in the **next 10 years** will involve each of the choices in the table below. *Examine the response options underneath this paragraph. For each choice in the table, place the number of your response option in the '**Your view**' column.*

RESPONSE OPTIONS:

HIGHLY UNLIKELY	UNLIKELY	UNSURE	LIKELY	HIGHLY LIKELY	NOT APPLICABLE
1	2	3	4	5	6

LIKELIHOOD YOUR LONG-TERM PLANS WILL INVOLVE	YOUR VIEW
Ownership of the property will stay within the family	
The property will be sold	
The property will be subdivided and a large part of the property sold	
I will move off the property around/soon after reaching retirement age	
All or most of the property will be leased or share farmed	
Additional land will be purchased	
Additional land will be leased or share farmed	
The enterprise mix will be changed to diversify income sources	
The enterprise mix will be changed to more intensive enterprises	
The enterprise mix will be changed to less intensive enterprises	
A family member will seek additional off-property work to support the farm	
Some part of my property will be set aside for conservation purposes	
Buying property outside of my current area to mitigate increased seasonal variability	

Do you have **family members interested in taking on your property in the future**? *Please tick your answer.*

○ Yes ○ No ○ Unsure/too early to know

If Yes, has your family agreed to a **succession plan**? *Please circle your answer.*

Not started Early stages Halfway Well advanced Completed/Ongoing

OTHER COMMENTS AND **THANK YOU FOR YOUR TIME**

Do you have any other comments about any of the topics covered in the survey, or other aspects of land and soil management in the Eyre Peninsula region? Please use the space provided to write your comments or attach additional sheets. Your comments will be recorded by the research team.

We appreciate the time you have spent answering the questions. **Please return the completed survey in the stamped envelope provided.**

If you need assistance with the survey, or wish to make specific comments about it, please contact Dr Hanabeth Luke via **1800 317 503**.