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Performance through collaboration

LAND MANAGEMENT IN THE WIMMERA

RURAL LANDHOLDER SOCIAL BENCHMARKING REPORT 2023

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WITH

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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 consulted during the research project.

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LIST OF ACRONYMS

Soil CRC – Soil Cooperative Research Centre
SCU – Southern Cross University
CSU – Charles Sturt University
CMA – Catchment Management Authority
LGA – Local Government Area
FTF - Full-time farmer
PTF - Part-time farmer
HF - Hobby farmer
NF - Non-farmer

LEGEND

Significant difference by farmer type

EXECUTIVE SUMMARY

The Soil CRC Social Benchmarking project, *Surveying On-Farm Practices*, was initiated in 2019 to implement surveys in partnership with local farming organisations across multiple Australian states, providing accurate information to support improved soil and land management. It is collating a dataset of national significance, showing both breadth and depth of information on factors involved in on-farm decision-making for Australian farmers. The 2023 Wimmera Social Benchmarking Study contributes to the national Soil CRC project, and is funded by the Co-operative Research Centre for High-Performance Soils (Soil CRC) and the Wimmera Catchment Management Authority (CMA).

The survey approach, led by Dr Hanabeth Luke, of Southern Cross University (SCU), builds on previous work by Professor Allan Curtis[1]. The questionnaire is customised through collaboration with regional partners to ensure regional relevance, with questions asked regarding farmers' actual and intended practices, challenges, and aspirations. Important background information is also collected on farm management styles, landholder values, risk perception, and items that focus on self-assessed knowledge of, and confidence in, current recommended (best) practices. Core questions remain consistent across regions to enable comparisons and the development of a nationally consistent dataset; however, our approach allows regional priorities to be explored through the customised questions.

Project leader Dr Hanabeth Luke visited the Wimmera region of Victoria in mid-2022 and undertook a workshop with a team from the Wimmera CMA to identify key topics and questions to inform survey development. A list of priorities was developed and distilled into five main topics:

A) Profile of farming in the Wimmera
B) Complexity in farming & land management: risk, change and resilience
C) How to engage landholders
D) Land management challenges
E) The future of farming in the Wimmera

These included: farmer attitudes, how risk-averse farmers may be, what drives them to change, adopt practices and improve their soil health. Also, included were the perceived state of soil health and drivers of increased productivity, including carbon, biology and natural resource management priorities and practices. A draft questionnaire was piloted with a small group of Wimmera landholders and refinements made.

The revised questionnaire (Appendix 2). was mailed to a random sample of rural property owners with holdings greater than 10 ha. Priority addresses were identified using spatially referenced landholder contact lists for the Wimmera region provided by the local governments of Ararat, Buloke, Hindmarsh, West Wimmera and Yarriambiack and Pyrenees. Questionnaires were posted to 1612 farmers within these local government areas, with an additional 2,000 notices sent to Horsham and Northern Grampians landholders indirectly via the local councils, asking landholders to opt-in to complete the survey, either on line or by a requested paper copy. Of the 1612, 471 surveys were 'return to sender' and opt-outs by other means, leading to a final sample of 1141. Of the paper

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

surveys, 268 were returned, with an additional 114 online completions. This total of 382 surveys from a sample of 1141 led to a response rate of 34%.

Demographic and descriptive characteristics were collected to contextualise responses including general personal and property information (e.g. property size, absentee ownership), as well as asking respondents to identify as full-time, part-time, hobby farmers, or non-farmers. This background information was used to check for sampling bias and to enable correlations to be sought between contextual variables and practice change. A summary of findings is below:

A. PROFILE OF FARMING

The key findings reflect that the Wimmera region of Victoria is primarily an agricultural landscape, dominated by full and part-time farmers, non-farmers, and some hobby farmers:

- Full-time farmers: 58%
- Part-time-farmers: 17%
- Hobby farmers: 8%
- Non-farming landholders: 17%

Full-time farmers in the Wimmera manage 87% of the land. Part-time farmers (17% of this sample) bring this to just under 96% of the land surveyed being under agricultural management. While non-farmers make up 17% of the sample, they manage just 4% of the land. Hobby farmers make up 8% of the sample but manage less than one percent of the land surveyed. This is why the data, particularly about agricultural practices, focuses primarily on the activities of full-time and part-time farmers.

Full-time farmers source 97% of their income from agriculture and spend more than 50 hours a week working on the farm: 79% of them live on their farm (69% of all respondents). A vast majority of full-time farmers (86%) were male, having an average age of 60 years, compared to a median age of 62 years and 76% were male. Three quarters of these farmers had family working with them on their farm, most often a spouse or their children. Of this group, 65% had completed high school or vocational training. The gender balance increased steadily by landholder type, with half of hobby farmers being female.

The reported median landholding was 1100 hectares across two properties for full-time farmers, while overall, the median landholding was 550 hectares. The most common land uses reported are sheep for meat or wool (63%), cereal cropping (62%), legumes (50%) and native vegetation (46%). The median length of family land ownership was reported as 57 years, with a mean of 63 years.

The results show a range of enterprise and land use mixes; however, the most common land use was sheep and cereal cropping (62% & 62%, respectively).

B. COMPLEX DECISIONS IN FARMING & LAND MANAGEMENT

In relation to soil management, over 90% of farmers felt a personal responsibility to maintain the productive capacity of their soils. However, many best-practice items had relatively low implementation rates, with just 55% of full-time farmers testing their soils, and 57% of full-time farmers maintaining at least 70% groundcover. This shows signs of improving, with 40% having maintained this level of groundcover five years before, and those planting legumes or pulses rising from 55% to 68% of full-time farmers in the last five years.

Soil health was managed through maintaining groundcover, crop rotation and avoiding overstocking. Overall, the data indicate a strong personal responsibility to maintain the productivity of soil and soil testing as an essential step, particularly among full-time farmers. A high percentage of full-time and part-time farmers believed that the benefits of stubble retention outweigh problems arising from the practice (78% and 76% respectively).

While 85% of full-time farmers agreed that soil testing is an essential step in understanding soil condition, the frequency of testing varied greatly. For example, when landholders were asked how often soil testing was performed on their property, 48% indicated that they tested every 3 – 5 years; 30% at least annually; 23% once ever; with 11% having never completed any soil testing. Of the full-time farmer group, a slightly higher 53% tested every 3-5 years, with most concentrating on soil testing systematically in multiple paddocks.

Having the ability to pass on a healthier environment for future generations was the most important value for (full-time and part-time) farming respondents, consistent with findings from Social Benchmarking across Australia. Having a sense of accomplishment from building or maintaining a viable business came up as slightly more important for full time-farmers,

A high proportion of landholders were open to new ideas, with a third of the sample self-identifying as early adopters. Their ability to take on the risk involved could be tempered by practical considerations, with half of farmers reporting that they can afford financially to take a few risks and experiment with new ideas. Time restrictions appeared to be even higher, with just a third of farmers having sufficient time available to consider changing their practices.

Just under a fifth of landholders indicate that their farm is doing fine the way things are and see no reason to change, which correlates negatively with best practice implementation. While this number is lower than in other regions of Australia, so is the proportion of early adopters.

C. ENGAGING LANDHOLDERS

A broad range of information is used by farmers, with other farmers, independent consultants, newspapers and field days important sources of information. Older farmers were more likely to access traditional information sources such as newspapers, while younger farmers were more likely to access online and social media sources. Many farmers in the region trust their intuition and other farmers over other information. Among those providing important support for farmers were friends, family, agronomists and Landcare facilitators.

The knowledge surrounding a practice remains an extremely important element of its implementation. Full-time and part-time farmer respondents indicated a sound level of expertise in a number of topics, including 'strategies to maintain ground cover to minimize erosion in this area' and preparation of a 'farm/property plan allocating land use according to land/soil characteristics'. Many other practices have low reported knowledge levels, with the lowest topic being 'market mechanisms that support carbon farming. 'Part-time farmers' self-reported knowledge tended to be lower than that of full-time-farmers across most topics, extending to non-farmers having the lowest self-reported knowledge of farming and Natural Resource Management (NRM) practices for all items.

In addition, higher knowledge-levels about a practice or how to implement it linked clearly to higher levels of confidence that implementing a practice is justified by the returns. Short courses appeared to be an important source of knowledge for how to implement many of the best-practices listed.

D. LAND MANAGEMENT CHALLENGES

While water security emerged as the top regional issue for all respondents, a lack of sufficient infrastructure was their number one issue for farmers. The third most important issue overall, and especially for full-time farmers, was considering their social license to operate for agricultural practices. Changing weather patterns and declining soil productivity were the fourth and fifth most important regional issues. On farms, the most important issue was rising input costs, followed by weed resistance to herbicides and the impact of weeds on productivity, as well as the impact of poor pest/weed management on public land. The most important soil issue raised was their water-holding capacity.

When asked an open question on what they saw as their greatest challenge in the next ten years, the two strongest themes were climate change and rising input costs. While 92% of all respondents agreed that landholders should manage their properties in expectation of highly variable climate, only 45% considered climate change to be a risk to the region, and just 40% considered that fundamental changes were required to make the region's farming systems more resilient.

The modelling showed that belief in climate change was a major driver of practice change. Also, having family living and working alongside them on the farm and participating in decision-making was a major driver of best-practice implementation, including whole-farm planning and succession planning. Those undertaking this longer-term planning were likely to consider a much longer timeframe in strategic decision-making and be implementing a broader range of resilience-building farm management practices. Farmers with a stronger level of belief in climate change were more likely to have recently changed their farming operations to reduce carbon emissions while also reducing their dependence on chemicals. This view was, however extremely closely correlated with the view that it was not too late to take action to address this. One-fifth of landholders had changed their operations in the last 12 months in order to mitigate climate change, either to sequester carbon or reduce emissions.

E. THE FUTURE OF FARMING

With only 11% of farmers indicating that they intend to sell the property, ownership turnover of farm land is projected to be low. A third of (34%) of farmers indicated that they intend to purchase additional land, which is in line with broader industry trends to larger holding sizes. Twenty-eight percent of farmers indicated they would lease additional land, 18% intended to change the enterprise mix to diversify income or move toward intensive enterprises (9%). Over three-quarters (82%) of farmers indicated that ownership of the property would stay within the family.

The transition to retirement and succession planning were major issues raised in the open questions. This was reinforced by the figures, with very low levels of succession planning in progress. While full-time farmers were the most likely to have commenced succession planning, only 39% had well advanced plans in place, with an additional 14% having plans halfway developed.

1 INTRODUCTION

A national Soil CRC project, **Social Benchmarking for Rural Landholders**, was initiated in 2019 to implement surveys in partnership with local farming organisations across multiple Australian states, to provide accurate information to support improved soil and land management. The project is collating a dataset of national significance, showing both breadth and depth of information on the factors involved in on-farm decision-making for Australian farmers. The project is led by Dr Hanabeth Luke of Southern Cross University (SCU) and funded by the Co-operative Research Centre for High-Performance Soils (Soil CRC). The Wimmera Social Benchmarking Study was co-funded by the Wimmera CMA. The research team includes social scientists from Southern Cross University and Charles Sturt University.

Data gathered will support the activities of local Soil CRC partners while contributing to the broader Soil CRC research portfolio. Leveraging the insights from in-depth landholder surveys, Soil CRC researchers will be able to explore farmer knowledge of soil health 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 been developed elsewhere in Victoria, as well as in New South Wales, South Australia, Western Australia and Tasmania.

The survey methodology implemented by Dr. Hanabeth Luke has adapted a widely accepted approach to social benchmarking for regional land and natural resource management that builds on the work of Professor Allan Curtis[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.

The general survey approach is that questionnaires are physically mailed to landholdings over ten hectares (10 ha) in size in a region, to either a random selection or all landholders in low population areas that are linked to cadastral lists that enable spatial analysis and display of data. The surveys include questions on farmers' actual and intended practices, challenges, and aspirations. Important background information is also collected on farm management styles and farmer values and items that focus on self-assessed knowledge of, and confidence in, best practices and perceptions of risk (Curtis and Luke 2019[3]).

Having spatially referenced data means that we can show social, economic and environmental trends spatially across the region. Our data can also be cross-referenced with other spatial data such as soil type and rainfall.

1.1 CONCEPTUAL FRAMEWORK

The conceptual underpinning of this study recognises that the drivers of human behaviour and decision-making are complex, multi-layered and interlinked. This requires careful consideration when seeking to support practice change in the context of rural land management. Drivers of practice change include governance frameworks, weather, property prices and demographic

[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.

factors. This includes what farmers view as important, their knowledge of 'best-practice' and how they perceive their own role as landholders. In the absence of well-understood causal relationships between decision-making drivers, the potential success of practice change support is diminished.

While values, beliefs and personal norms (i.e., accepted 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 essential to understand the values and beliefs of landowners if they are to be effectively engaged. Values-Belief-Norm Theory (VBN) is a theoretical approach developed and applied to explain the relationship between values and behaviour, particularly regarding human-environment interactions and land management.

In short, landholder values and beliefs may be difficult to change but are extremely important to understand 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 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 those values landholders attach to 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 simultaneously have more than one value orientation[7].

Practical strategies to encourage the adoption of current recommended practice (CRP) and new innovations can be improved by identifying a number of 'levers' to effect change[7]. If a landholder does not know of or understand an approach, technology or practice, it is unlikely that they will adopt it. If they are aware of the practice or innovation but have little confidence in its effectiveness, 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 concerning risk-taking are essential predictors of adoption, where those with a higher risk tolerance are more likely to implement practice change[8].

The next step is identifying the most effective 'extension' or information-sharing approaches, processes or platforms for engaging rural property owners in learning, dialogue and action. In

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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.

identifying these approaches, it is also important to understand how landholders perceive and trust their local and regional organisations[9].

Landholder categories present a useful way to see how different priorities influence landholder management practices. This questionnaire asked how the respondent identified themselves as a full-time farmer, part-time farmer, hobby farmer or non-farmer. This typology, developed by Groth et al. (2014), has been published in peer-reviewed academic journals[10] , and has been applied in all phases of this Soil CRC project[11].

1.2 SURVEY DEVELOPMENT

Dr Hanabeth Luke visited the Wimmera region of Victoria in mid-2022 and undertook a workshop with a team from the Wimmera CMA to identify key topics and questions to inform survey development. A list of priorities was developed and distilled into five main topics:

A) Profile of farming in the Wimmera
B) Complexity in farming & land management: risk, change and resilience
C) How to engage landholders
D) Land management challenges
E) The future of farming in the Wimmera

Following the workshop, the project team built these topics into the existing core survey instrument, with sections on significant 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. Because this is the fifth survey of its kind undertaken in the Wimmera, and the sixth Soil CRC survey region, decisions were made to ensure that both longitudinal and cross-national comparisons could be made using the survey tool designed.

Priority topics were chosen by consensus. These included: farmer attitudes, how risk-averse farmers may be and what drives them to change and improve their soil health. Also, the perceived state of soil health and drivers of increased productivity, including carbon and biology; the timeframe of decision-making; perceptions of regenerative agriculture; how soil testing is taking place, and to what extent landholders were fencing and undertaking other natural resource management activities. A survey was drafted and sent to workshop participants for comment and input. A follow up workshop with local farmers and Wimmera staff enabled the pre-testing of the survey form and refinement of survey questions (Figure 1). The final questionnaire is presented in Appendix 2.

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[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.
[10] 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.
[11] Curtis, A., & Luke, H. (2019). Social benchmarking for natural resource management: 2019 North Central Victoria. Southern Cross University, NSW.

Figure 1 Pre-testing the survey at the workshop with local farmers and the Wimmera CMA team, 2022

1.3 SURVEY ADMINISTRATION AND RESPONSE RATE

The questionnaire (Appendix 2). was mailed to a random sample of rural property owners with holdings greater than 10 ha. Addresses were identified using spatially referenced landholder contact lists for the Wimmera region provided by the local governments of Ararat, Buloke, Hindmarsh, West Wimmera, Yarriambiack and Pyrenees. The catchment region managed by the Wimmera CMA includes almost all of the local council region of West Wimmera and Horsham, half of Yarriamback, Hindmarsh and the Northern Grampians, and a small area of The Pyrenees, Ararat and Buloke.

In advance of the survey, in January 2023, notices were mailed by the Southern Cross University team to 1612 randomly selected properties over ten hectares. These notices included a link to an online survey posted on the Soil CRC website, and allowed some refinement of the mailing list. In February 2023, 1612 comprehensive questionnaire booklets were mailed out to landholders in five of the partnering local government areas. These were followed up with three reminder notes and a second survey. Separately, another two local councils in the Wimmera region, Horsham and Northern Grampians posted out 1,000 notices each to a random sample within each LGA. The notes provided a QR code and asked landholders to opt-in to complete the survey online or request a paper survey be sent to them.

Project Leader Dr. Hanabeth Luke presented on the broader survey project at the Wimmera Machinery Field Days in March 2023. A social, print and radio media campaign by the Wimmera CMA also augmented the survey implementation.

Of the 1612 mailed out survey booklets, 471 surveys were 'return to sender' and opt-outs by other means, leading to a final sample of 1141. Of the paper surveys, 268 were returned, with an additional 114 online completions. This total of 382 surveys from a sample of 1141, led to a response rate of 34% for the main survey sample. Figure 2 shows the number of responses from each LGA.

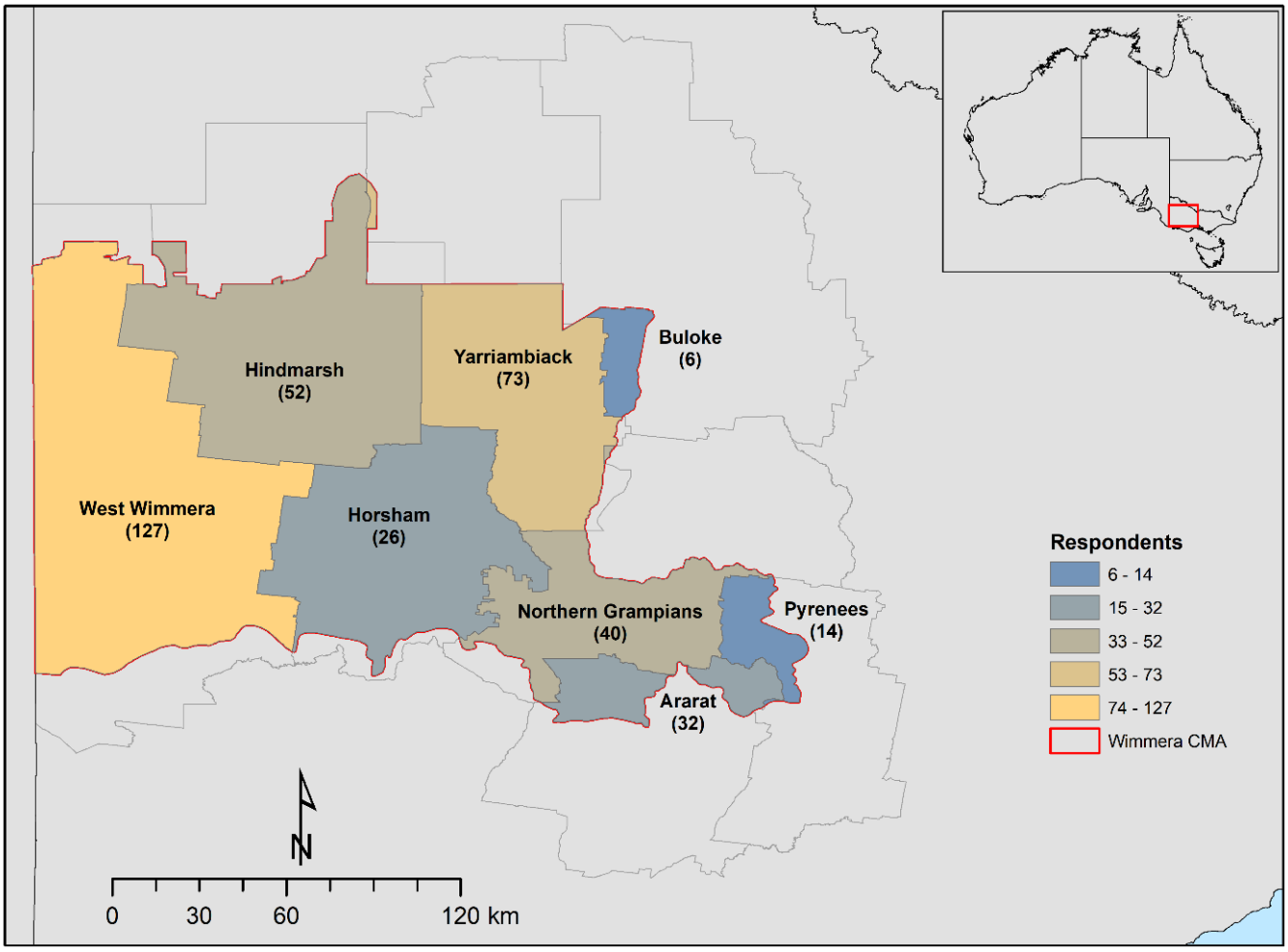

Figure 2 The distribution of landholder responses, Wimmera survey, by local government area, 2023

1.4 DATA ANALYSIS

We seek understanding of the data using three methods: descriptive statistics, tests for statistically significant relationships, and correlations between variables using linear regression modelling.

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 means analysis).

Further analyses include examining data for statistically significant differences between different landholder groups (i.e. full-time farmer, part-time farmer, hobby farmer, non-farmer), and different generation groups (Baby Boomer, Gen X, Gen Y).

Kruskal Wallis Rank Sum tests were used to determine significant 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). The Likert responses 1-2 and 4-5 were combined for the reporting of percent in the descriptive statistics.

Chi-squared Goodness of Fit test were used to examine dependence between two grouping variables. For example, 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).

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 current recommended practices that often relate to sustainable or regenerative agricultural practices and natural resource management. For all questions within the survey, respondents were given the choice "Don't know/Not applicable" to allow for context-specific responses. Consequently, the proportion of 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 R statistical software package and Microsoft Excel.

Interpretation of the pairwise comparisons (e.g., to eliminate significant relationships that were irrelevant/nonsense) allowed the research team to identify a small number (approximately 25) of independent variables to include in the modelling for each best practice. The selected variables were then modelled with combinations of all variables, ranked by Akaike Information Criterion (AIC), with any models flagged where there could be multicollinearity.

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 we have only considered models with an accuracy of above 70%.

Rejecting regression models where multicollinearity (i.e. where two variables essentially have the same impact) may be detected, could lead to conceptually significant variables being excluded from models. However, experiences with social benchmarking data suggest that those efforts may lead to conceptually significant variables being excluded from models. For example, pairwise comparisons may reveal a meaningful relationship between the 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.

1.5 CONTEXT OF SURVEY IMPLEMENTATION

When the Wimmera Social Benchmarking Study was undertaken between February and April 2023, there had been several wet years of relatively high productivity. The Russian invasion of Ukraine was also having the effect of elevating input costs, particularly for nitrogen. Supply chains were starting to stabilise following the Covid 19 pandemic.

The sections that follow detail the results of the survey.

2 PROFILE OF FARMING IN THE WIMMERA

2.1 AN AGRICULTURAL LANDSCAPE

The Wimmera region of Victoria is primarily an agricultural landscape, with 80% of all respondents earning an income from their property in 2020/2021. Of respondents, 74% reported earning more than $50,000 from these activities; this sits above the national average of 69% of agricultural enterprises with a turnover of $50,000 or above[12].

The reported median landholding was 550 hectares across one property (mean of 1,240 hectares, mean of two properties). The most common land uses for all landholders were sheep (63%), cereal crops (62%), and legumes (50%). Within the full-time and part-time farmer group 78% indicated they had pasture crops.

Overall, 69% of respondents reside on their Wimmera property. The median length of land ownership by the respondent's family was reported as 57 years, with a mean average of 63 years. Across all respondents, the median age was 62 years and 76% of respondents were male. This is above the national median farmer age of 54 years, which sat well above the national general workforce median age of 40 years and suggested slightly lower female participation in farm management than the national average of 32% females across the agricultural sector[13].

Survey participants were asked to self-identify into one of four landholder types, with results as follows:

- Full-time farmers: 58%
- Part-time-farmers: 17%
- Hobby farmers: 8%
- Non-farming land holders: 17%

Full-time farmers represented just over half of the respondents (58%), and 86% of these respondents were male, with an average age of 60 years. Full-time farmers had the largest holdings, with an average holding size of 1100 hectares. Their most likely land use was for cereal cropping (82%), sheep for wool or meat (77%), legumes (69%), pasture (58%), and areas of remnant vegetation (46%). Full-time farmers also had the highest residency rates (79%) and had the longest association with their land, with an average family ownership of 80 years. This group was most likely to have a family member working on the farm (75%), with 57% of this group working alongside their spouse/partner, 56% their children, 17% a parent, and 7% a sibling.

This cohort was least likely to have off-farm employment, sourcing 97% of income from agriculture in the region and spending more than 50 hours working on the farm. Full-time farmers were most likely to have additional land under their management (an average of 506 hectares). In terms of education, 65% had completed high school or vocational training and of those, 28% held tertiary qualifications.

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[12] 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

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

Part-time farmers represented 17% of all respondents and of these respondents, 76% were male. The average age of part-time farmers was 61 years, and they held an average of 430 hectares, with 64% residing on the property. On average, their family had owned the land for 59 years. This group was the second most likely to have a family member working on the farm (59%), 66% with their spouse/partner, 24% a child, and 7% a parent. Part-time farmers were most likely to use their land for sheep for wool or meat (73%), cereal cropping (65%), legumes (45%), pasture (44%), and areas of remnant vegetation (47%). This is a highly educated group in terms of education, with 94% having completed high school or vocational training and of those, 44% hold tertiary qualifications.

Hobby farmers as 8% of all respondents were the least common landholder type, with the highest level of female respondents (52%). The average age of hobby farmers was 56 years, 54% of hobby farmers lived on their property, which had an average size of 66 hectares and had been owned by their family for 27 years. This group was the third most likely to have a family member working on the farm (35%). Of these, 30% were their spouse/partner, 15% were children of the respondent, and 5% were a parent. This group used their land for raising sheep for wool or meat (52%), areas set aside for living/recreation (45%), native vegetation (41%), tree planting (31%), and horticulture (21%). Ninety-two percent of hobby farmers had completed secondary school or higher, and of those 56% hold tertiary qualifications.

Non-farmers comprised 17% of respondents, holding an average property size of 220 hectares. This group had an average age of 63 years; of these, 61% were male. Less than half of non-farmers were residents on the property (41%). They work around 10 hours per week on the property and receive a median of 14% of income from regional agriculture. Their family ownership of the land spanned an average of 30 years, and they were the group most likely to set aside areas for native vegetation (51%), and have a heritage agreement or covenant with the Wimmera CMA or other organisation (18%). Ninety-eight percent of non-farmers had completed high school or higher and of those, 70% hold tertiary qualifications.

A further summary table of key landholder type characteristics is in Appendix 1. Figure 3 displays a map of landholder type by local government area:

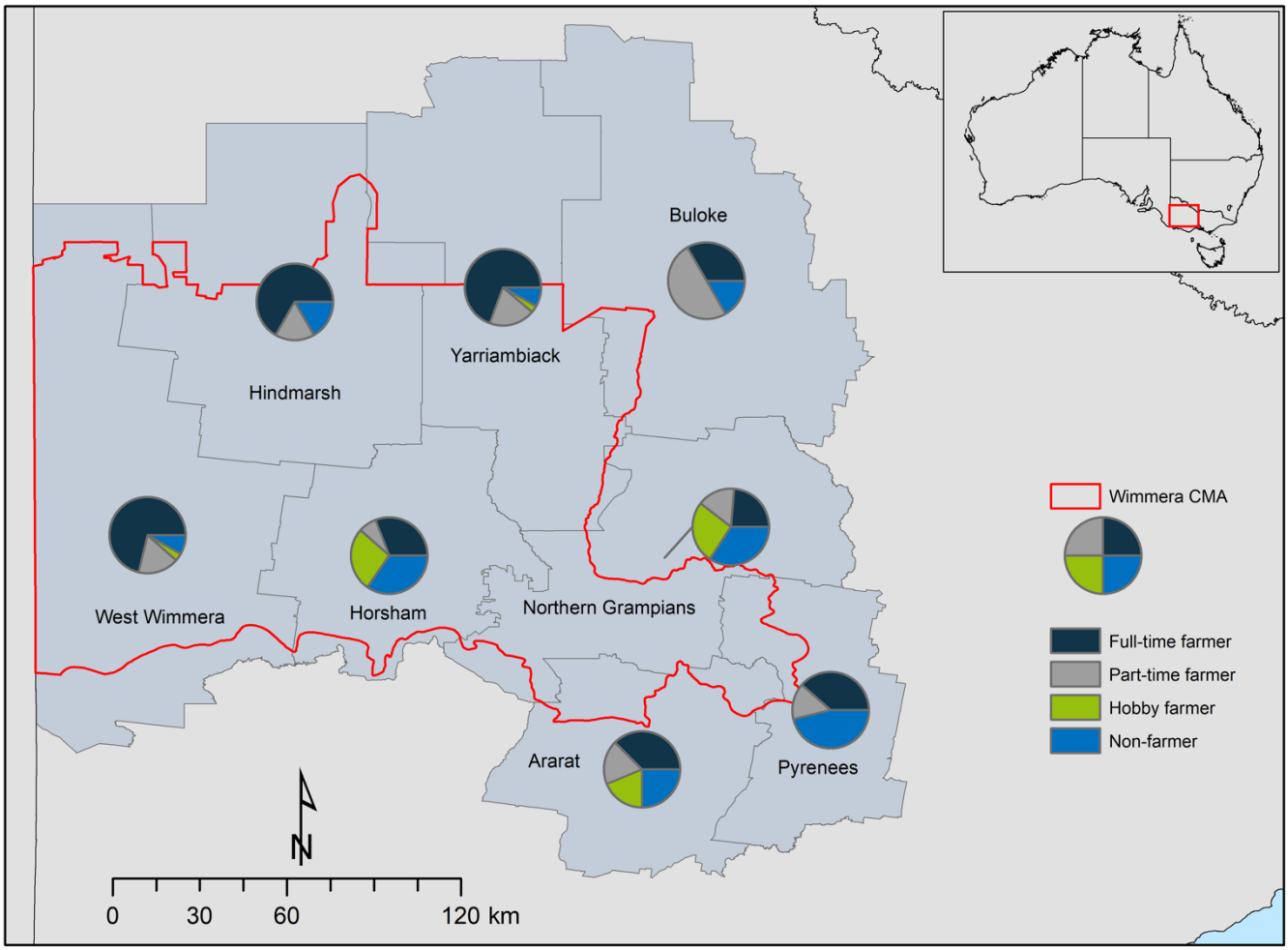

Figure 3 The distribution of landholder categories in the Wimmera survey area, by local government area, 2023

A breakdown of the survey responses relating to each reported land use can be found in Figure 4 below, with a further breakdown of land use and enterprise type in Table X2, Appendix 1.

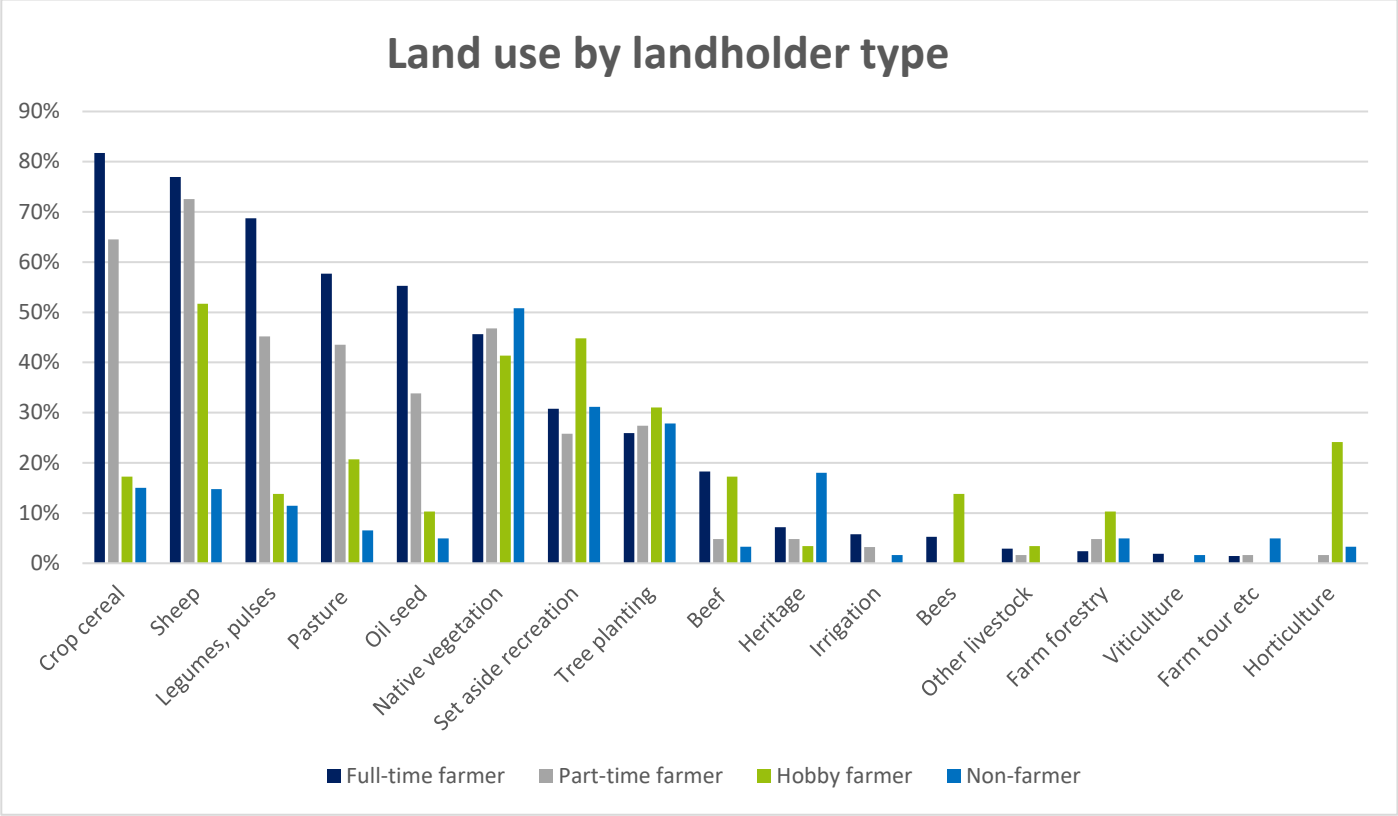

Figure 4 Land use by landholder type. Percentage shows proportion of each landholder type undertaking that activity 2023

2.2 FARM MANAGEMENT

Fifty-one percent of landholders reported having bought additional land in the region in the last twenty years, with 13% having subdivided or sold part of their property in that time. Across all landholder types, the average number of hours of on-property work was 38 hours per week, and 62% of respondents had another family member working on the farm, most of which (53%) were their spouse or partner. Off-property income was important for 37% of enterprises. Of this off-farm income, 50% was above $50,000 in the 2020/2021 financial year.

Key characteristics of the respondents overall and by landholder type are summarised in Table A with a further breakdown of key characteristics by local government area (LGA) in Table X1 in the Appendix.

Table A Key attributes summary table, Wimmera Victoria Landholder Survey 2023 (N= 373 n=329)

Key attributes (mean unless indicated)	All	Full-time	Part-time	Hobby Farmer	Non-Farmer
Proportion of survey responses	100%	58% (own 87% of land surveyed)	17% (own 9%)	8% (own 0.6%)	17% (own 4%)
Age of respondent	61 years (median =62)	60 years (median=61)	61 years (median=62)	56 years (median=60)	63 years (median=64)
Percentage of Female respondents	24%	14%	24%	52%	39%

Key attributes (mean unless indicated)	All	Full-time	Part-time	Hobby Farmer	Non-Farmer
Mean total area owned (median in brackets)	1240 ha (550 ha)	1356 ha (1100 ha)	430 ha (325 ha)	66 ha (40 ha)	220 ha (49 ha)
Bought additional land in region in past 20 yrs	51%	71%	32%	0%	23%
Subdivided or sold part of property past 20 yrs	13%	14%	18%	0%	6%
Property leased, share farmed or agisted by others	Area mean 135 ha 19%	Area mean 129 ha 13%	Area mean 231 ha 40%	Area mean 30 ha 17%	Area mean 97 ha 15%
Property leased, share farmed or agisted from others	353 ha	506 ha	143 ha	55 ha	4 ha
Resident on property	69%	79%	64%	54%	41%
Mean length of family ownership (median)	63 years (57)	80 years (80)	59 years (55)	27 years (17)	30 years (20)
Other family members working on the property	62%	75%	59%	35%	29%
Paid off-property work last 12 months	79 days	28 days	140 days	146 days	102 days
Hours work on-property per week	38 hours	54 hours	20 hours	15 hours	10 hours
Income from agriculture in relevant region 2020/21	80%	97%	92%	50%	14%
Net profit from agriculture in relevant region in 2020/21	83%	92%	82%	63%	35%
Received off-property income 2020/2021	15% primary respondent	13% primary respondent	17% primary respondent	29% primary respondent	10% primary respondent
	21% spouse	25% spouse	24% spouse	21% spouse	4% spouse
	20% both	14% both	35% both	21% both	29% both
Survey respondents net income from off-property >$50k	51%	44%	64%	63%	52%
Completed short course related to property management, past 5 yrs	28%	33%	22%	24%	18%
Attended a field day in the last 12 months	48%	60%	40%	24%	23%
Property management or whole farm plan completed	41%	50%	33%	25%	25%

Key attributes (mean unless indicated)	All	Full-time	Part-time	Hobby Farmer	Non-Farmer
Proportion of land lost to production due to soil problems (mean)	15%	18%	11%	16%	4%
	Area: 45 ha	Area: 52 ha	Area: 29 ha	Area: 17 ha	Area: 50 ha

On-farm management was largely collaborative, with 68% of farmers including another person or people in their management decisions. Most often, this was their spouse/partner, or other family member/s.

Of commercial farmers (full-time and part-time together), 86% reported having generated a profit over the last ten years. For a more detailed breakdown by LGA, see Table X1 in Appendix 1.

The pairwise comparisons showed that farmers who had prepared comprehensive property plans had fairly consistently high knowledge levels of most best-practices. They also had a high level of confidence in applying those practices. They regularly test their soils, were competent with data management and view data as an essential basis for decision-making. They were also more likely to own more properties in the region.

The modelling showed that farmers who had a whole farm or property plan in place were likely to have recently completed a short course and in the past year, attended a field day focused on soils, as well as changed their practices to reduce on-farm emissions. They are more likely to have a succession plan in place, and intend to purchase more land in the near future (Nagelkerkes R^2= 0.32). The model for all landholders was similar, but the associations were less strong. It did, however, include a decreased likelihood of intention to sell the property.

2.3 LANDHOLDER VALUES

A key element of the conceptual basis for this social research is that farmer behaviour is derived from "core elements of personality and belief structures"[14], which 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, suggesting that individuals were more likely to act when something they value may be threatened[15].

This section of the report explores the values that landholders connect to their property ('attached values') as well as underlying values and principles held by the landholder ('held values'). Values described in this way help inform understanding of the complex priorities of landholders that may drive land management behaviours. Landholder beliefs and norms will be examined in following sections.

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

Table B Attached values, overall & by landholder type (n=352). Grey shading shows top 3 responses by landholder type. ### = significant difference by landholder type. Colours indicate value-typology: egoistic (orange), biospheric (green), altruistic (blue).

ATTACHED VALUES: Why your property is important to you	% INDICATING IMPORTANT/ VERY IMPORTANT				
	OVERALL (Mean/5)	FTF%	PTF%	HF%	NF%
Ability to pass on a healthier environment for future generations	90 (4.4)	92	92	82	84
An attractive place/ area to live	80 (4.1)	80	85	79	76
Sense of accomplishment from building/ maintaining a viable business ###	78 (3.9)	95	86	48	26
A great place to raise a family ###	77 (4.0)	89	71	74	41
Provides sense of belonging to a place	77 (4.0)	81	76	68	66
My property is an important part of who I am	75 (4.1)	80	68	71	67
The productive value of the soil on my property ###	74 (3.9)	89	85	57	25
Sense of accomplishment from producing food and fibre for others ###	73 (3.8)	88	85	46	18
An asset that is an important part of family wealth ###	70 (3.9)	80	78	52	41
An important source of household income ###	69 (3.8)	89	71	25	19
Native plants & animals make the property an attractive place to live ###	69 (4.0)	64	70	75	83
Provide opportunities to learn new things ###	68 (3.8)	73	63	71	51
Provides a sense of belonging to a community	64 (3.7)	68	65	46	55
Native vegetation provides habitat for birds and animals ###	63 (3.8)	55	72	71	80
An asset that will fund my retirement ###	63 (3.7)	68	71	64	37
Contributing to local economy by providing work, support local businesses ###	62 (3.6)	77	65	25	24
A place or base for recreation ###	48 (3.4)	44	43	75	53

Table B shows related topics built on a typology measuring egoistic (orange shading), biospheric (light green shading) and altruistic (blue shading). Our results show that different types of landholders attach different values to the land they own and manage, which is consistent with our findings in other areas[16] [17]. These different groupings reflect the links between agriculture and the

[16] Luke, H., Baker, C., Allan, C. & McDonald, S. (2020). Agriculture on the Eyre Peninsula: Rural Landholder Social Benchmarking Report 2020. Southern Cross University,NSW, 2480.
[17] Luke, H., Baker, C., Allan, C., McDonald, S., & Alexanderson, M. (2021). Agriculture in The Northern Wheatbelt: Rural Landholder Social Benchmarking Report 2021. Southern Cross University,NSW, 2480.

natural and social landscapes within which it occurs, particularly given the higher levels of on-farm residency reported. These results highlight that farm ownership provides a range of values for those who live, work and recreate on the land.

We observed a range of attached values across themes of environmental and social values. The top three values by landholder type are indicated with grey shading, but when looking across the whole sample, there is a fairly even spread among the top four ways in which landholders value the property. These are: the property representing the ability to pass on a healthier environment to future generations (90%), an attractive place/area to live, (80%), and a sense of accomplishment from building/maintaining a viable business (78%).

In addition to the values attached to the property presented above, the survey also considered the principles that guide a respondent's life, as represented by the underlying values held by respondents ('held values'). These are summarised in Table C.

The data in Table C shows a strong dominance of the principle 'looking after my family/loved ones and their needs across all landholder types' (96%), representing a significant focus on the family unit. In comparison with the attached values shown above, there is a much stronger correlation among the landholder types across the top four principles guiding their lives, this time with a focus on more egoistic items (looking after family and creating a financially profitable business) and environmental values (preventing pollution, protecting natural resources, respecting the earth and living in harmony with nature).

Table C Principles that guide life, overall & by landholder type, 2023 (n= 360). ### significant difference by landholder type. Colour shading refers to value-typology: egoistic (orange), biospheric (green), altruistic (blue).

PRINCIPLES THAT GUIDE YOUR LIFE	% INDICATING IMPORTANT/ VERY IMPORTANT				
	OVERALL (mean/5)	FTF %	PTF %	HF %	NF %
Looking after my family /loved-ones and their needs	96 (4.7)	97	95	93	90
Preventing pollution & protecting natural resources ###	80 (4.2)	77	84	85	85
Respecting the earth & living in harmony with nature ###	71 (3.9)	63	74	79	81
Creating wealth & striving for a financially profitable business ###	67 (3.8)	79	77	25	33
Fostering equal opportunities for all community members	52 (3.4)	51	47	61	55
Caring for the weak/ vulnerable and correcting social injustice	51 (3.5)	48	54	61	53
Being influential, having an impact on people and events	36 (3.0)	37	32	43	35

3 COMPLEXITY IN FARMING & LAND MANAGEMENT

This section focuses on the implementation of farm management practices and some of the key drivers of investment and implementation of these practices. Some tables and information presented use combined data from self-identified full and part-time farmers, unless clearly identified otherwise.

3.1 LAND MANAGEMENT PRACTICES

The actual practices that landholders incorporate in their management – historically, currently and those they intend to undertake – are important outcomes of decision-making. Figure 5 shows changing farming practices implemented over time. A full breakdown of management practices is in Table X4 and Table X4 b in the Appendix 1.

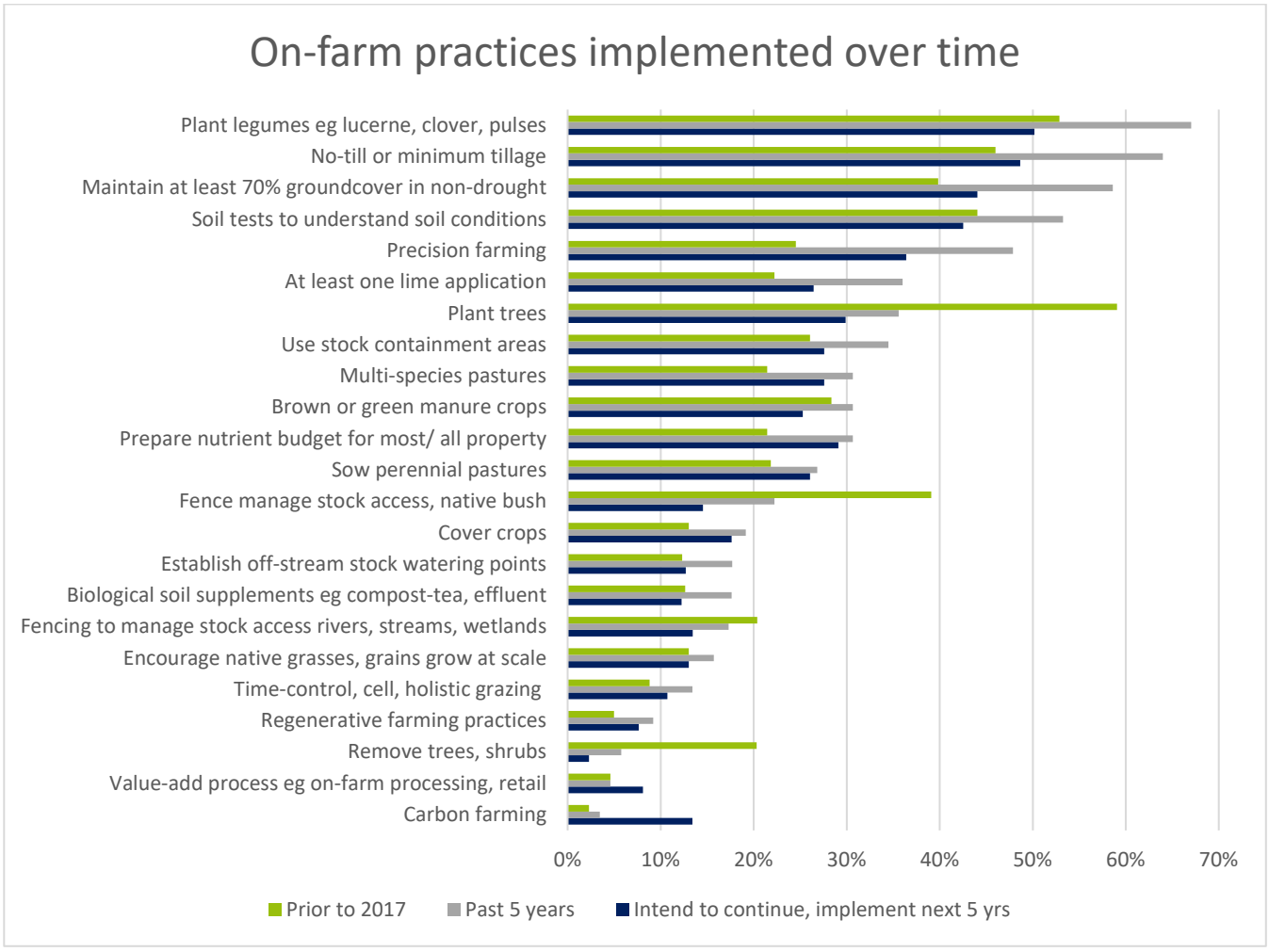

Figure 5 Farmer practices implemented over time, 2023 (full- & part-time farmers combined, n=260)

Planting legumes, that is, lucerne, clover and pulses, stands out as the most common practice in the current period (2017 – present) for two-thirds of farmers, followed by the use of no-tillage techniques to establish crops or pastures (64%). Practices such as planting trees and shrubs, fencing areas of native bush/grasslands to manage stock access, and removal of trees show a decline. Apart from these three practices, all others indicate an increase in implementation since 2017.

When future intended practices were considered, most practices are being maintained. The use of no-tillage techniques to establish crops or pastures, soil testing to understand soil condition, and maintaining at least 70% groundcover (in non-drought years) are practices noted. There was generally a higher rate of implementation of practices across the board for full-time farmers.

Regarding stubble management, 50% of overall property holders used full retention, while 23% used incorporation. Only 23% used a cool burn method, while 13% used a hot burn method. For a breakdown of approaches to stubble management by landholder type, see Table D. A breakdown of management practices over time for both full and part-time farmers can be viewed in Table X4 in the Appendix.

In relation to regenerative agricultural practices, just 9% considered themselves to have been recently undertaking practices that they consider to be regenerative. Despite this, a much higher proportion of farmers are implementing practices that are broadly considered to be within the toolkit of regenerative agriculture. For example, 57% of farmers are now maintaining at least 70% groundcover (in non-drought years), a practice that only 40% of farmers claimed to have been doing prior to five years ago. Even multi-species cover-cropping is a practice that over a quarter of farmers have implemented in the last five years.

Table D Stubble management by landholder type, 2023 (n=306).

If relevant, how do you usually manage your stubble?	Full-time farmer	Part-time farmer	Hobby farmer	Non- farmer
Full retention	60%	60%	14%	10%
Incorporation	28%	23%	18%	3%
Cool burn	30%	30%	0%	0%
Hot burn	16%	11%	9%	5%
Other	10%	9%	18%	15%

3.2 CONFIDENCE IN THE IMPLEMENTATION OF BEST PRACTICE

An important element of decision-making in farm management practice are the beliefs that farmers hold toward those practices, otherwise understood as the level of confidence in the practice. Also very important are the personal norms farmers have in relation to their farm, such as the personal responsibility they feel towards good soil stewardship. Table E presents a collection of norms and beliefs related to soil management for different types of landholders.

Table E View statement agreement overall & by landholder type, 2023 (n=334-345). Mean out of 5. Top 3 for landholder type shaded grey.

VIEWS & EXPERIENCE: STATEMENT	% AGREE/ STRONGLY AGREE				
	OVERALL MEAN	FTF %	PTF %	HF %	NF %
I feel a personal responsibility to maintain the productive capacity of my soil	87 (4.3)	93	92	85	59
I'm confident that my land is in better condition than when I took on management of this farm	86 (4.2)	88	92	85	72

VIEWS & EXPERIENCE: STATEMENT	% AGREE/ STRONGLY AGREE				
	OVERALL MEAN	FTF %	PTF %	HF %	NF %
Soil testing is an essential first step in understanding soil condition	82 (4.2)	85	90	89	55
Fencing to manage stock access is an essential element of protecting the health of waterways and native vegetation	78 (4.2)	78	79	85	74
Biological activity is an important indicator of the productive capacity of soils	76 (4.0)	78	75	89	56
The benefits of stubble retention outweigh problems arising from the practice	66 (4.1)	78	76	37	27
Reduced production in the short term is justified where there are long term benefits	65 (3.8)	65	64	82	62
The costs of applying lime to address soil acidity are justified by increased production	48 (3.9)	57	54	37	14
The costs of establishing perennial pasture are justified by the returns	43 (3.7)	49	43	59	15
I'm confident that adopting regenerative/ holistic farming practices is justified by the returns	20 (3.0)	15	22	48	21

Overall, our results indicate a strong sense of personal responsibility to maintain the productivity of soil, with soil testing regarded as an essential step, particularly among full-time farmers. Full-time farmers show the strongest support across most of the soil management items. There are mostly low scores for the two topics on alternative or holistic farming practices. The later section of modelling analyses a collection of norms and beliefs related to soil management for different types of landholders in Table L.

3.3 RISK AND OPENNESS TO CHANGE

Overall, there is a very high level of openness to change, with 90% of farmer respondents agreeing that they were open to new ideas about farming and land management, including 91% of full-time farmers (Table F). Just over half of farmers were interested in learning more about alternative/holistic farming approaches (52%), with a third being confident that adopting regenerative/holistic farming practices is justified by the returns (34%).

However, these responses were complicated by relatively low levels of agreement on other measures, such as 'financially I can afford to take a few risks and experiment with new ideas' (51%), 'I am usually an early adopter of new agricultural practices and technologies' (35%), and 'I have sufficient time available to consider changing my practices' (46%). This suggests that while farmers may have an open mindset, there are financial and time constraints upon adoption. For a further breakdown of measures of trust and risk, refer to Table X6 in the Appendix.

3.3.1 Self-identified early adopters

Those in the Wimmera identifying as early adopters came from a broad range of educational backgrounds, with the majority being 'trained in life', with no formal qualifications. According to the survey data, early adopters are more likely to test their soils and to have implemented practices

such as cover cropping, multi-species pastures, liming, no tillage, whole-farm planning and precision farming prior to and during the last five years. They are likely to have the view that primary producers should do all they can to reduce carbon emissions from their activities.

The modelling showed that farmers who considered themselves to be early adopters were more likely to have prepared a whole farm/property plan, consider risks to be a challenge to embrace, and not need to see local success prior to trying a new practice. Early adopters in the Wimmera were planning to buy property outside of their area to mitigate increased seasonal variability, and slightly less likely to have completed any formal education (R^2=0.34).

Table F Highest response questions on risk & openness to change, 2023 (n=244). Mean & percent overall for full- & part-time farmers (mean /5)

RISK AND OPENNESS TO CHANGE	Mean	% Imp/ very imp	Highest concern by landholder type
I am open to new ideas about farming & land management	4.1	90	Full-time farmers (91%)
You can't be too careful when dealing with people	3.6	62	Non-farmers (67%)
I usually view risks as a challenge to embrace	3.5	56	Hobby farmers (63%)
Financially I can afford to take a few risks & experiment with new ideas	3.3	50	Non-farmers (55%)
People are almost always interested only in their own welfare	3.2	40	Full-time farmers (42%)
I am usually an early adopter of new agricultural practices, technologies	3.1	36	Full-time farmers (42%)
I prefer to avoid risks	3.0	34	Hobby farmers (41%)
I prefer to see evidence of local success before trying a new practice	3.0	40	Full-time farmers (40%)
I have sufficient time available to consider changing my practices	3.0	34	Hobby farmers (63%)
This may not be the best farm around, but I see no reason to change	2.4	19	Part-time farmers (19%)

An important question to consider when looking into the willingness of farmers to change/adopt new practices or take more risks is to consider whether landholders are happy with their farm as it is now. In this regard, landholders were asked if their farm is 'doing ok the way things are' but 'see no reason to change': 19% of farmers responded to the affirmative. .

Those who answered positively to this question were most likely to make decisions on a seasonal or year-to-year basis, less likely to make plans over longer timeframes. Their properties are unlikely to stay within the family, and may be sold and/or subdivided in the future. They were more likely to be trained in life rather than have formal qualifications, and to be older. Those self-selecting this group correlated negatively with many of the knowledge-items in the survey, particularly those about soil health and the role of wetlands and native vegetation in filtering water entering rivers, lakes and streams.

The modelling for those who agreed that their farm may not be the best farm around indicated that this group was unlikely to have a farm plan in place, instead making decisions on a season-to-season

basis. They are risk-adverse and highly likely to have a view that climate change is not caused by humans. They are more likely to be planning to subdivide their property in the near future (R^2=0.36).

They were less likely to be implementing most of the best-practices (not including Regenerative Agriculture), including testing soils, precision-farming, cover cropping, applying lime, manure or biological amendments, fencing, planting trees or legumes, using stock containment areas or supporting the persistence of native grasses on their farm. They were less likely to be of a view that human activities are influencing changes in climate, or that climate change will have dire consequences. They were also less likely to be putting aside land for conservation purposes.

3.4 TIMING OF STRATEGIC DECISION MAKING

Up-to-five-year timeframes were most relied on for strategic decision-making in the Wimmera, with less than ten percent of all farmers making strategic decisions based on a seasonal timeframe (8%). This was followed by 6-20 years' timeframes (23%), and year-to-year timeframes (21%. Only 6% of farmers indicated that they consider a timeframe of more than 100 years, while 12% considered timeframes of up to 20 years (Figure 6).

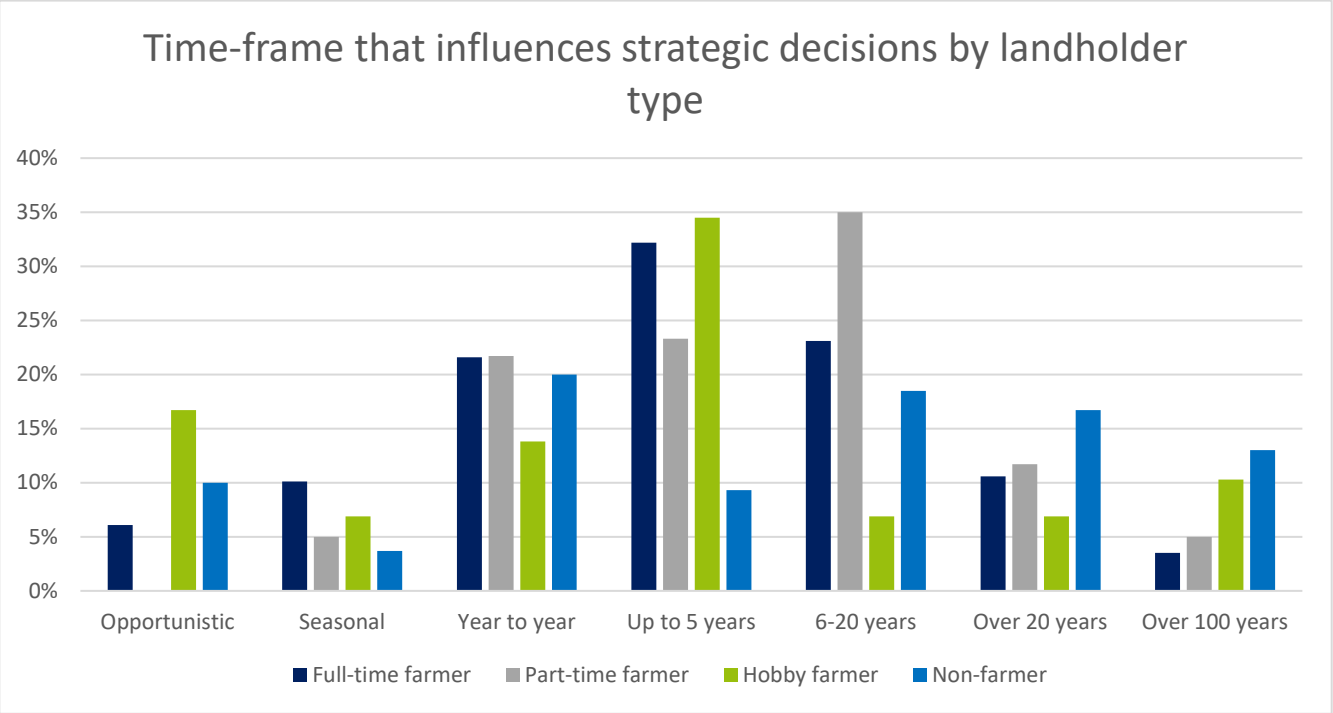

Figure 6 Timeframes relating to strategic, on-farm management decisions. 2023 (n=354)

Well-developed engagement approaches aiming to support improved productivity, land management and soil stewardship can be informed by a better understanding of landholder beliefs experiences and attitudes, which have been explored in this section. The following section outlines self-reported knowledge-levels of a range of practices, and how farmers are currently accessing information, to inform future engagement.

3.5 DATA MANAGEMENT

Business management at the farm level will directly impact land management decisions and has important consequences for profitability. Of farmers (full-time and part-time combined), 59% agreed that data should strongly inform decision-making around farm management, and 56% agreed that

they already have good systems in place to manage farm data, yet over half (53%) report internet connectivity as a barrier to using on-farm data effectively.

When asked what indicators farmers use to assess soil/land health, soil tests were the predominant answer, but many also indicated the importance of other methods such as visual inspections of soils, plant health observations (including weeds), and yields (Figure 7).

While 84% of farmers agreed that soil testing is an essential step in understanding soil conditions, only 55% of farmers reported having tested their soils at least once in the last five years (Table G).

When asked about soil testing frequency on their property, 41% of commercial (full-time and part-time) farmers indicated that they tested every 3 – 5 years; 23% at least annually; 12% once, and 24% never. For a breakdown of the results for different landholder types, see Table G.

Table G Frequency of soil testing, 2023 (n=332)

Landholder type	3-5 years	At least annually	Once	Never
Full-time farmer	48%	30%	11%	10%
Part-time farmer	53%	15%	20%	12%
Hobby farmer	23%	12%	15%	50%
Non-farmer	10%	6%	4%	79%
All commercial farmers	41%	23%	12%	24%

Regarding where farmers concentrated their soil testing, 83% of landholders indicated that they test systematically across paddocks, while only 10% tested systematically in one paddock. Only 7% of property holders preferred one location for soil testing. For a breakdown of the results for different landholder types see Table H.

Table H Preferred geographic approach to soil-testing by property holders. 2023 (n-233)

Landholder type	Systematically across paddocks	Systematically in one paddock	One preferred location
Full-time farmer	89%	6%	5%
Part-time farmer	84%	9%	7%
Hobby farmer	62%	23%	15%
Non-farmer	70%	10%	20%
All commercial farmers	88%	7%	5%

Full-time farmers reported a higher level of knowledge on how to use data to inform land-management decisions than other landholder types. Figure 7 shows the levels of understanding of how to use data to inform decision-making. The consistently lower knowledge across practices for part-time farmers could present an important opportunity for agricultural support organisations to target this group of land managers, who also play an important role in the productivity of approximately 9% of the land.

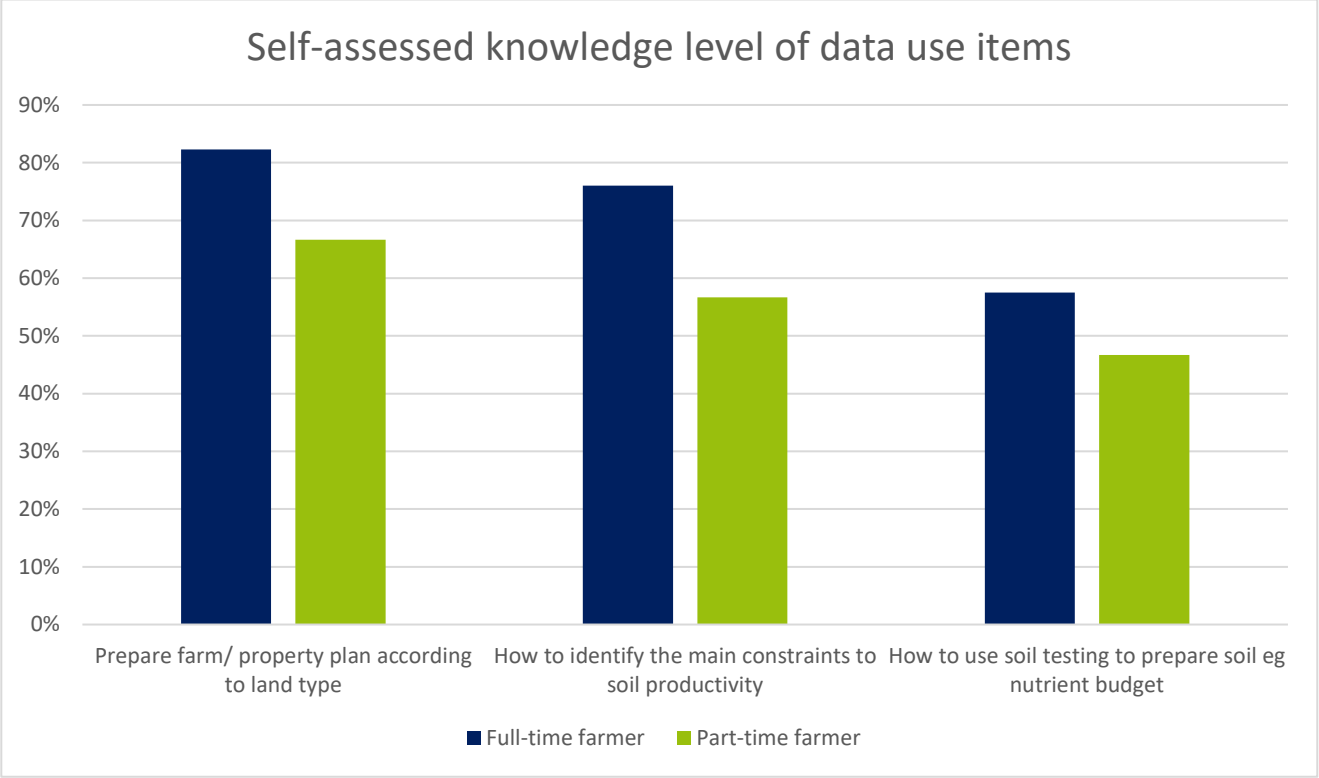

Figure 7 Self-assessed knowledge of data use by farmer type, 2023 (n = 344)

Table I Implementation of management practices compared to related knowledge & confidence in the practice for full- & part-time farmers (data amalgamated), 2023. (n=346).

Management Practice	Imple-mented within 5 years	Confidence	Agree-ment	Knowledge	Sound or very sound
Testing soils to understand soil condition	53%	Soil testing is an essential first step in understanding soil condition	86%	How to use soil testing to prepare a nutrient budget that will increase soil productivity	55%
Preparation of a nutrient budget for all/most of the property	31%	I am confident making management decisions based on data from my farm	86%	How to identify the main constraints to soil productivity on your property	71%
Prepared/ preparing a property management or whole farm plan	46%	Decision making needs to be strongly influenced by data/ scientific evidence	63%	How to prepare a farm/property plan allocating land use according to land/soil characteristics	79%

Table I brings together some key elements of how farmers are using data. It shows that while there is a strong belief in the importance of soil testing, and a general confidence in working with numbers, soil testing was implemented by only 53% of farmers within the previous five years. What this indicates is that farmer capacity to use and apply this data has room for improvement, with just 31% of farmers reporting having prepared a nutrient budget, and under half of farmers having prepared a whole farm plan. Farmer belief in the importance of data for informing decision-making is also relatively low, at 63%. For a more detailed breakdown, see Table X3 in Appendix 1.

3.6 BEST PRACTICE MODELLING

This section describes the outcome of the modelling process undertaken, including important pairwise linkages, as well as which factors emerged as particularly strong when brought together in the modelling. A strong model is a Nagelkerkes R^2 of >0.4.

3.6.1 Soil testing

Those testing soils were more likely to be cropping or doing mixed farming. They were also likely to have recently prepared a nutrient budget for their property. The model showed that farmers implementing soil testing were more likely to have a property plan in place, have purchased additional land in the past 20 years, and have brought in an income slightly above the national average. They were slightly more likely to be working on the farm with a parent (Nagelkerkes R^2=0.33).

3.6.2 Precision-farming

The model for farmers undertaking precision-farming was weak, however it did indicate that this group were slightly more likely to own additional land and be working on the farm with a parent; while likely to have earned $50,000 or more, but less likely to have an off-farm income (Nagelkerkes R^2=0.2).

3.6.3 Liming

Those undertaking lime were more likely to also be applying biological soil supplements. The model showed that they were more likely to have prepared a nutrient budget, and plan to diversify their enterprise. They were also likely to have owned the land for less time. They were slightly more likely to have a whole-farm plan, and own more than one property (Nagelkerkes R^2=0.18).

3.6.4 Minimum till

Farmers undertaking minimum-till techniques were more likely to have purchased additional land in the past two decades and tend to be younger, with a parent working on their property. They were slightly more likely to have turned a profit during the recent financial year (Nagelkerkes R^2=0.23).

3.6.5 Value-adding

Farmers implementing value-adding were more likely to be managing smaller properties where, within the past 12 months, they have taken steps to reduce emissions, and have completed a short course on soil health (Nagelkerkes R^2=0.5).

3.6.6 Planting trees

A strong model showed that farmers planting trees were less likely to have soil problems and put part of their property aside for conservation purposes. They were slightly more likely to make strategic decisions on a year-to-year basis (Nagelkerkes R^2=0.65). (The hobby farmer group was most likely to be planting trees.)

3.6.7 Biological soil amendments

Those applying biological soil amendments were also likely to be using green or brown manure crops, cover crops, multi-species pasture-cropping, using stock containment areas, be planting legumes, fencing off supporting the growth of native grasses and planting trees. They also were more likely to consider the practices they implement 'regenerative'. Further data analysis on implementing regenerative agriculture is in Section 5.5.3. For full-time and part-time farmers 18% responded that they had implemented this in the past five years (refer Table X4 in Appendix 1). In individual LGAs the top two are Hindmarsh (61%) and Horsham (62%) on their self-assessed knowledge on benefits of applying biological soil supplements (e.g., compost, manure, microbial inoculants) (see Table X1 in Appendix 1).

The model showed that farmers implementing these amendments were slightly more likely to be changing on-farm practices to reduce their emissions, to have recently attended a short-course be planning to diversify their enterprise, and be making decisions on an opportunistic basis (Nagelkerkes R^2=0.23).

3.6.8 Carbon farming

The pairwise comparisons indicated a link with carbon farming and corporate farms. The land parcels were likely to be smaller, with the property managers involved more likely to be younger, and working less hours on the farm.

A strong model showed that those implementing carbon farming were on slightly smaller properties and making changes to reduce carbon emission and diversify their farm enterprise. However, there

was also a negative link with retirement and/or subdivision of their land in the near future (Nagelkerkes R^2=0.79).

3.6.9 Maintaining groundcover

A relatively weak model showed that farmers maintaining at least 70% groundcover tended towards being younger, plan over longer timeframes (20-100 years), be making changes to reduce on-farm emissions and planning to diversify their enterprise - not sell the property (Nagelkerkes R^2=0.13).

3.6.10 Fencing

Those undertaking fencing to protect waterways or native species were more likely to also be managing stock to off-stream watering, and sowing perennial and multi-species pastures. Understanding the role of wetlands and native vegetation in filtering water entering rivers, lakes and streams had a very strong relationship with fencing. In the past five years, according to data for all respondents, the majority of fencing had taken place in the Pyrenees, with the least amount in the Horsham LGA.

A fairly weak model showed that these farmers were more likely to be making changes to sequester carbon, reduce on-property carbon emissions and be planning to conserve part of their property in the future. They were also slightly more likely to have a whole-farm plan in place (Nagelkerkes R^2=0.16).

3.6.11 Off-stream watering

Those with off-stream watering points were more likely to have a whole-farm plan in place, be implementing changes to sequester carbon on their property and have slightly higher levels of education (Nagelkerkes R^2=0.2).

3.6.12 Stock containment areas

Farmers using stock containment areas were more likely to, in the last 12 months, have attended soil-focussed field days, and changed their farming operations to reduce emissions. They were likely to be working more hours per week, to be planning to intensify their farming enterprise, and be planning to purchase land to mitigate for increased seasonal variability (Nagelkerkes R^2=0.25).

3.6.13 Grazing

Farmers undertaking time-controlled grazing were more likely to be in Generation X (age 43-57) rather than younger, they were also likely to have made changes to their practices in the last 12 months to sequester carbon and reduce on-farm emissions. They were also more likely to have a property or whole farm plan in place, and slightly more likely to be dealing with land lost to soil-related issues (Nagelkerkes R^2=0.25).

3.6.14 Perennial pastures

The model for farmers sowing perennial pastures showed that they had family members prepared to take on the farm in the future, even though their family were likely to have owned the farm for less time. They were more likely to have a whole-farm plan in place and own more than one property in the Wimmera (Nagelkerkes R^2=0.21).

3.6.15 Multi-species pastures

A fairly weak model showed that farmers implementing multi-species pastures were likely to be farming with other family, changing practices to reduce their emissions, have a whole-farm plan in place and be making strategic decisions on both an opportunistic and long-term basis (20-100 years) (Nagelkerkes R^2=0.12).

3.6.16 Encouraging native grasses/grains to grow at scale

Those who were encouraging native grasses/grains to grow at scale were likely to make decisions on both opportunistic and very long timeframes (100 years or more). They were also more likely to be fencing and consider themselves to be regenerative farmers.

A strong model revealed something slightly different, where farmers encouraging native grains to grow at scale were more likely to be make decisions opportunistically, be taking steps to reduce their on-farm emissions, have an off-farm income, and were less likely to be working on the farm with their child/ren. They were likely to have plans to conserve part or all of their property, indicating that growing native grains may be viewed as a conservation practice rather than a farming practice (Nagelkerkes R^2=0.45).

3.6.17 Planting legumes or pulses

Farmers planting legumes or pulses were likely to be slightly younger, possibly managing their farm with a sibling, and less likely to be earning an off-property income. They were also more likely to own more than one property, and make strategic decisions over a five-year timeframe (Nagelkerkes R^2=0.18)

3.6.18 Increasing chemical use

A fairly weak model showed that farmers increasing use of chemicals per hectare were more likely to be testing their soils at a depth of more than 30 cm, earning at least $50,000 per year from their farm but less likely to be turning a profit. An intention to intensify their farming enterprise was also linked to this item (R^2=0.12).

The significant pairwise comparisons identified that farmers who were increasing synthetic fertiliser/ chemical inputs per hectare were more likely to be undertaking cropping enterprise/s, applying precision-farming techniques and planting legumes or pulses. They were less likely to be applying biological soil amendments, encouraging native grains to grow, farming carbon or fencing off rivers or wetlands. Farmers increasing chemical use were less likely to be of a view that climate change would have dire consequences, but also of a view that it's too late to have any impact anyway. They were also less likely to be using podcasts, books or Landcare as important information sources. Increasing chemical use correlated negatively with corporate farming.

This item linked to farmers who had had the farm in the family for longer, and wish for the farm to remain in the family, with family in line to do so, and are more likely to be turning a profit. On balance, they appeared less concerned about climate change and more confident that we could adapt to the expected changes. They are most likely to undertake strategic planning on a 5-year timeframe, and be using commercial or independent consultants and other farmers as important information sources, while they prefer to see success locally prior to investing in a new practice.

4 ENGAGING LANDHOLDERS

4.1 KNOWLEDGE OF CURRENT RECOMMENDED PRACTICE

The knowledge surrounding a practice remains an extremely important element of its implementation. Respondents were asked to assess their level of knowledge of a number of farm management practices. Table J shows the proportion of self-reported knowledge for the listed topics. Full-time and part-time farmer respondents indicated a sound level of expertise in a number of topics, including 'strategies to maintain ground cover to minimize erosion in this area' and preparation of a 'farm/property plan allocating land use according to land/soil characteristics'. Many other practices have low reported knowledge levels, with the lowest topic being 'market mechanisms that support carbon farming'. Notably, part-time farmers' self-reported knowledge tended to be lower than that of full-time-farmers across most topics, extending to non-farmers having the lowest self-reported knowledge for all items (Table J).

Table J Self-assessed sound/very sound knowledge, 2023 (n=340-347). Mean /5. Grey shading = knowledge level below 50%. ### significant difference by landholder type

KNOWLEDGE TOPIC	Overall % (mean/5)	FTF %	PTF %	HF %	NF %
Strategies to maintain ground cover to minimise erosion in this area ###	75 (4.0)	84	81	44	51
Preparing a farm/ property plan allocating land use according to land/ soil characteristics ###	68 (3.8)	82	67	56	26
How to identify the main constraints to soil productivity on your property ###	59 (3.6)	76	57	27	21
How to (re)introduce more legumes/ pulses into your enterprise mix ###	56 (3.6)	76	59	12	9
Time controlled, holistic, cell grazing strategies for stock containment ###	49 (3.4)	58	61	39	16
The processes leading to declining soil heath or structure in this area ###	49 (3.5)	53	56	42	28
Options & strategies to (re)establish perennial pastures (e.g. lucerne, native grasses) in this area ###	46 (3.4)	55	47	31	25
How to build soil organic matter/soil carbon ###	46 (3.3)	52	52	27	24
How to use soil testing to prepare a nutrient budget that will increase soil productivity ###	45 (3.3)	58	47	23	14
The benefits of applying biological soil supplements e.g. compost, manure, microbial inoculants ###	44 (3.4)	47	49	50	28
Laws, regulations that apply to management of rural properties ###	42 (3.3)	47	43	42	24
How to manage subsurface soil constraints e.g. compaction, water holding capacity ###	42 (3.2)	54	40	39	9
How to protect, improve health of native vegetation, waterways, wetlands	42 (3.3)	39	51	46	39

KNOWLEDGE TOPIC	Overall % (mean/5)	FTF %	PTF %	HF %	NF %
Role of wetlands, native vegetation for filtering water entering rivers, lakes, streams	36 (3.2)	32	39	46	40
Role of microbiology (bacteria, fungi) in soil health	35 (3.1)	36	44	24	27
How land in your district was used & managed before European settlement	33 (2.6)	18	17	15	28
Use soil moisture probe data to make decisions on crop, pasture management ###	33 (3.0)	45	39	12	3
Regenerative agriculture and holistic farm management	24 (2.8)	25	27	19	17
The extent, type of biological activity in soils on your property	21 (2.8)	21	26	23	12
The location of Aboriginal cultural sites in district e.g. scar trees, middens	18 (2.5)	18	20	12	17
The Aboriginal group/s connected to the area where your property is located	12 (2.4)	7	22	15	16
Market mechanisms that support carbon farming	11 (2.4)	11	12	12	14

4.1.1 Knowledge & Best Practice

According to the pairwise comparisons, knowledge on a range of topics was extremely important for best-practice implementation. In addition, higher knowledge levels about a practice or how to implement it linked clearly to higher levels of confidence that implementing a practice is justified by the returns.

High knowledge levels on a broad range of topics, from law to the role of microbiology and holistic farm management, linked to strategic decision making made on a longer timescale, from 20 to over 100 years. Understanding the use of stock containment areas, or time controlled, holistic or cell grazing strategies seemed to be important for the greatest number of best-practice items. How to protect and improve the health of native vegetation, waterways and wetlands was the second most important knowledge-item related to best-practice implementation. Applying biological soil amendments and maintaining at least 70% ground cover were practices that linked to the highest number of different knowledge items.

There was a strong correlation between 19 of the 22 knowledge questions, and the survey item on farmers who were confident that their land is in a better condition than when they took on its management. It also had an important relationship with those earning over the $50,000 per year from their farm, with knowledge about strategies to improve groundcover, soil health, to make plans in relation to land class, and thereby reduce erosion and soil loss appeared to have the greatest impact on income.

Those who were aware of the Wimmera CMA were likely to have higher knowledge on how to make a property plan based on land characteristics. Also, soil constraints, soil health, including and the role of microbiology in this; how to test soils, establish legumes, and use a soil-moisture probe.

4.2 ACCESSING INFORMATION

The provision of information, support and education are important ways to increase knowledge and confidence in farm management practices. Understanding how landholders engage with processes of knowledge sharing and education, and with industry and land management groups, provides useful insights into how information can best be shared and landholders can be meaningfully engaged.

Respondents were asked what their top modes and sources of information were on topics related to the management of their property (Table K). For full and part-time farmers combined, newspapers (49%), field days (46%) and websites (45%) were the most frequently nominated information sources. The top source of knowledge was other farmers (74%), followed by a farmer's own knowledge from their own experiences (62%), and independent agricultural consultants, agronomists or stock agents (55%).

Some other very interesting correlations emerged from the pairwise comparisons: short courses appeared to be an important source of knowledge for how to implement many of the best-practices listed. People accessing Twitter were about 12 years younger than those who were not, and early adopters were likely to be using podcasts as a primary information source, followed by NRM organisations, field days and twitter. Notably, those using podcasts were less likely to need to see local evidence of success before trying something new.

MODE OF INFORMATION	% YES
Newspapers	49
Field days	46
Websites	45
Emails	36
Magazines	34
Brochures/leaflets/newsletters	31
Radio	28
Television	21
Academic journals/ research papers	16
Books	14
Short courses	12
Podcasts	10
YouTube	9
Facebook	9
Twitter	9
Whatsapp, Messenger groups	2
Instagram	0

SOURCE OF KNOWLEDGE	% YES
Other farmers	74
My own knowledge from my own experiences	62
Independent agric consultants, agronomists, stock agents	55
Friends/neighbours/relatives	45
Bureau of Meteorology	39
Commercial agricultural consultants, agronomists, stock agents	38
Farming system groups e.g. Birchip, Southern Farming Systems	32
Rural R&D corporations (e.g. GRDC)	25
Landcare	19
Commodity groups	19
Ag Vic	16
VFF, NFF	15
Wimmera CMA	10
Universities/ CSIRO	9
Local Council	5
Environmental organisations e.g. Greening Australia	5
Soil CRC	2

Table K Modes of information, knowledge sources used for full- & part-time farmers, 2023 (n=259)

Farmers accessing information from NRM organisations had, on average, properties that were one third bigger (up to 15,000ha). People using books as an important information source were far more likely to be of a view that primary producers should do all they can to reduce carbon emissions from their activities.

There appeared to be an important connection between extension agents and attendance at field days. The practices that commercial consultants were closely associated with were soil testing, no-till, planting legumes, precision farming and green or brown manure-crops. Farmers using commodity groups as information providers were likely to be implementing all of these practices, with the addition of time-controlled grazing.

Those using Ag Vic as a primary information source were more likely to have a property plan in place, be testing soils, precision-farming, have planted legumes and set up of-stream watering points in the past, and preparing a nutrient budget. They were also likely to be implementing practices they considered to be regenerative and planning fencing to protect native species. Those using NRM sources were more likely to have implemented similar practices, with the inclusion of green or brown manure crops and tree-planting, but Regenerative Agriculture did not emerge as a strong association in the pairwise.

The practices that the CMA was closely associated with were: fencing, native grains, and preparing a nutrient budget. People living on the farm with a parent were more likely to use the CMA as an information source.

Farmers drawing on scientific journals or universities directly were more likely to be implementing almost all of the best-practice items listed, with time-controlled grazing a planned practice-change.

4.2.1 Information consumption by generation

Farmers were divided up into age groups by standardised generations[18]: Generation Y+ (born 1981-1996 and younger), Generation X (born 1965-1980) and Baby Boomer and older (born prior to 1965, referred to as Baby Boomer+). The age breakdown reveals that older farmers are more likely to refer to traditional information sources such as newspapers (58%), whereas younger farmers were more likely to use websites (Gen X 62%) and email (Gen Y 59%). Around 50% in all three age groups drew on field days for information on agriculture or land management, and 10% across the three groups used YouTube. A trend is for the youngest group to use podcasting (24% Gen Y vs 7% Baby Boomer, 9% Gen X); a similar percent of Gen Y used short courses (24% Gen Y vs 9% Baby Boomer, 16% Gen X). The middle age group (Gen X) was the most likely to use websites. The youngest group of farmers was the least likely to draw on Landcare or environmental organisations for information. For sources of information, all generations reported they consulted other farmers (Baby boomer 74%, Gen X 80%, Gen Y 59%), drew on their own experience and knowledge (Baby boomer 66%. Gen X 62%, Gen Y 59%) and used independent advisers, consultants (Baby boomer 53%, Gen X 62%, Gen Y 65%). Friends and Bureau of Meteorology were also important sources of information (Appendix 1, Tables X11 a, b, c, d).

[18] 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/

4.3 SOURCES OF SUPPORT

Participants were asked to respond to a series of open questions relating to their sources of support and desired support for their agricultural and land management practices. Two-thirds (61%), felt adequately supported to conduct farming and land management activities on their properties. The most frequent text responses to "main source of support" where respondents could add one or more sources of support were in these examples: "paid agronomist, friends, family discussions", "agronomist, BCG, Vic No till", "Best wool Best Lamb group, friends/neighbours", "groups: Grasslands SOL. Landcare; Friends; Neighbours; Stock agent", "soil tests, Agronomist, BCG, Field Days etc", and "Vets, Agronomist, Animal health specialist, Fertiliser companies". Figure 8 shows the weighting of the top 50 words in the text responses.

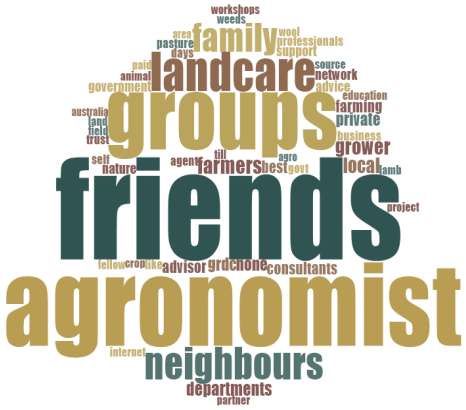

Figure 8 Nvivo™ word-cloud representation of responses to the open question: what is your main source of support for agricultural, land management activities?

This qualitative data complemented the quantitative, showing that support from friends, family, neighbours and other farmers was of great importance. However, agronomists, farming system groups, and Landcare groups were also important support organisations.

In this section of the survey a set of four questions were asked about the Wimmera CMA assistance to landholders.

Table L Awareness of Wimmera CMA support, full- & part-time farmers, 2023 (n=251)

TOPIC	FTF, PTF % agree	Overall % agree
Awareness of the Wimmera CMA	88% yes	85% yes
The Wimmera CMA provides valuable information about soil, land, water, natural resource management	49	36
The Wimmera CMA can be relied on to keep landholders' interests in mind when making decisions about land, water, NRM	25	27
I can rely on the Wimmera CMA to provide appropriate financial assistance for land, water, NRM	14	14
Sound principles guide Wimmera CMA's decisions about land, water, NRM	20	22
In past 5 years did government programs or Wimmera CMA provide financial support for work on your property? - Yes, as part of community grant - Yes, a specific grant to you as landholder	No = 84% Grant = 5% Landholder = 11%	No = 85% Community= 4% Landholder = 11%

The number of full-time and part-time farmers (48%) reported to have attended field days/farm walks or demonstrations focused on soil health and productivity in the past 12 months (Table M). A very low 11% of farmers considered there is adequate compensation or support for on-farm conservation activities. However, there was a positive relationship with using the CMA and/or Landcare as important information sources and receiving funding for land management activities. This also positively correlated with having attended short courses. The practices related to having received funding were: fencing, grazing and tree-planting. There was also an association with regenerative agriculture.

Table M Views, experiences for farmers overall (FT + PT) & landholder type 2023 (n=348). Mean/ 5 = 'strongly agree'.

VIEWS & EXPERIENCE: STATEMENT	% AGREE/ STRONGLY AGREE				
	Farmer % (mean/5)	FTF	PTF	HF	NF
I feel adequately supported to conduct farming, land management activities on my property	61 (3.6)	62	61	50	42
There is adequate compensation or support for good land, soil stewardship	15 (2.6)	16	12	11	10
There is adequate compensation or support for conservation activities on my farm	11 (2.6)	11	10	11	4

4.3.1 The decision-making team

The modelling identified that farmers making decisions as part of a team were far more likely to have family living and working on their land, particularly their partner, and they were likely to own more than one property. There was also an associated concern about the impact of absentee landholders on the region (Nagelkerkes R^2=0.41). Feeling well supported, having a strong sense of belonging to a community and knowledge of how to support the growth of native vegetation and soil heath also emerged as important in the data.

5 LAND MANAGEMENT CHALLENGES

Respondents were asked to rate the importance of a set of issues at the district and property scale, identified by local groups at the survey development workshop. The percentages presented here are the proportion of respondents indicating an issue was important or very important. This section is divided up into the four landholder categories to show the difference in importance across issues by landholder type. Matters at this scale can mean a threat to the values expressed by the different groups, and therefore play a role in land management behaviours as a possible driver of action. Issues at the regional scale are presented in Figure 9, shown as the top five issues by landholder type.

5.1 REGIONAL ISSUES

The top four issues for commercial farmers in the region were: the absence of essential services and infrastructure (such as health, schools, internet, phone coverage) (81%), water security (78%), and public opposition for agricultural practices such as GMs, animal welfare, pesticide use (74%). For a complete list, see Table X5 in the Appendix.

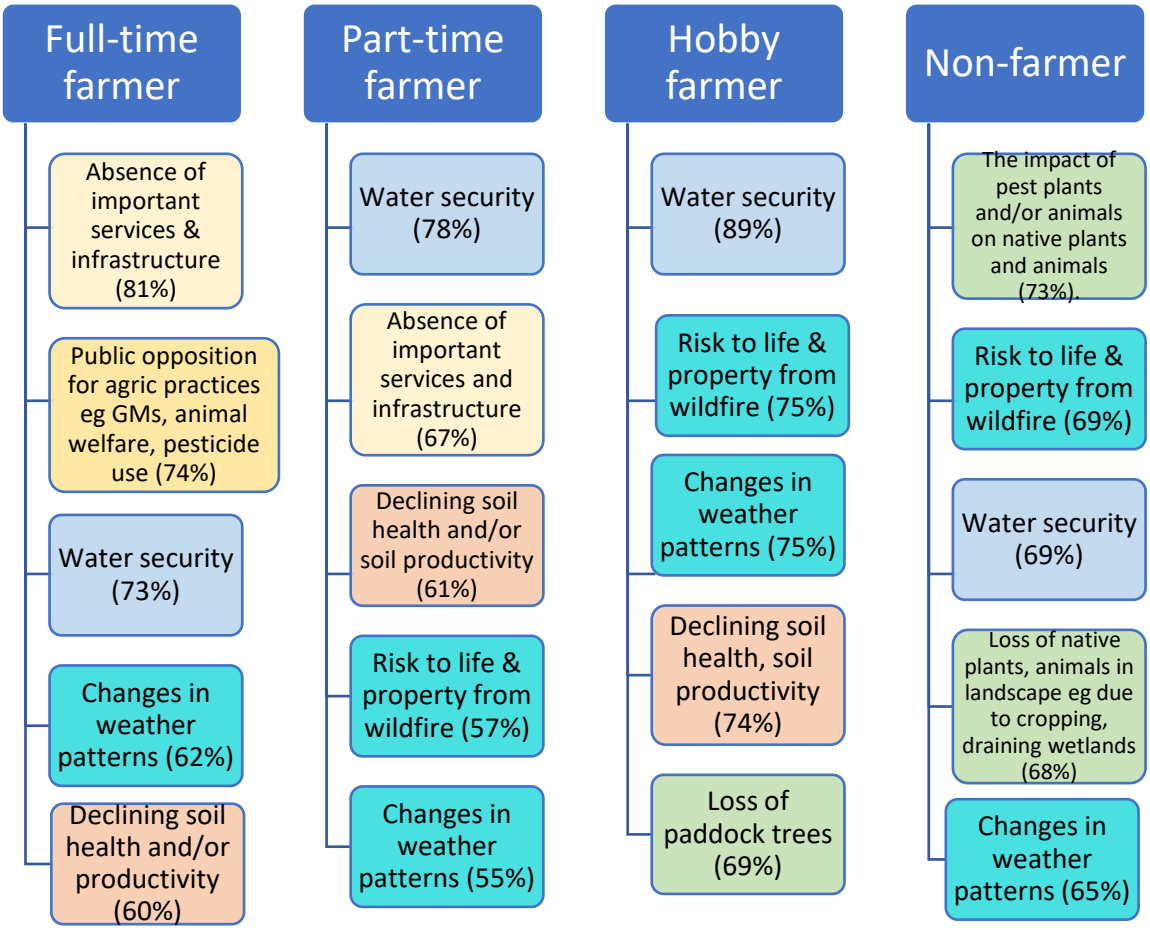

Figure 9 Top five most important regional issues by landholder type, 2023 (n= 319-350)

5.2 PROPERTY SCALE ISSUES

At the property scale (Figure 10), the top issues across all groups were the rising input costs (92%) and the impact of weeds, pest animals or over-abundant native plant species on productivity (67%). Weed resistance to herbicides, pesticides and fungicides featured as a top-three issue for full and part-time farmers (74%). Full-time farmers were concerned by the lack of skilled labour.

For a complete list of property-scale issues by landholder type, see Table X5 in the Appendix.

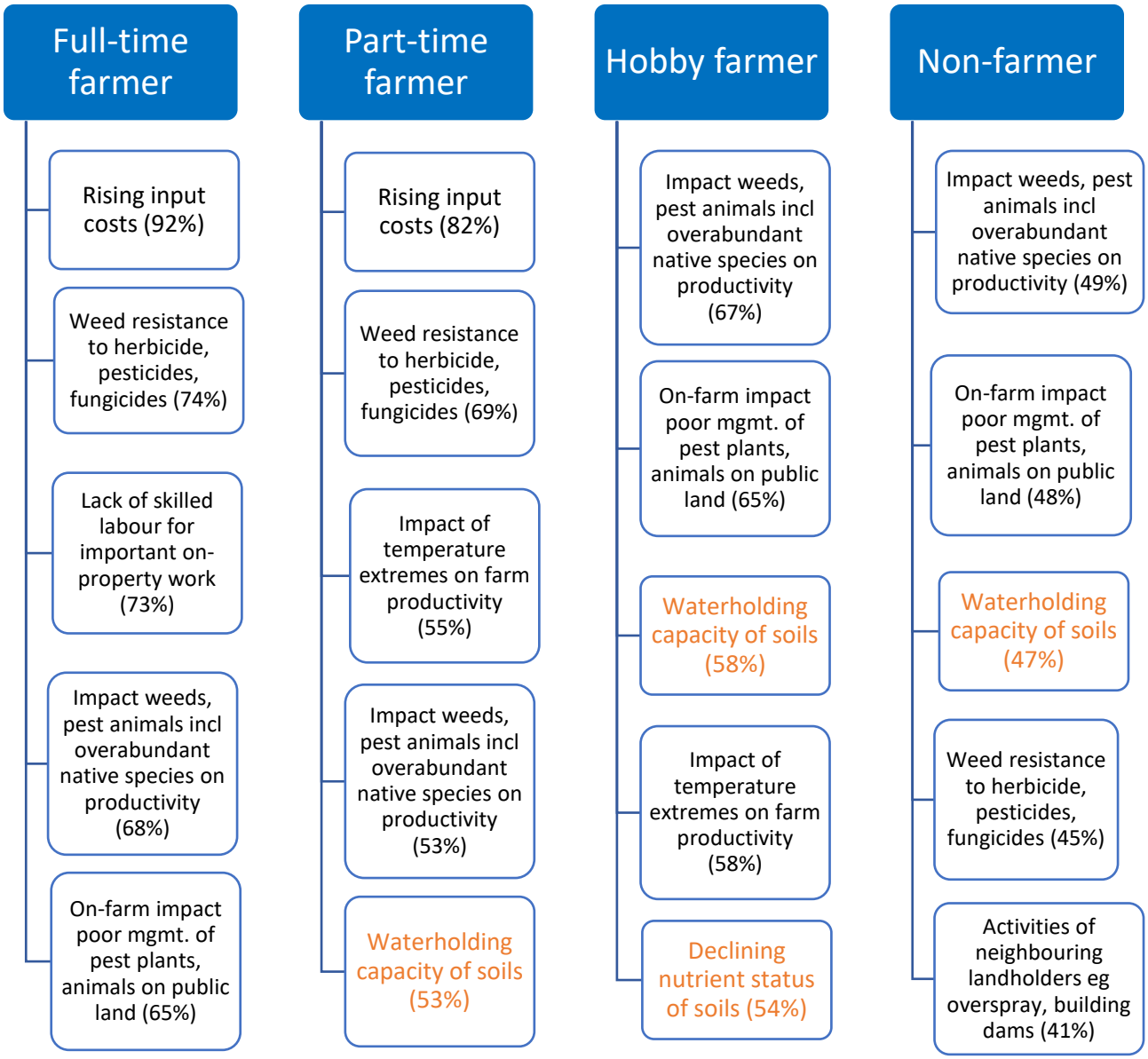

Figure 10 Top five property-level issues by landholder type, 2023 (n=337-345). Orange text indicates soil-related item.

In an open-ended question, landholders were asked to nominate what they saw as their biggest challenge or opportunity in the next ten years. In terms of challenges, the strongest emergent theme was that of climate change. Many farmers were cognisant of seasonal variability linked to climate change: "inconsistent and extreme weather events" and "climate variability resulting from climate change". The second most common challenge highlighted was that of costs, such as costs of inputs: "Increased financial risk due to high annual input costs". Land and machinery costs were also seen

as a big challenge to farmers. Succession planning, government red tape, and productivity related to soil health were noted by respondents (Figure 11).

Figure 11 Nvivo™ word-cloud 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.

5.2.1 Uncertain returns limiting capacity to invest

Farmers who were highly concerned about uncertainty of returns limiting their capacity to invest were more likely to be also concerned about rising input costs, labour shortages and the impact of temperature extremes on farm productivity. They were more likely to feel time-poor and stressed (R^2 =0.49). Other important related issues (in addition to input costs and temperature extremes) were acidic soils, soils with poor water-holding capacity, and an overabundance of weeds (R^2=0.4).

The younger generations were significantly more concerned about having uncertain returns than farmers over 57 years old (Baby boomers & older). These younger farmers appeared to be often working a high number of hours per week.

In relation to soil health, soil acidity, salinity, soil-borne diseases, erosion, lowering levels of soil carbon, and a declining nutrient status of soils was linked with weed resistance to herbicides, the impact of pesticides on soil biota, and lowered levels of biological activity. Concerns were also evident about the impact of farm dams on groundwater extraction down the catchment, as well as poor weed management on public lands.

The identity and values of farmers in relation to this survey item also emerges as important in the pairwise data. They are likely to view their property as an important part of who they are and have a strong sense of belonging. Creating wealth is very important and they value having a sense of accomplishment from raising a family there, building a viable business, and providing food and fibre for others, while strengthening the local economy, as well as considering it an attractive place to live, work and play. They value having a healthy environment to pass on to future generations.

For farmers concerned about uncertainty of returns, of the 16 listed values they attach to their property, the most important were that they view their property as an attractive place to live and an important part of their identity, feeling a sense of accomplishment from building/maintaining a viable business that was an important source of household income (R^2 = 0.16).

5.3 RESPONDING TO THE CHALLENGES

Landholders were asked about their level of satisfaction with their farm's productivity, finding that 76% were satisfied in light of the seasonal conditions experienced. Seventy-one percent of farmers indicated that they are coping well with the associated stresses and challenges of managing their farm.

5.3.1 Wellbeing

Those who were coping well with the associated stresses of managing their farm did not make decisions on an opportunistic basis. Factors positively affecting landholder wellbeing were: feeling supported in the management of their land, having smaller farms with sufficient time to consider new practices, and being older. Also, feeling confident making management decisions based on on-farm data, and feeling that they could adapt to expected changes in weather patterns.

For all landholders, the model showed that those who agreed that they were coping with the associated stressors of managing their land, were likely to be on smaller properties and less likely to have bought additional land to mitigate for seasonal variability. They felt supported in their land management and farming activities, were confident making management decisions based on on-farm data, and felt confident that landholders in this region could adapt to expected changes in rainfall patterns (R^2 =0.28). They were also less likely to have changed on-property operations in the past year to mitigate for climate change. For farmers and all landholders, feeling supported emerged as a very important factor in their reported levels of being able to cope with stress.

Factors most negatively affecting landholder wellbeing were concerns about climate change, that it would have dire consequences and presented a risk to the region.

For farmers (FT, PT), the model was quite similar: they were also likely to be on smaller properties and less likely to have bought additional land to mitigate for seasonal variability. They felt supported in their land management/farming activities, were confident making management decisions based on on-farm data, and were less likely to have changed on-property operations in the past year to mitigate for climate change (R^2=0.22).

5.3.2 Sense of belonging

Having a sense of belonging to a place linked strongly with a number of items in the pairwise comparisons. Farmers with a strong sense of place-belonging had a very strong sense of their property as an important part of their identity, and way to contribute to the local economy. They also enjoy the native flora and fauna and have a view of biological activity as an important indicator of soil productivity (R^2 =0.41).

5.3.3 Impacts and opportunities

Landholders were asked, in an open-text question, to nominate the management decision that had the most influence on profitability in the last twelve months. The responses were wide-ranging across crop rotations, sheep-grazing, weed control, increase or decrease numbers, mix of breeds, management – soil health, stock, chemical/fertiliser. Other activities mentioned were fencing maintenance and weed control. Over a longer period of 10 years a variety of management decision topics were included: soil, cropping such as improved cropping practices, and no-till or minimum-till. Soil health, fertility and soil moisture were described along with regular soil testing and nutrient management.

In terms of opportunities arising in the coming decade, several were mentioned relating to reducing input costs, dealing with climate change (and the "politics of climate change"), other government policies, rainfall changes, carbon and carbon markets. When asked what particular technology/ tool/innovation/knowledge would support their farm management goals, there was a range of responses. Soil testing, understanding soil constraints and soil management including for carbon, better weather forecasting both short term and longer range. Technology and knowledge were listed with some respondents suggesting restraint on technology (specifically automation) as its uptake would reduce the regional workforce population. Some landholders indicated that they were seeking improved knowledge on a broad range of farm management, weed and soil practices.

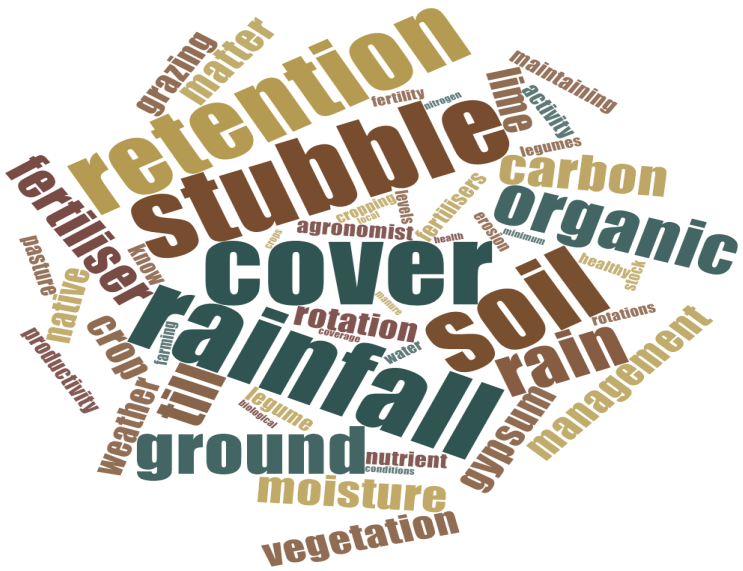

Figure 12 Nvivo™ word cloud of factors farmers consider to be the most important influence on soil health, shows larger words in proportion to the frequency of mentions by respondents, 2023.

When asked what the most important influence on soil health is, the most common response was maintaining groundcover, consistent with their most commonly implemented listed practice. Other common responses included the use of crop rotation and avoiding over-stocking. A word cloud created from the words raised in the open question can be found in Figure 12. Each word becomes larger the more frequently it was reported.

5.4 RELATIONSHIPS BETWEEN ISSUES AND PRACTICE

We assessed the relationship between soil health issues experienced on farming properties and management interventions commonly employed using a Kruskal-Wallis Rank Sum Test (Table N). Significant positive associations were identified between declining soil health and productivity with several management interventions, including maintaining at least 70% ground cover, soil testing, sowing perennial pastures, planting legume and pulses, and carbon farming. Concerning interventions that assist soils' water holding capacity, we observed a positive relationship with management interventions such as rotational grazing, no-tillage crop or pasture establishment techniques, and sowing perennial pastures.

Concerning soil management practices, the strongest pairwise comparison was the association between low levels of organic carbon and low levels of biological activity in soils on their property, suggesting that farmers view these as synonymous. Understanding the role of soil carbon in

maintaining soil health strongly correlated with knowledge on how to build soil organic matter/soil carbon.

Table N Relationships between assessments of issues & best-practices implemented as mitigation interventions in the past five years, 2023.

Significant Relationships	
Important issue	**Management practice applied in the past five years**
Impact of temperature extremes on farm productivity	• Maintaining at least 70% ground cover (in non-drought years)
Declining soil health and/or soil productivity **(concern at regional scale)**	• Application of biological soil supplements • Farming practices that they consider to be regenerative • Fencing of native bush/grasslands to manage stock access • Fencing erected to manage stock access to rivers/streams/wetlands • Use of time controlled, cell or rotational grazing • Use of stock contamination areas
Water holding capacity of soils **(property scale issue)**	• Application of biological soil supplements • Maintaining at least 70% ground cover (in non-drought years) • Farming practices considered to be regenerative practice/s • Preparation of a nutrient budget for all/most of the property • Use of stock contamination areas
Low level of biological activity in soils (property scale issue)	• Application of biological soil supplements • Maintaining at least 70% ground cover • Farming practices that they consider to be regenerative • Use of time controlled, cell or rotational grazing • Fencing native bush/grasslands to manage stock access • Brown or green manure crops • Sowing perennial pastures • Use of stock contamination areas
Low level of organic carbon in soils (property scale issue)	• Fencing of native bush/grasslands to manage stock access • Sowing perennial pastures • Use of minimum-tillage techniques to establish crops or pastures • Use of precision farming techniques • At least one lime application to arable land • Application of biological soil supplements • Maintaining at least 70% ground cover • Testing of soils to understand soil condition • Preparation of a nutrient budget for all/most of the property • Planting legumes or pulses • Use of stock contamination areas • Farming practices that they consider to be regenerative • Brown or green manure crops • Multi-species pastures • Fencing erected to manage stock access to rivers/streams/wetlands
Risk to life and property from wildfires (all negative correlations)	• Planting legumes or pulses • Brown or green manure crops • Use of minimum-tillage techniques • Use of precision farming techniques

	• Carbon farming
Increasing chemical use per ha: Correlated positively Correlated negatively (i.e they are not implementing)	• Use of precision farming techniques • Testing of soils to understand soil condition • Planting legumes or pulses • Brown or green manure crops • Application of biological soil supplements • Carbon farming • Fencing erected to manage stock access to rivers/streams/wetlands • Encouraging native grasses/grains to grow at scale • Farming practices that they consider to be regenerative
Important issue	**Management practice applied in the past five years**
Soil-borne diseases	• Use of precision farming techniques • Planting legumes or pulses • Use of stock contamination areas • Brown or green manure crops
Loss of native plants and animals in the landscape	• Planting trees and shrubs (incl. direct seeding) • Use of minimum-tillage techniques to establish crops or pastures • Use of precision farming techniques • At least one lime application to arable land • Testing of soils to understand soil condition • Preparation of a nutrient budget for all/most of the property • Planting legumes or pulses • Encouraging native grasses/grains to grow at scale • Farming practices that they consider to be regenerative • Brown or green manure crops
Effects of pesticide use on soil biota	• Application of biological soil supplements (e.g. compost tea, effluent) • Use of time controlled, cell or rotational grazing • Use of stock contamination areas
Rising input costs	• Planting trees and shrubs (incl. direct seeding) • Sowing perennial pastures • Use of minimum-tillage techniques • Use of precision farming techniques • At least one lime application to arable land • Maintaining at least 70% ground cover (in non-drought years) • Testing of soils to understand soil condition • Preparation of a nutrient budget for all/most of the property • Planting legumes or pulses • Use of stock contamination areas • Brown or green manure crops • Encouraging native grasses/grains to grow at scale • Cover cropping
Soil erosion	• Planting trees and shrubs (incl. direct seeding) • Use of stock contamination areas • Cover cropping
Uncertain returns limiting capacity to invest in my property	• Use of precision farming techniques • At least one lime application to arable land • Testing of soils to understand soil condition • Planting legumes or pulses • Use of stock contamination areas • Use of precision farming techniques

Salinity Correlated positively Correlated negatively	• Fencing erected to manage stock access to rivers/streams/wetlands • Planting legumes or pulses • Planting trees and shrubs (incl. direct seeding) • Sowing perennial pastures • Brown or green manure crops • Use of minimum-tillage techniques to establish crops or pastures

5.5 CLIMATE CHANGE

We draw out a section on accelerated climate change because of the notable presence of climate change as a key issue raised by landholders. In terms of the level of concern expressed by respondents, the survey included five regional or district issues related to climate change: water security, declining soil health and soil productivity, impacts of temperature extremes, changes in weather patterns, uncertain returns, and risk to life and property from wildfires. Results are shown in Table O.

Table O Issues affecting local district for farmers, issue by landholder type 2023 (n= 254). Mean /5 'very important'

ISSUE	Mean /5	% Importance for farmers	Highest concern by landholder type
Water security (district-level)	4.2	74	Hobby farmer (89%)
Declining soil health, productivity (district-level)	3.7	60	Hobby farmer (74%)
Impact temperature extremes on farm productivity e.g. frost, heat damage (farm-scale)	3.7	56	Hobby farmer (58%)
Changes in weather patterns (district-level)	3.6	60	Hobby farmer (75%)
Uncertain returns limiting capacity to invest in my property (farm-scale)	3.6	58	Full-time farmers (60%)
Risk to life and property from wildfires (district-level)	3.5	51	Hobby farmer (75%)

As demonstrated in Figure 13, survey respondents were largely aware of the risks associated with climate change, with 45% agreeing and 24% of respondents disagreeing that climate change poses a risk to the region, with 31% unsure. Of all respondents, 59% agreed that human activities are influencing changes in climate, with 72% agreeing that landholders should do all they can to reduce carbon emissions. Under half (45%) of all respondents agreed that if nothing is done, climate change will have dire consequences, with 40% of the view that fundamental changes were required to improve the resilience of the region.

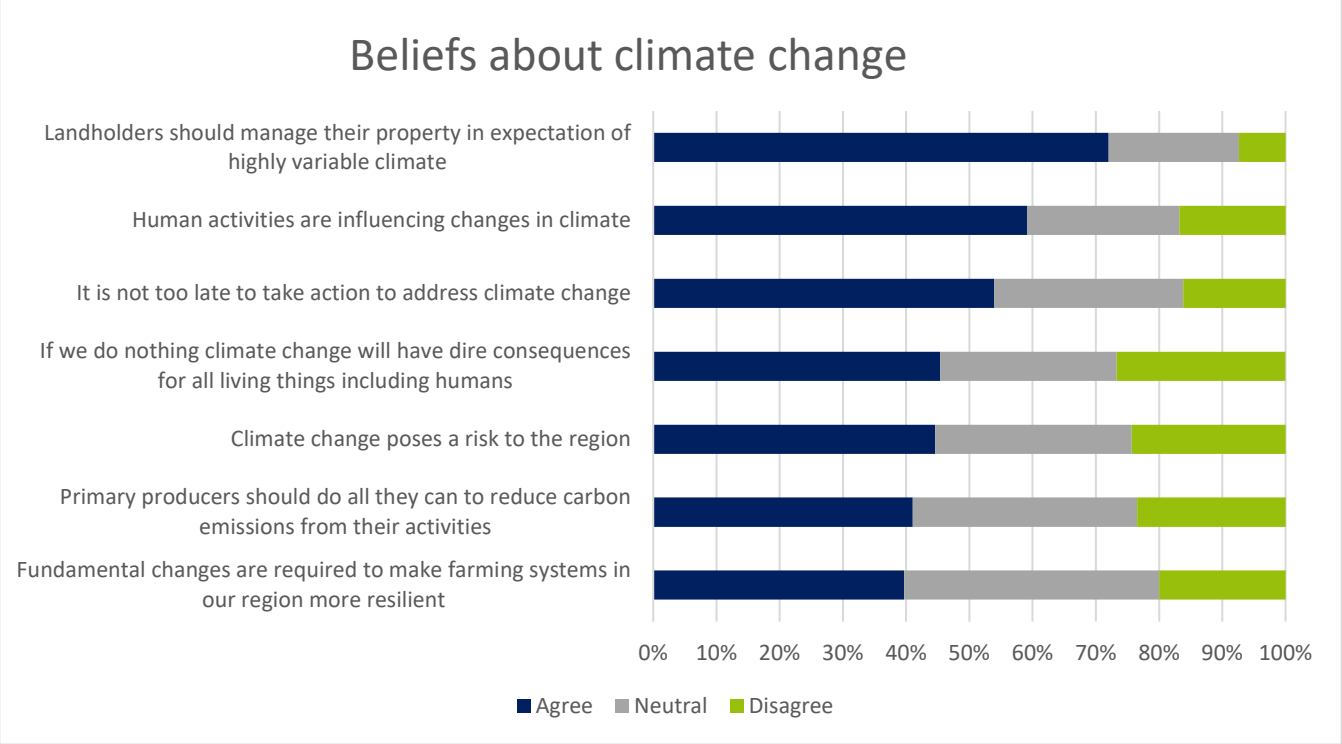

Figure 13 Landholder beliefs about climate change across all landholder types, 2023 (n=324)

A high level of confidence was apparent that landholders in the region can adapt to changes in weather patterns (68%). The data, shown by landholder type in Figure 14, illustrates that of the four landholder types, hobby farmers were the most optimistic about the effects of climate change and our ability to adapt (75%), while the least likely to believe that climate disruption is due to human activities (50% of full-time farmers vs 96% of hobby farmers). Hobby farmers were most likely to be of the view that primary producers should be doing all they can to reduce emissions, compared to just 31% of full-time farmers.

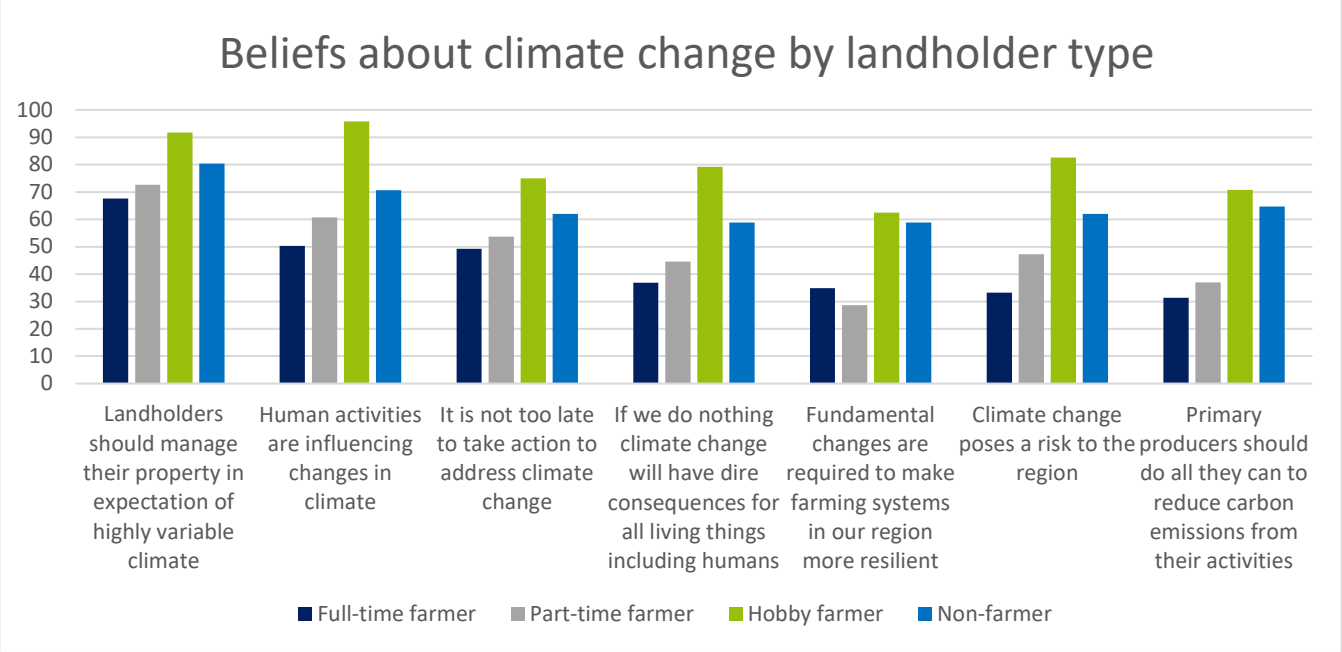

Figure 14 Landholder beliefs about climate change by percent agreement of landholder type, 2023 (n=324)

5.5.1 Information sources and climate change

People who relied on short-courses for information were far more likely to be of a view that human activities are influencing changes in climate (No=2.47 Yes=3.64, p=0.000085). The Wimmera CMA and Landcare were also important information sources for people clear on this view. Alternatively, farmers using newspapers as a primary information source were far less likely to be of this view (No=3.36 Yes=2.85, p= 0.00015). There was a similar disbelief in global warming for farmers using TV or friends and family as a primary information source.

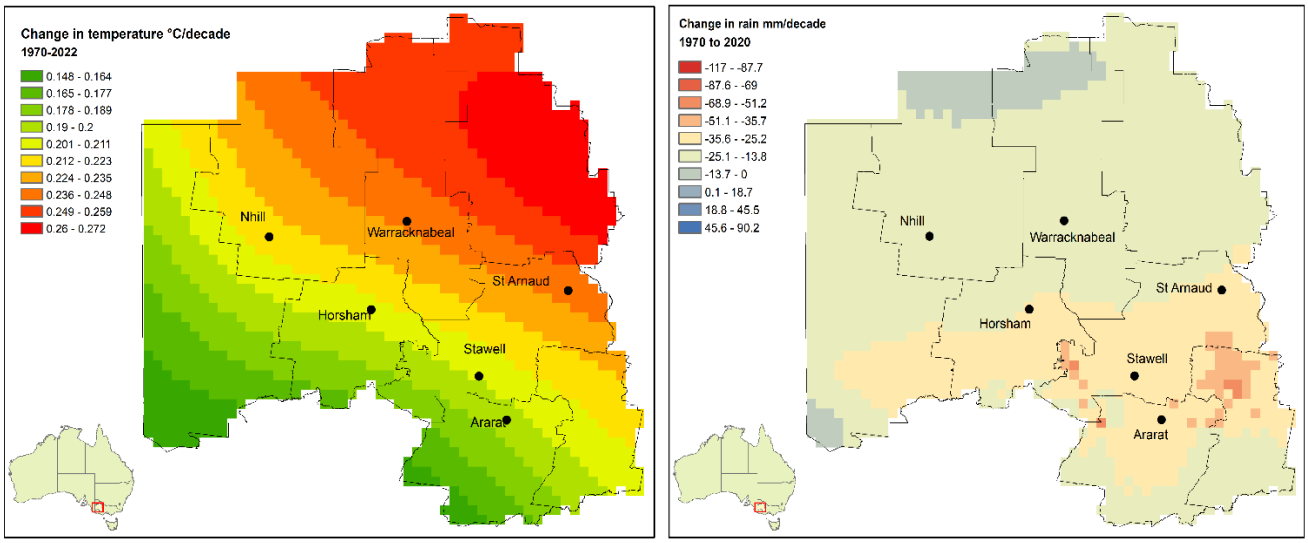

Figure 15 Changes in temperature & rainfall, 1970-2020/2022 in the survey region. (Climate change – Trends and extremes. Australian Bureau of Meteorology, Australia, accessed June 2023).

With water security and changes in weather patterns being top issues across landholder types, it is perhaps unsurprising given recorded changes in both rainfall and temperature over recent decades (Figure 15), and associated impacts in the region. Figure 15 is based on historical Bureau of Meteorology data that demonstrates trends in decreasing annual rainfall and increasing mean annual temperatures since 1970. The prominence of fire risk as an issue for more than 50% for all landholder types echoes similar results to those in other survey work[19].

5.5.2 Responding to climate change

Farmers with a stronger level of belief in climate change were more likely to have recently changed their farming operations to reduce carbon emissions while also reducing their dependence on chemicals (Table P). This view was, however extremely closely correlated with the view that it was not too late to take action to address this. These landholders were more likely to put their land aside for conservation purposes and be keen to participate in regenerative agriculture and/or carbon farming. They were also more likely to have a been increasing chemical use up to five years prior, but not in the last 5 years.

[19] Norman, B., Newman, P. & Steffen, W. 2021. Apocalypse now: Australian bushfires and the future of urban settlements. *npj Urban Sustainability* 1, 2.

Table P Practices related to climate change issues, 2023 (n=332). ###= Note ZERO significant differences by landholder type

CURRENT PRACTICE	% Yes ALL	% 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	20	21	15	32	14
In the past 12 months have you changed your financial or on-property operations as a result of seasonal changes in weather patterns	21	23	18	31	12
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, wind power, increased power use efficiency, improved grazing practices, improved nitrogen use efficiency	14	15	10	26	10

The pairwise comparisons suggest that landholders who agree that climate change is caused by human activities were far more likely to make strategic plans over a longer timeframe, between 6-100+ years. Of all enterprise types, croppers were least likely to be of this view, and horticulturalists were most likely to be of this view. There was a clear trajectory on this item in relation to education levels.

The model showed that landholders of the view that climate change is caused by human activity, were highly likely to believe that climate change will have dire consequences, and that landholders should be expected to manage their land in anticipation of a highly variable climate. They were also optimistic that it is not too late to take action on climate, with a weaker association that more than half of their property contains an area of restored or remnant native vegetation or wetland. Corporate farmers were more likely to agree that climate change is anthropogenic (R^2= 0.58).

This set of views and beliefs translated into reasonable levels of current action, and higher levels of intended action. In the past 12 months, less than a quarter (23%) of full-time farmers had changed their financial or on-property operations as a result of seasonal changes to weather patterns, and 21% of all respondents. These rates were low for both increasing soil carbon (21% of full-time farmers, 20% overall), and lower again for reducing carbon emissions (15% of full-time farmers, 14% overall).

Table Q Long-term plans related to climate change all landholder types, 2023 (n=332) ### significant difference by landholder type

LONG-TERM PLANS	% UNLIKELY	% LIKELY	% UNSURE
Buying property outside of my current area to mitigate increased seasonal variability ###	68	19	13
Some part of my property will be set aside for conservation purposes ###	46	26	28

For a further breakdown, see Table E Q. With regard to long-term plans, 26% of all respondents were likely to set part of their property aside for conservation purposes, and 19% were likely to buy property outside of their current area to mitigate against increased seasonal variability. The pairwise comparisons suggest that landholders who agree that climate change is caused by human activities

were far more likely to make strategic plans over a longer timeframe, between 6 - 100+ years. Of all enterprise types, croppers were least likely to be of this view. There was a clear trajectory on this item in relation to education levels.

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5.5.3 Implementing regenerative agriculture

Landholders with confidence that implementing regenerative agricultural practices is justified by the returns (20% of respondents) were more likely to be generally trusting of others. They were also likely to have faith that CMAs have the best interests of land managers in mind, and that they provide reliable information about farming and NRM. They were more likely to be on smaller landholdings, with a view that the public should have the right to access rivers, streams, or wetlands on private land.

Practices positively correlated with this group were applying biological soil amendments, planting trees, encouraging native grasses and grains to grow at scale and building fences. Interestingly, a number of best-practices correlated negatively, including minimum-tillage, soil testing, precision-farming, and preparing a whole farm plan.

In terms of information sources used by this group, they were less likely to rely on independent or commercial consultants, newspapers or NRM groups as information sources. They are, however, likely to consider books, Landcare, CMA and environmental groups as important information sources.

Of the full-time and part-time farmers, 17% replied that they had confidence that implementing regenerative practices was justified by the returns, were more likely to be planning over a very long timescale (100 years plus), applying biological soil amendments, planting trees, encouraging native grasses/grains to grow at scale and building fences. This group was planning to implement carbon farming, cover cropping and value adding in the near future, but was less likely to be cropping.

They were slightly less likely to be testing soils or undertaking precision farming. They were also less likely to be managing additional areas of land or have been expanding over recent decades. This group viewed books as the most important information source, relying less on consultants or NRM groups.

Of all landholders, those who had a higher level of confidence that adopting regenerative agriculture was justified by the returns, were more likely to plan over a longer timeframe (100 yrs+); to have sufficient time to consider trying new practices; be of a view that primary producers should do all

they can to reduce carbon emissions from their activities, and that reduced production in the short term is justified where there are long term benefits (R^2 =0.21).

Of part-time and full-time farmers, representing three quarters of respondents, they were also likely to plan over a long (100 year+) timeframe, to consider that reduced production in the short term is justified where there are long term benefits, and have implemented on-property changes in the past year to both increase soil carbon and reduce carbon emissions from their operations. They were also less likely to have purchased additional land in recent decades (R^2 = 0.22).

A strong model showed that farmers implementing practices they considered to be regenerative (5% of farming respondents) were likely to be changing practices to both increase soil carbon and decrease on-farm emissions. They were slightly more likely to have a succession plan in place. They were also slightly less likely to have made a greater than average profit over the recent financial year, and have worked more days off-property in the past year (Nagelkerkes R^2=0.45).

6 THE FUTURE OF FARMING

6.1 DIFFERENCES BY GENERATION

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 farmer data (full-time and part-time farmers) was broken down into three age categories, as determined by established definitions of generations[20]: Generation Y+ (born 1981-1996 and younger), 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 at $p<0.05$. From this analysis, some interesting differences emerged.

There was clear evidence of trends toward reduced intensity of farming among the younger group, with a slight trend towards increased intensity among the older group. As a group, Generation Y managed 1038 hectares on average, while Generation X managed slightly more land, with an average of 1091 hectares compared to the oldest cohort average of 1118 hectares.

Of the youngest group, 88% had purchased additional land in the region in the last 20 years (compared to 54% of the Baby Boomers group). Generation Y work an average of 43 hours per week on the farm, compared to 48 hours for Generation X, and 44 hours for Baby Boomers.

The area in which the most differences emerged was in the levels of self-assessed knowledge between the groups, with the younger generation indicating a higher level of self-assessed knowledge across several knowledge topics, as shown in Figure 16.

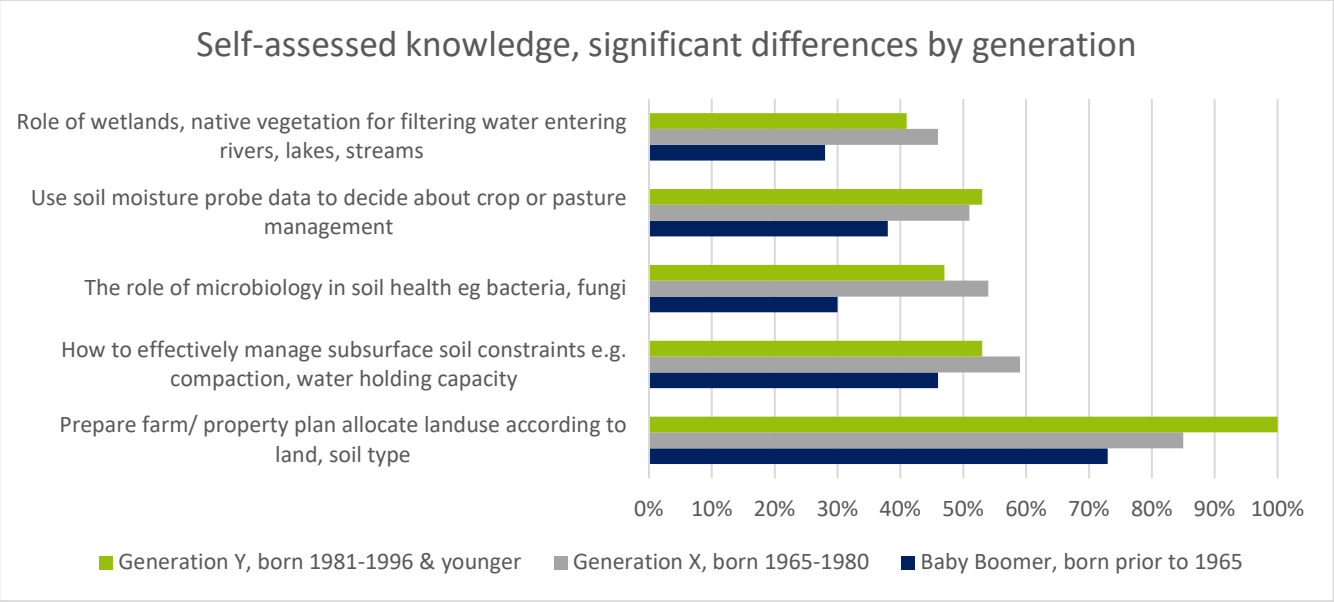

Figure 16 Levels of self-assessed knowledge that are significantly different between age groups, 2023. (full- & part-time farmers)

[20] 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/

This higher level of reported knowledge translated into a higher rate of actual practice over a number of items, both those that have been put in place and intended practice. In terms of past practice, there were six items for which there was a significant difference between the groups for practices implemented at some point prior to 2017. The first of these was the use of minimum or no-till practices, for which 94% of Generation Y adopted, 76% of Generation X had implemented and 60% of Baby Boomers. Similarly, the use of soil tests to understand soil conditions had been implemented by 82% of Generation Y, 62% of Generation X compared with 49% of the Baby Boomer group. As shown in Figure 17, other practices showing generational significant differences were the use of precision farming, fencing to manage stock access to rivers etc, encouraging native grasses and grains to grow at scale, and use of time controlled, cell or holistic grazing methods.

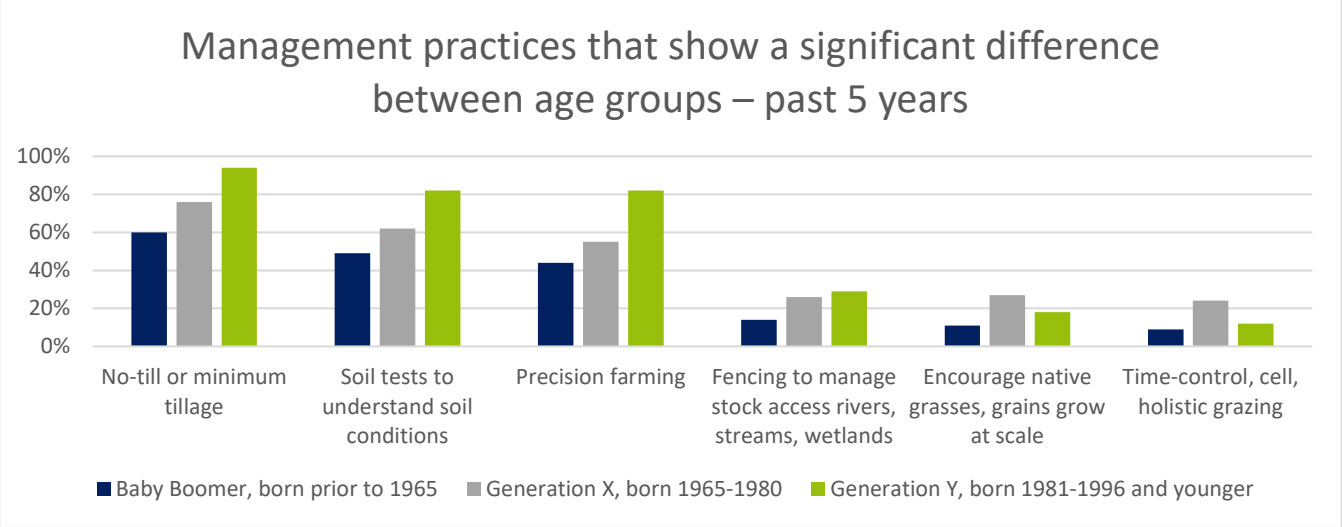

Figure 17 Management practices that show a significant difference between age groups – practices implemented in past 5 years, 2023. (Full- & part-time farmers).

As shown in Figure 18, this extended to 19 practices when considering intended implementation. All of these items correspond to self-assessed knowledge items that were rated with higher levels of confidence by the younger group.

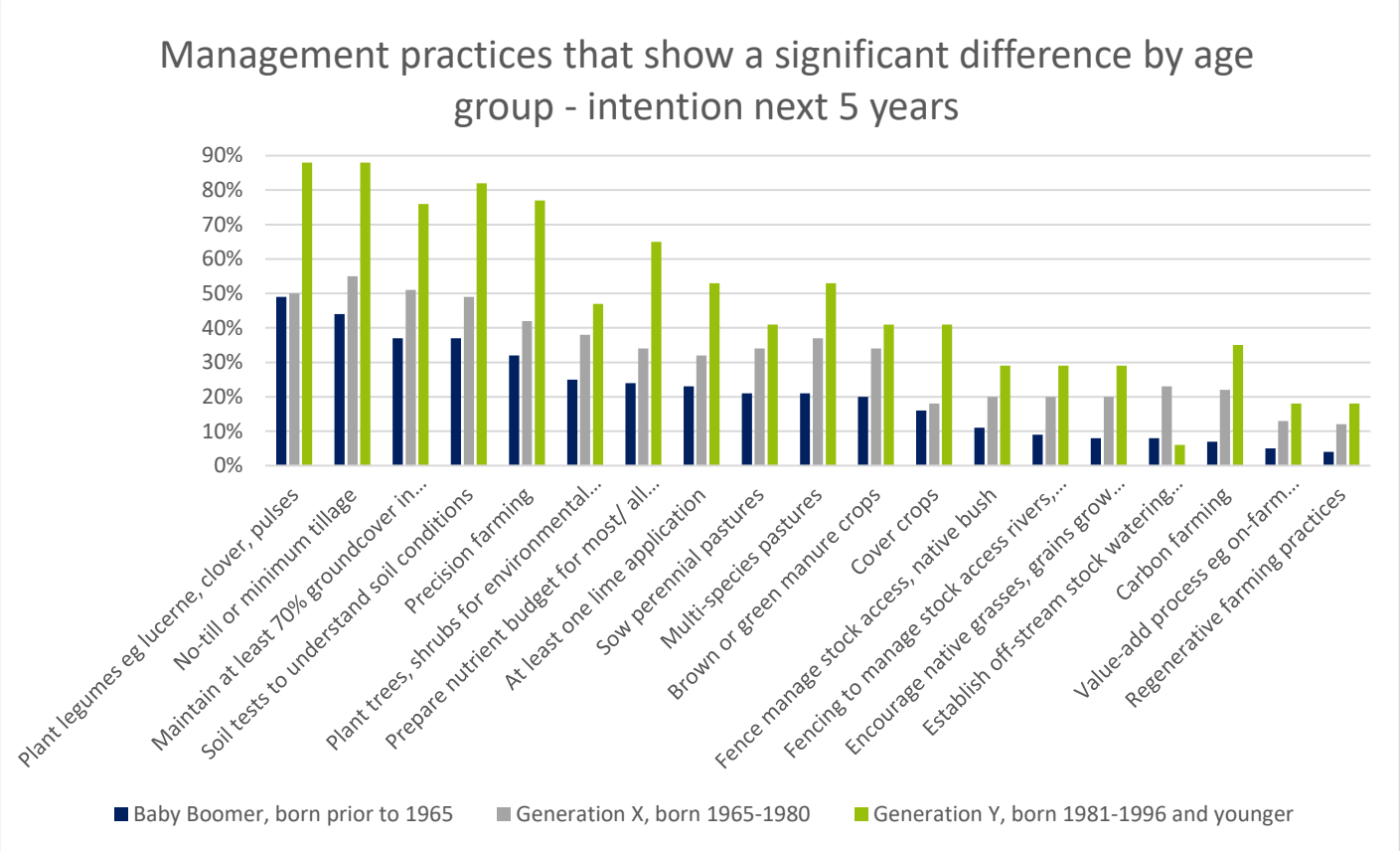

Figure 18 Intention to implement, continue in next 5 years - management practices that show significant difference by generation, 2023 (Full & part-time farmers).

6.2 LONG-TERM PLANS

With only 11% of farmers indicating that they intend to sell the property, ownership turnover of farm land is projected to be low. A third of (34%) of farmers indicated that they intend to purchase additional land, which is in line with broader industry trends to larger holding sizes[21]. Twenty-eight percent of farmers indicated they would lease additional land, 18% intended to change the enterprise mix to diversify income or move toward intensive enterprises (9%). Over three-quarters (82%) of farmers indicated that ownership of the property would stay within the family. For a breakdown of long terms plans by landholder type see Table X8 in Appendix 1.

The transition to retirement and succession planning were major issues raised in the open questions. This was reinforced by the figures, with very low levels of succession planning in progress, as shown in Figure 19. Full-time farmers are the most likely to have commenced succession planning, yet still only 39% had well advanced plans in place, with an additional 14% having plans halfway developed.

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

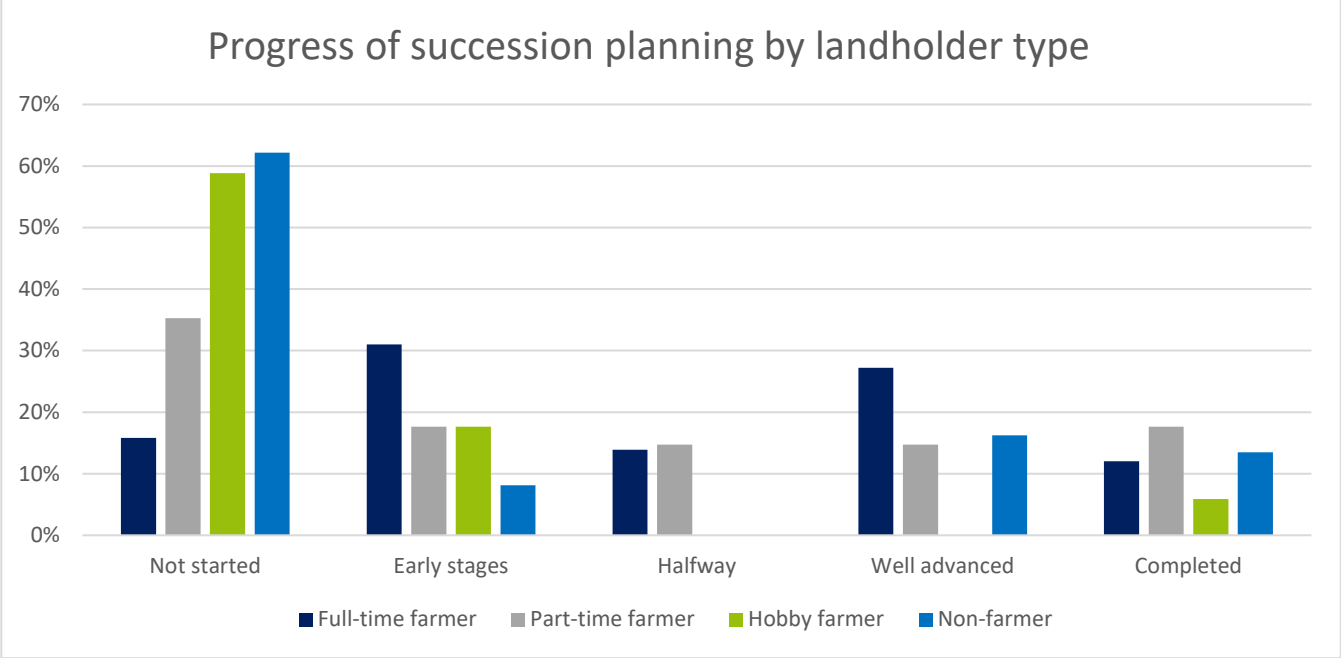

Figure 19 Progress of succession planning by landholder type, 2023 (n = 252).

7 CONCLUSION

This report has given a broad range of insights into the values, beliefs, norms and practices related to farming in the Wimmera CMA region of Victoria.

The Wimmera remains a primarily agricultural landscape, with 58% of respondents being full-time farmers who manage 87% of the land. Part-time farmers (17% of this sample) bring this to just under 96% of the land surveyed being under agricultural management. Full-time farmers source 97% of their income from agriculture and spend more than 50 hours a week working on the farm: 79% of them live on their farm. The most common land uses reported were sheep (63%), cereal cropping (62%) and legumes (50%), with 46% of landholders having areas of native vegetation on their properties.

A vast majority of full-time farmers (86%) were male, with an average age of 60 years. Three quarters of these farmers had family working with them on their farm, most often a spouse or their children. Of this group, 65% had completed high school or vocational training. This increased to 94% for part-time farmers, who had a larger proportion that had attended university (44% compared to 28% of full-time farmers). The gender balance increased steadily by landholder type, with half of hobby farmers being female.

Having the ability to pass on a healthier environment for future generations arose as the most important value for farming respondents, consistent with findings from social benchmarking surveys from across Australia. However, for full time-farmers, having a sense of accomplishment from building or maintaining a viable business came up as slightly more important.

When asked an open question on what they saw as their greatest challenge in the next ten years, the two strongest themes were rising input costs and climate change. While 92% of respondents agreed that landholders should manage their properties in expectation of highly variable climate, 45% considered climate change to be a risk to the region, just 40% considered that fundamental changes were required to make the region's farming systems more resilient.

Farmers with a stronger level of belief in climate change were more likely to have recently changed their farming operations to reduce carbon emissions while also reducing their dependence on chemicals. This view was, however extremely closely correlated with the view that it was not too late to take action to address this. A fifth of landholders had changed their operations in the last 12 months in order to mitigate climate change, either to sequester carbon or reduce emissions.

While water security emerged as the top regional issue for all respondents, for farmers, a lack of sufficient infrastructure was their number one issue. Indeed, 58% viewed inadequate internet as a barrier to effective use of on-farm data. The third most important issue overall, and especially for full-time farmers, was considering their social license to operate for agricultural practices. Changing weather patterns and declining soil productivity were the fourth and fifth most important regional issues. On farms, the most important issue was rising input costs, followed by weed resistance to herbicides and the impact of weeds on productivity, as well as the impact of poor pest/weed management on public land. The most important soil issue raised was its water-holding capacity.

In relation to soil management, over 90% of farmers felt a personal responsibility to maintain the productive capacity of their soils. Many best-practice items had relatively low implementation rates, with just 55% of full-time farmers testing their soils, and 57% of full-time farmers maintaining at least

70% groundcover. This does show signs of improving, with 40% having maintained this level of groundcover five years before, and those planting legumes or pulses had risen from 55% to 68% of full-time farmers in the last five years.

Despite a high proportion being open to new ideas, there are a relatively low number of self-identified early adopters in the sample (about one-third). Their ability to take on the risk involved could be tempered by practical considerations, with half of farmers reporting that they can afford financially to take a few risks and experiment with new ideas. Time restrictions appeared to be even higher, with just a third of farmers having sufficient time available to consider changing their practices.

A broad range of information is used by farmers, with older farmers more likely to access traditional information sources, and younger farmers more likely to access online and social media sources. Most farmers in the region trust their intuition and other farmers over other information. Among those providing important support for farmers were friends, family, agronomists and Landcare facilitators.

The modelling showed that belief in climate change was a major driver of practice change. Also, having family living and working alongside them on the farm and participating in decision-making was a major driver of best-practice implementation, including whole-farm planning and succession planning. Those undertaking this longer-term planning were likely to consider a much longer timeframe in strategic decision-making and be implementing a broader range of resilience-building farm management practices.

8 APPENDIX 1 – DATA TABLES

Table X1. KEY ATTRIBUTES by LGA, Wimmera 2023

Key attributes (medians unless indicated)	**Ararat n = 32 (8% of respondents)**	**Buloke n = 6 (2% of respondents)**	**Hindmarsh n = 52 (14% of respondents)**	**Horsham n = 26 (7% of respondents)**	**Northern Grampians n = 40 (11% of respondents)**	**Pyrenees n = 14 (4% of respondents)**	**West Wimmera n = 127 (34% of respondents)**	**Yarriambiack n = 73 (20% of respondents)**
Farmer identity: Full-time	38%	33%	67%	31%	24%	38%	71%	69%
Farmer identity: Part-time	19%	50%	17%	8%	16%	15%	17%	19%
Farmer identity: Hobby	19%	0%	0%	27%	26%	0%	3%	3%
Farmer identity: Non-F	25%	17%	17%	35%	34%	46%	8%	8%
Who is the most important person/people in making decisions for your property	55% Me & my family 42% Just me 3% Property manager (and me)	17% Me & my family 50% Just me 17% Multiple 17% Property manager (and me)	59% Me & my family 35% Just me 2% Multiple 4% Property manager (and me)	68% Me & my family 24% Just me 8% Property manager (and me)	61% Me & my family 39% Just me	46% Me & my family 38% Just me 8% Multiple 8% Property manager (and me)	63% Me & my family 28% Just me 5% Multiple 4% Property manager (and me)	1% Agronomist 51% Me & my family 31% Just me 4% Multiple 13% Property manager (and me)
Enterprise mix - top 3	Sheep (56%), Native vegetation (56%), Other tree (44%)	Cereal cropping (83%), Sheep (83%) Legumes (67%)	Cereal cropping (81%), Legumes (71%), Sheep (50%)	Cereal cropping (46%), Sheep (42%), Other tree (31%)	Native vegetation (58%), Sheep (45%), Other tree (30%)	Sheep (64%), Pasture (43%), Other tree (43%)	Sheep (79%), Cereal cropping (65%), Pasture (56%)	Cereal cropping (96%), Legumes (86%), Oil seed (62%)
Top 3 LGA Issues	Risk to life and property from wildfires 90%), Impacts of pest plants and animals (90%), Water security (87%)	Water security (100%), Declining soil health and/or soil productivity (83%), Reduced opportunities for recreation as lakes dry out (83%)	Absence of important services and infrastructure (e.g., phone, schools, internet, roads & transport) (84%), Changes in weather patterns (68%), Water security (66%)	Impacts of pest plants and animals (91%), Water security (87%), Impact of reduced water flows on the health of rivers/streams/wetlands (87%)	Impact of reduced water flows on the health of rivers/streams/wetlands (81%), Water security (78%), Declining soil health and/or soil productivity (77%)	Risk to life and property from wildfires 64%), Water security (64%), Impacts of pest plants and animals (57%)	Absence of important services and infrastructure (e.g., phone, schools, internet, roads & transport) (79%), Water security (74%), Risk to life and property from wildfires (68%)	Absence of important services and infrastructure (e.g., phone, schools, internet, roads & transport) (76%), Public opposition practices (e.g., GMOs, animal welfare, pesticide use) (72%), Water security (71%)

Key attributes (medians unless indicated)	**Ararat n = 32 (8% of respondents)**	**Buloke n = 6 (2% of respondents)**	**Hindmarsh n = 52 (14% of respondents)**	**Horsham n = 26 (7% of respondents)**	**Northern Grampians n = 40 (11% of respondents)**	**Pyrenees n = 14 (4% of respondents)**	**West Wimmera n = 127 (34% of respondents)**	**Yarriambiack n = 73 (20% of respondents)**
Top 3 issues for property owners	The impacts of weeds and pest animals (70%), Impact of temperature extremes and/or changing rainfall patterns on farm productivity (69%), Rising input costs (63%)	Water holding capacity of soils (83%), Rising input costs (83%), Impact of poor pest management on public land (50%)	Weed resistance to pesticides (81%), Rising input costs (79%), Impact of poor pest management on public land (71%)	Impact of poor pest management on public land (71%), Weed resistance to pesticides (65%), Water holding capacity of soils (61%)	The impacts of weeds and pest animals (62%), Rising input costs (61%), Water holding capacity of soils (60%)	Uncertain returns limiting my capacity to invest in my property (54%), Impact of poor pest management on public land (50%), Soil erosion (50%)	Rising input costs (85%), Lack of skilled labour for on-property work (66%), The impacts of weeds and pest animals (63%)	Rising input costs (90%), Weed resistance to pesticides (88%), The impacts of weeds and pest animals (60%)
Top 3 principles that guide property owners	Looking after family/loved ones and their needs (94%), Preventing pollution and protecting natural resources (94%), Respecting the earth and living in harmony with nature (74%)	Looking after family/loved ones and their needs (100%), Preventing pollution and protecting natural resources (83%), Respecting the earth and living in harmony with nature (80%)	Looking after family/loved ones and their needs (98%), Creating wealth and striving for a profitable business (80%), Preventing pollution and protecting natural resources (75%)	Looking after family/loved ones and their needs (100%), Preventing pollution and protecting natural resources (92%), Respecting the earth and living in harmony with nature (80%)	Looking after family/loved ones and their needs (84%), Preventing pollution and protecting natural resources (89%), Respecting the earth and living in harmony with nature (76%)	Looking after family/loved ones and their needs (93%), Respecting the earth and living in harmony with nature (64%), Preventing pollution and protecting natural resources (57%)	Looking after family/loved ones and their needs (97%), Preventing pollution and protecting natural resources (77%), Creating wealth and striving for a profitable business (74%)	Looking after family/loved ones and their needs (97%), Creating wealth and striving for a profitable business (81%), Preventing pollution and protecting natural resources (80%)

Key attributes (medians unless indicated)	**Ararat n = 32 (8% of respondents)**	**Buloke n = 6 (2% of respondents)**	**Hindmarsh n = 52 (14% of respondents)**	**Horsham n = 26 (7% of respondents)**	**Northern Grampians n = 40 (11% of respondents)**	**Pyrenees n = 14 (4% of respondents)**	**West Wimmera n = 127 (34% of respondents)**	**Yarriambiack n = 73 (20% of respondents)**
Top 3 Attached Values	Ability to pass on healthier environment for future generations (94%), An attractive place/area to live (91%), Provides a sense of belonging to a place (88%)	Ability to pass on healthier environment for future generations (83%), Sense of accomplishment from building a viable business (83%), Its native vegetation provides habitat for birds and animals (83%)	A great place to raise family (96%), Ability to pass on healthier environment for future generations (92%), My property is an important part of who I am (88%)	Ability to pass on healthier environment for future generations (92%), Its native vegetation provides habitat for birds and animals (80%), An attractive place/area to live (76%)	An attractive place/area to live (90%), Provides sense of belonging to a place (90%), Ability to pass on a healthier environment for future generations (87%)	Ability to pass on healthier environment for future generations (69%), An attractive place/area to live (69%), Sense of accomplishment from building a viable business (62%)	Ability to pass on a healthier environment for future generations (90%), Sense of accomplishment from building a viable business (86%), Sense of accomplishment from producing food and fibre for others (84%)	Sense of accomplishment from building a viable business (93%), Ability to pass on a healthier environment for future generations (91%), An important source of household income (86%)
Property size (area owned)	360ha mean (101ha median)	1054ha mean (985ha median)	1267ha mean (755ha median)	467ha mean (100ha median)	351ha mean (38ha median)	481ha mean (300ha median)	1071ha mean (728ha median)	1148ha mean (1000ha median)
Property principal place of residence	56%	67%	78%	57%	70%	43%	75%	66%
Bought additional land in region in past 20 years	38%	33%	64%	57%	15%	54%	55%	59%
Subdivided or sold part of property past 20 years	12%	33%	15%	18%	3%	0%	11%	17%

Key attributes (medians unless indicated)	Ararat n = 32 (8% of respondents)	Buloke n = 6 (2% of respondents)	Hindmarsh n = 52 (14% of respondents)	Horsham n = 26 (7% of respondents)	Northern Grampians n = 40 (11% of respondents)	Pyrenees n = 14 (4% of respondents)	West Wimmera n = 127 (34% of respondents)	Yarriambiack n = 73 (20% of respondents)
Property leased, share farmed or agisted from others (mean)	156ha (n=16)	150ha (n=4)	613ha (n=26)	76ha (n=9)	210ha (n=21)	120ha (n=7)	303ha (n=53)	545ha (n=40)
Age of respondent (mean)	61 years	67 years	57 years	60 years	57 years	61 years	63 years	61 years
Gender of respondent (n=331) (both = filled out by male and female together)	12% both 19% female 69% male	33% female 67% male	2% both 11% female 87% male	26% female 74% male	32% female 68% male	15% both 8% female 77% male	12% both 10% female 78% male	9% both 16% female 73% male 2% non-binary
Length of family ownership	45 years mean (34 yrs median)	97 years mean (90 yrs median)	74 years mean (75 yrs median)	43 years mean (31 yrs median)	28 years mean (19 yrs median)	55 years mean (42 yrs median)	68 years mean (69 yrs median)	80 years mean (80 yrs median)
Other family members working on property	50%	50%	69%	48%	40%	36%	74%	61%
Average hours work on-property per week over last 12 months (mean)	30 hours	41 hours	44 hours	33 hours	21 hours	18 hours	43 hours	41 hours
Received income from agricultural property in Wimmera Region 2020/21	71%	83%	78%	57%	43%	57%	91%	94%
If yes, % all survey respondents who received net profit from agriculture >$50k	41% (n=9)	67% (n=2)	75% (n=27)	88% (n=7)	44% (n=4)	30% (n=3)	75% (n=70)	94% (n=59)
Received net off-property income in last	30% both 15% me	33% both 17% me	21% both 13% me	19% both 5% me	6% both 26% me	29% both 14% me	22% both 12% me	15% both 21% me

Key attributes (medians unless indicated)	**Ararat n = 32 (8% of respondents)**	**Buloke n = 6 (2% of respondents)**	**Hindmarsh n = 52 (14% of respondents)**	**Horsham n = 26 (7% of respondents)**	**Northern Grampians n = 40 (11% of respondents)**	**Pyrenees n = 14 (4% of respondents)**	**West Wimmera n = 127 (34% of respondents)**	**Yarriambiack n = 73 (20% of respondents)**
financial year (both=myself and partner)	11% partner	17% partner	32% partner	14% partner	21% partner	7% partner	21% partner	22% partner
% all survey respondents who received net income from off-property >$50k	50% (n=10)	25% (n=1)	42% (n=13)	75% (n=6)	67% (n=12)	56% (n=5)	51% (n=34)	48% (n=21)
Completed short course related to property management in the past 5 years (both=myself and partner)	3% both 13% me 13% partner	20% both 20% me 0% partner	6% both 10% me 2% partner	15% both 35% me 0% partner	6% both 23% me 3% partner	0% both 14% me 7% partner	6% both 16% me 4% partner	9% both 19% me 2% partner
Prepared or preparing a property management or whole farm plan	45%	33%	35%	30%	42%	50%	43%	41%
Attended a field day/farm walk/ demonstration focused on soil health and productivity in last 12 months	47%	17%	56%	70%	35%	29%	44%	54%
Land lost to production due to soil problems and area lost	13% 14 ha mean (3 ha median)	17% 26 ha mean (26 ha median)	29% 55 ha mean (40 ha median)	5% 10 ha mean (10 ha median)	15% 47 ha mean (25 ha median)	36% 70 ha mean (40 ha median)	12% 57 ha mean (35 ha median)	10% 11 ha mean (7 ha median)
Family members interested in taking on property	22%	50%	40%	37%	23%	54%	62%	44%

Key attributes (medians unless indicated)	Ararat n = 32 (8% of respondents)	Buloke n = 6 (2% of respondents)	Hindmarsh n = 52 (14% of respondents)	Horsham n = 26 (7% of respondents)	Northern Grampians n = 40 (11% of respondents)	Pyrenees n = 14 (4% of respondents)	West Wimmera n = 127 (34% of respondents)	Yarriambiack n = 73 (20% of respondents)
Preparing a farm/property plan according to land/soil characteristics	61%	50%	74%	74%	51%	46%	73%	71%
The Aboriginal group/s who are connected to the area where your property is located	23%	0%	17%	21%	27%	0%	5%	9%
Strategies to maintain groundcover to minimise erosion	68%	100%	86%	88%	61%	62%	72%	78%
Options and strategies to (re)establish perennial pastures (e.g., lucerne/native grasses)	48%	33%	52%	50%	24%	38%	64%	24%
How to identify main constraints to soil productivity on property	45%	50%	71%	67%	27%	38%	69%	60%
The benefits of applying biological soil supplements (e.g., compost, manure, microbial inoculants)	34%	20%	61%	62%	32%	23%	44%	41%
The processes leading to soil structure decline in this area	44%	40%	54%	71%	35%	38%	47%	52%
Market mechanisms that support carbon farming	10%	0%	17%	17%	14%	23%	9%	9%

Key attributes (medians unless indicated)	Ararat n = 32 (8% of respondents)	Buloke n = 6 (2% of respondents)	Hindmarsh n = 52 (14% of respondents)	Horsham n = 26 (7% of respondents)	Northern Grampians n = 40 (11% of respondents)	Pyrenees n = 14 (4% of respondents)	West Wimmera n = 127 (34% of respondents)	Yarriambiack n = 73 (20% of respondents)
How to build soil organic matter/soil carbon	31%	50%	54%	50%	30%	38%	44%	54%
How land in your district was used and managed before European settlement	28%	20%	26%	35%	14%	38%	12%	15%
How to use soil testing to prepare a nutrient budget that will increase soil productivity	31%	33%	49%	54%	22%	38%	51%	48%
Regenerative agriculture and holistic farm management	22%	0%	27%	25%	22%	46%	22%	22%
The location of Aboriginal cultural sites in your district (e.g., culturally modified trees, middens)	22%	0%	26%	22%	14%	8%	20%	13%
The role of wetlands and native vegetation for filtering water entering water bodies	44%	33%	31%	62%	54%	25%	30%	27%
The role of microbiology	22%	0%	44%	50%	31%	42%	32%	34%
The use of stock containment areas, or time controlled, holistic or cell grazing strategies	38%	80%	44%	46%	38%	25%	54%	59%
The extent and type of biological activity in soils on your property	9%	0%	25%	33%	14%	15%	22%	24%
How to (re)introduce more legumes/pulses into your enterprise mix	25%	40%	74%	46%	19%	31%	60%	79%

Key attributes (medians unless indicated)	Ararat n = 32 (8% of respondents)	Buloke n = 6 (2% of respondents)	Hindmarsh n = 52 (14% of respondents)	Horsham n = 26 (7% of respondents)	Northern Grampians n = 40 (11% of respondents)	Pyrenees n = 14 (4% of respondents)	West Wimmera n = 127 (34% of respondents)	Yarriambiack n = 73 (20% of respondents)
Laws and regulations that apply to the management of rural properties	44%	60%	39%	54%	40%	23%	42%	44%
How to use soil moisture-probe data to make decision about crops or pasture management	22%	50%	35%	46%	19%	8%	34%	43%
How to effectively manage subsurface soil constraints (e.g., compaction, water holding capacity)	25%	40%	43%	50%	19%	23%	46%	57%
How to protect and improve the health of native vegetation, waterways and wetlands	50%	60%	46%	44%	51%	46%	37%	35%
The benefits of stubble retention outweigh problems arising from the practice	43%	67%	76%	68%	44%	50%	65%	87%
If relevant, how is stubble managed	12% cool burn 18% hot burn 29% full retention 12% incorporation 12% other	17% cool burn 17% hot burn 67% full retention 33% incorporation 33% other	18% cool burn 16% hot burn 70% full retention 36% incorporation 0% other	4% cool burn 4% hot burn 15% full retention 12% incorporation 15% other	5% cool burn 5% hot burn 18% full retention 10% incorporation 15% other	14% cool burn 29% hot burn 43% full retention 14% incorporation 14% other	43% cool burn 20% hot burn 50% full retention 31% incorporation 8% other	15% cool burn 8% hot burn 72% full retention 17% incorporation 15% other
The costs of applying lime to address soil	53%	0%	45%	54%	40%	36%	68%	22%

Key attributes (medians unless indicated)	Ararat n = 32 (8% of respondents)	Buloke n = 6 (2% of respondents)	Hindmarsh n = 52 (14% of respondents)	Horsham n = 26 (7% of respondents)	Northern Grampians n = 40 (11% of respondents)	Pyrenees n = 14 (4% of respondents)	West Wimmera n = 127 (34% of respondents)	Yarriambiack n = 73 (20% of respondents)
acidity are justified by increased production								
The costs of establishing perennial pasture are justified by the returns	55%	0%	32%	41%	49%	57%	60%	14%
Soil testing is an essential first step in understanding soil condition	83%	100%	82%	91%	92%	43%	85%	74%
Biological activity is an important indicator of the productive capacity of soils	67%	67%	70%	86%	76%	64%	78%	78%
Fencing to manage stock access is an essential element of protecting waterways and native vegetation	93%	80%	71%	82%	86%	64%	75%	77%
I feel a personal responsibility to be part of a group working to improve land/natural resource management	77%	60%	35%	72%	70%	50%	52%	48%
I feel a personal responsibility to maintain the productive capacity of my soil	87%	83%	82%	73%	92%	79%	87%	91%
There is adequate compensation or support for improving soil carbon on my property	7%	0%	15%	14%	8%	0%	11%	9%
There is adequate compensation or support	7%	0%	15%	14%	8%	0%	11%	9%

Key attributes (medians unless indicated)	Ararat n = 32 (8% of respondents)	Buloke n = 6 (2% of respondents)	Hindmarsh n = 52 (14% of respondents)	Horsham n = 26 (7% of respondents)	Northern Grampians n = 40 (11% of respondents)	Pyrenees n = 14 (4% of respondents)	West Wimmera n = 127 (34% of respondents)	Yarriambiack n = 73 (20% of respondents)
provided for conservation activities on my farm								
There is adequate compensation or support provided for good land/soil stewardship	17%	0%	19%	18%	8%	7%	11%	18%
Decision-making needs to be strongly influenced by data/scientific evidence	80%	40%	61%	82%	78%	50%	58%	67%
Internet or mobile phone connectivity is a barrier to my using on-farm data more effectively	37%	67%	57%	36%	59%	29%	61%	48%
Most years I'm satisfied with my farm's productivity given the seasonal conditions experienced	63%	83%	72%	68%	49%	50%	86%	88%
I am coping well with the associated stresses and challenges of managing my farm	73%	67%	65%	59%	59%	36%	81%	74%
I am interested in learning more about regenerative/holistic farming approaches	53%	0%	25%	41%	57%	36%	34%	25%

Key attributes (medians unless indicated)	Ararat n = 32 (8% of respondents)	Buloke n = 6 (2% of respondents)	Hindmarsh n = 52 (14% of respondents)	Horsham n = 26 (7% of respondents)	Northern Grampians n = 40 (11% of respondents)	Pyrenees n = 14 (4% of respondents)	West Wimmera n = 127 (34% of respondents)	Yarriambiack n = 73 (20% of respondents)
I am confident that adopting regenerative/holistic farming practices is justified by the returns	23%	0%	19%	18%	38%	14%	17%	17%
Landholders should have the right to harvest water that falls on their property, even if it impacts others	30%	17%	29%	27%	40%	43%	44%	22%
The public should have the right to access rivers/streams/wetlands on private property	13%	20%	6%	9%	8%	14%	6%	6%
It is fair that the community expects land managers to not cause foreseeable harm to the environment	87%	33%	69%	91%	97%	71%	79%	78%
Reduced production in the short-term is justified where there are long-term benefits	70%	17%	60%	73%	81%	57%	65%	65%
I am confident making decisions based on the data from my farm	67%	67%	71%	64%	60%	50%	85%	84%

Key attributes (medians unless indicated)	Ararat n = 32 (8% of respondents)	Buloke n = 6 (2% of respondents)	Hindmarsh n = 52 (14% of respondents)	Horsham n = 26 (7% of respondents)	Northern Grampians n = 40 (11% of respondents)	Pyrenees n = 14 (4% of respondents)	West Wimmera n = 127 (34% of respondents)	Yarriambiack n = 73 (20% of respondents)
Overall, I find that I am increasing fertiliser/chemical inputs per hectare	3%	40%	41%	27%	16%	14%	50%	50%
I am confident that landholders in this region can adapt to expected changes in rainfall patterns	53%	80%	69%	54%	38%	43%	76%	85%
I am confident that my land is in a better condition than when I took on the management of this farm	90%	100%	83%	95%	76%	71%	90%	84%
I feel adequately supported to conduct farming and land management activities on my property	60%	33%	67%	64%	44%	36%	56%	63%
You can't be too careful when dealing with people	57%	67%	63%	35%	43%	69%	62%	65%
I am usually an early adopter of new agricultural practices and technologies	31%	17%	30%	29%	31%	25%	35%	38%

Key attributes (medians unless indicated)	Ararat n = 32 (8% of respondents)	Buloke n = 6 (2% of respondents)	Hindmarsh n = 52 (14% of respondents)	Horsham n = 26 (7% of respondents)	Northern Grampians n = 40 (11% of respondents)	Pyrenees n = 14 (4% of respondents)	West Wimmera n = 127 (34% of respondents)	Yarriambiack n = 73 (20% of respondents)
People are almost always interested in their own welfare	32%	33%	37%	45%	29%	46%	38%	47%
This may not be the best farm around, but I see no reason to change	19%	33%	11%	10%	3%	17%	24%	20%
I prefer to see evidence of local success before trying a new practice	30%	67%	38%	35%	24%	33%	46%	36%
I prefer to avoid risks	44%	50%	29%	15%	29%	38%	41%	33%
I am open to new ideas about farming and land management	85%	83%	85%	95%	94%	83%	88%	92%
I usually view risks as challenges to embrace	52%	40%	52%	60%	59%	50%	55%	56%
Financially, I can afford to take a few risks and experiment with new ideas	44%	50%	47%	45%	53%	54%	51%	50%
I have sufficient time available to consider changing my practices	30%	33%	33%	50%	68%	38%	34%	36%
Climate change poses a risk to the region	79%	40%	44%	60%	70%	38%	32%	38%
Human activities are influencing changes in the climate	79%	60%	56%	85%	86%	46%	50%	48%

Key attributes (medians unless indicated)	Ararat n = 32 (8% of respondents)	Buloke n = 6 (2% of respondents)	Hindmarsh n = 52 (14% of respondents)	Horsham n = 26 (7% of respondents)	Northern Grampians n = 40 (11% of respondents)	Pyrenees n = 14 (4% of respondents)	West Wimmera n = 127 (34% of respondents)	Yarriambiack n = 73 (20% of respondents)
It's not too late to take action to address climate change	75%	40%	48%	70%	69%	31%	52%	45%
If we do nothing, climate change will have dire consequences for all living things, including humans	79%	40%	44%	55%	63%	31%	40%	33%
Primary producers should do all they can to reduce carbon emissions from their activities	78%	40%	33%	45%	71%	31%	34%	28%
Landholders should manage their properties in expectation of a highly variable climate	78%	60%	76%	85%	91%	62%	62%	73%
Fundamental changes are required to make farming systems in our region more resilient	57%	20%	38%	60%	60%	39%	34%	27%

TABLE X2: LAND USE and ENTERPRISE MIX, 2023 (n=371)

LAND USE/ ENTERPRISE TYPE	% Yes ALL	Difference by landholder type (top response group %)
Sheep for wool or meat	63	### (FTF 77)
Cereal	62	### (FTF 82)
Legumes, pulses	50	### (FTF 69)
Area remnant native vegetation e.g. trees, grasslands, wetlands	47	(NF 51)
Pasture	44	### (FTF 58)
Oil seed	39	### (FTF 55)
Area set aside for living/recreation e.g. gardens, pets, water bodies, vehicle	31	(HF 45)
Other tree planting e.g. shelter, habitat, erosion, recharge control, carbon	27	(HF 31)
Beef cattle	14	### (FTF 18)
Heritage agreement/ covenant	9	### (NF 18)
Bee keeping	5	### (HF 14)
Farm forestry	4	(HF 10)
Irrigated agriculture	4	(FTF 6)
Horticulture	3	### (HF 24)
Other commercial livestock enterprises e.g. goats, pigs, deer, horse studs, poultry, alpaca, dogs	2	(HF 3)
Farm-based tourism e.g. farm stays, B&B	2	(NF 5)
Viticulture	1	(FTF 2)
Dairying	0.3	(HF 3) n=1

TABLE X3: VIEW AGREEMENT, DATA USE & MANAGEMENT BY LANDHOLDER TYPE, 2023 (n=332-348)

VIEW STATEMENT	% AGREE/ STRONGLY AGREE				
	OVERALL	FTF	PTF	HF	NF
I feel a personal responsibility to maintain the productive capacity of my soil	87 (4.3)	93	92	85	59
I feel personal responsibility to be part of a group working to improve land/natural resource management	55 (3.6)	51	60	52	62
I am confident my land is in better condition than when I took on management of farm	86 (4.2)	88	92	85	72
Most years I am satisfied with my farm's productivity with the seasonal conditions experienced	76 (4.0)	92	80	59	23
I am coping well with the associated stresses & challenges of managing my farm	71 (3.9)	82	75	70	32
I usually include another person/people in my on-farm management decisions	68 na	Y 71	Y 64	62	62
Decision making needs to be strongly influenced by data	65 (3.8)	63	63	74	72
I'm confident making management decisions based on data from my farm	75 (4.0)	86	84	67	30
Internet, mobile phone connectivity is barrier to using on-farm data more effectively	53 (3.6)	58	55	52	30
I feel adequately supported to conduct farming & land management activities on my property	57 (3.6)	62	61	50	42
There is adequate compensation or support for conservation activities on my farm	9 (2.6)	16	12	11	10
There is adequate compensation, support for good land, soil stewardship	9 (2.6)	16	12	11	10
Soil testing is an essential first step in understanding soil condition	82 (4.2)	85	90	89	55
Biological activity is an important indicator of the productive capacity of soils	76 (4.0)	78	75	89	56
Fencing to manage stock access is essential element of protecting health of waterways & native vegetation	78 (4.2)	78	79	85	74
I'm confident that adopting regenerative/ holistic farming practices is justified by the returns	20 (3.0)	15	22	48	21
The costs of establishing perennial pasture are justified by the returns	43 (3.7)	49	43	59	15
The benefits of stubble retention outweigh problems arising from the practice	66 (4.1)	78	76	37	27
The costs of applying lime to address soil acidity are justified by increased production	48 (3.9)	57	54	37	14

I'm confident that adopting regenerative/ holistic farming practices is justified by the returns	20 (3.0)	15	22	48	21
I am interested in learning more about alternative/holistic farming approaches	35 (3.2)	31	33	74	30

TABLE X4: MANAGEMENT PRACTICES OVER TIME, 2023 (n= 260)

MANAGEMENT PRACTICE	At some point (prior to 2017) % yes		Past 5 years (2017-2022) % yes		Intend to implement in next 5 years % yes	
	FT	PT	FT	PT	FT	PT
Planting legumes or pulses	55	47	68	65	52	45
Use of no-tillage techniques to establish crops, pastures	49	35	63	68	50	43
Maintain at least 70% groundcover	40	38	57	63	44	43
Testing soils to understand soil condition	47	35	55	48	45	33
Use of precision farming techniques	27	15	52	33	40	23
Use of stock containment areas	29	17	37	27	30	18
At least one lime application to arable land	23	18	37	32	28	20
Plant trees, shrubs incl. direct seeding	61	52	35	38	29	32
Preparation of nutrient budget for most/ all of the property	23	15	35	17	31	23
Brown or green manure crops	30	23	32	25	27	20
Multi species pastures	23	17	32	25	29	23
Sowing perennial pastures	23	18	29	18	27	25
Fencing native bush/ grasslands to manage stock access	40	35	21	27	14	15
Cover crops	14	10	19	18	18	15
Number of off-stream stock watering points established	14	5	18	15	14	8
Fencing to manage stock access to rivers, streams, wetlands	20	20	17	17	15	9
Apply biological soil supplements e.g., compost tea, effluent	13	10	17	18	12	12
Encourage native grasses, grains to grow at scale	12	15	16	13	13	12
Use time controlled, cell or holistic grazing	8	12	14	10	13	3
Farming practices that you consider to be regenerative	5	5	9	12	8	8
Removal of an area of trees, shrubs	21	17	7	2	2	3

Value-add processes e.g., on-farm processing, retail	5	3	5	3	7	13
Carbon farming	1	7	2	8	14	10

TABLE X4 b: MANAGEMENT PRACTICES in past five years by landholder types, 2023 (n=355)

MANAGEMENT PRACTICE	Number Yes (n)	% OVERALL	% FTF	% PTF	% HF	% NF
Planting legumes or pulses	190	54	68	65	21	11
Maintain at least 70% groundcover	187	53	57	63	45	28
Use of no-tillage techniques to establish crops, pastures	183	52	63	68	21	13
Testing soils to understand soil condition	160	45	55	48	35	15
Plant trees, shrubs incl. direct seeding	138	39	35	38	55	43
Use of precision farming techniques	133	38	52	33	3	7
Brown or green manure crops	85	33	32	25	10	0
At least one lime application to arable land	107	30	37	32	24	6
Use of stock containment areas	102	29	37	27	24	4
Preparation of nutrient budget for most/all of the property	88	25	35	17	10	4
Multi species pastures	83	23	32	25	7	2
Sowing perennial pastures	76	21	29	18	10	4
Fencing native bush/ grasslands to manage stock access	74	21	21	27	21	11
Encourage native grasses, grains to grow at scale	64	18	16	13	24	26
Cover crops	56	16	19	18	7	4
Number of off-stream stock watering points established	56	16	18	15	14	6
Fencing to manage stock access to rivers, streams, wetlands	58	16	17	17	14	9
Apply biological soil supplements e.g., compost tea, effluent	58	16	17	18	17	13
Use time controlled, cell or holistic grazing	42	12	14	10	14	4
Farming practices that you consider to be regenerative	33	9	9	12	17	7

Removal of an area of trees, shrubs	20	6	7	2	14	2
Value-add processes e.g., on-farm processing, retail	15	4	5	3	3	2
Carbon farming	10	3	2	8	0	2

TABLE X4 c: MANAGEMENT PRACTICES full- & part-time farmers completed or intention to implement practices, 2023 (n= 260)

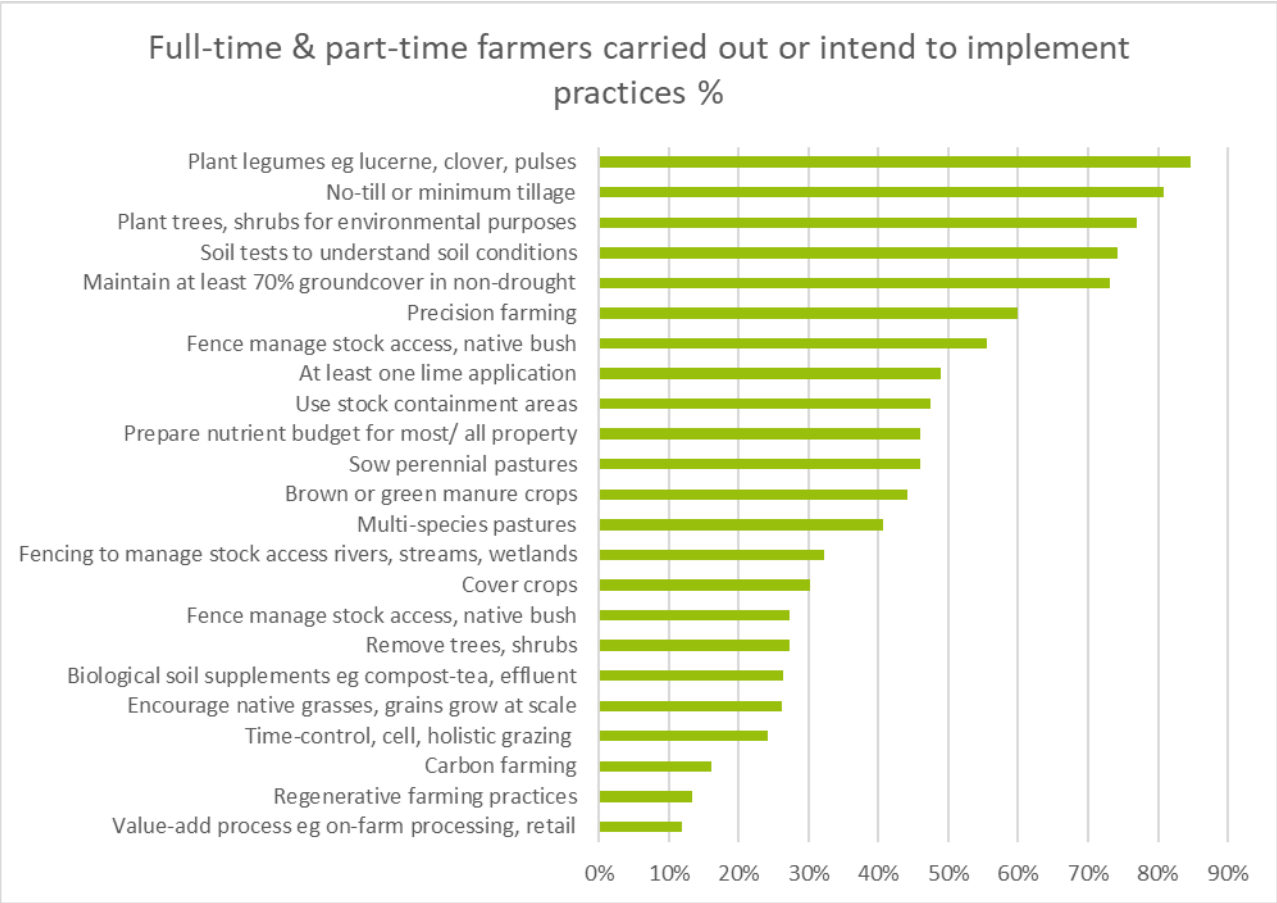

TABLE X5: MOST IMPORTANT ISSUES 2023 (n = 328-345)

ISSUES in LOCAL DISTRICT	% AGREE/ STRONGLY AGREE				
	OVERALL %	FTF	PTF	HF	NF
Water security	75	73	78	89	69
Absence of important services & infrastructure e.g. health, schools, internet, phone coverage	73	81	67	58	58
Public support/opposition for agric practices e.g. GMs, animal welfare, pesticide use	64	74	49	59	51
Changes in weather patterns	63	62	55	75	65
Declining soil health, soil productivity	61	60	61	74	58

The impact of pest plants, animals on native plants & animals	61	60	47	68	73
Risk to life & property from wildfires	57	50	57	75	69
Impact of reduced water flows on long-term health of rivers, streams, wetlands	51	48	46	67	59
Loss of paddock trees	45	39	41	69	60
Loss of native plants & animals in the landscape	44	35	36	62	67
Salinity, nutrient, chemical runoff threatening water quality rivers, streams, wetlands	43	38	42	63	48
Reduced opportunities for recreation as lakes dry out	41	40	44	41	47
Long-term negative impacts of property purchased by absentees or corporate farms	40	45	29	50	23
Land use change, conflicting land use (e.g. solar, mining, residential) impact/encroaching on farming land	38	38	32	52	41
Stock damage to native vegetation, rivers, streams, wetlands	38	28	39	63	58
ISSUES on YOUR PROPERTY	OVERALL %	FTF	PTF	HF	NF
Rising input costs	77	92	82	52	31
Weed resistance to herbicide, pesticides, fungicide	66	74	69	44	45
The impact of weeds, pest animals incl over-abundant native plant species, on productivity	62	68	53	67	49
On-farm impact of poor management of pest plants & animals on public land	60	65	51	65	48
Water holding capacity of soils	57	62	53	58	47
Lack of skilled labour to undertake important on-property work	57	73	51	35	19
Impact of temperature extremes on farm productivity e.g., frost, heat damage	53	57	55	58	29
Uncertain returns limiting capacity to invest in my property	52	60	49	33	33
Low level of organic carbon in soils	43	49	46	37	23
Low level of biological activity in soils	43	44	50	52	26
Effects of pesticide use on soil biota	42	42	46	39	36
Declining nutrient status of soils	42	46	38	54	23
Soil-borne diseases	41	45	36	35	33
Soil erosion (due to wind or water)	40	43	38	36	32
The activities of neighbouring landholder e.g., overspray, building dams	35	34	27	46	41

Soil acidity (lower pH) undermining productive capacity of soil	33	36	30	27	23
Impact of farm dams on groundwater extraction further up the catchment	26	25	23	39	25
Salinity undermining productive capacity of soils	24	27	20	15	18

TABLE X6: VIEWS ABOUT RISK & TRUST 2023 (n= 321-326)

VIEW STATEMENT	% AGREE/STRONGLY AGREE				
	ALL % (mean/ 5)	FTF	PTF	HF	NF
I am open to new ideas about farming & land management	89 (4.0)	92	86	92	85
You can't be too careful when dealing with people	60 (3.6)	63	61	46	51
I usually view risks as a challenge to embrace	55 (3.5)	57	53	63	54
Financially I can afford to take a few risks & experiment with new ideas	50 (3.2)	50	53	38	55
I prefer to see evidence of local success before trying a new practice	39 (3.0)	40	39	29	36
People are almost always interested only in their own welfare	39 (3.1)	42	35	25	41
I have sufficient time available to consider changing my practices	38 (3.1)	33	36	63	49
I prefer to avoid risks	35 (3.0)	34	35	42	35
I am usually an early adopter of new agricultural practices & technologies	33 (3.1)	42	16	32	21
This may not be the best farm around, but I see no reason to change	19 (2.5)	19	19	8	15

TABLE X7: VIEWS & BELIEFS REGARDING CLIMATE CHANGE, 2023 (n= 326-344)

VIEW	Mean /5.0	% Disagree	% Neutral /Don't know	% Agree	% NA	Landholder type with highest rate of agreem't
I'm confident that landholders in region can adapt to expected changes in rainfall patterns	3.7	8	21	68	3	FT
Primary producers should do all they can to reduce carbon emissions from their activities	3.3	23	36	41	0	HF
Fundamental changes are required to make our region's farming systems sustainable	3.3	20	40	40	0	HF
BELIEF						
Climate change poses a risk to the region	3.3	24	31	45	0	HF
It is not too late to take action to address climate change	3.4	16	30	54	0	HF
Human activities are influencing changes in climate	3.6	17	24	59	0	HF
If we do nothing, climate change will have dire consequences for all living things, including humans	3.3	27	28	45	0	HF
Landholders should manage their properties in expectation of highly variable climate	72 (3.8)	68	73	92	80	HF
ACTIONS						
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 only			21		HF
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 only			20		HF
In past 12 months have you changed your on-property operations as a result of considering opportunities to reduce carbon emissions e.g, generating wind power, improved grazing practices	Yes/ no only			14		FTF

Table X8: LONG TERM PLANS, 2023 (n = 338-345)

LONG TERM PLANS	% OVERALL	% FTF	% PTF	% HF	% NF
Ownership of the property will stay within the family	80	88	62	75	74
Some part of my property will be set aside for conservation purposes	28	18	27	50	54
Additional land will be purchased	28	41	13	8	8
The enterprise mix will be changed to diversify income sources	16	19	14	17	12
I will move off the property around/soon after reaching retirement age	22	24	32	14	11
A family member will seek additional off-property work to support the farm	16	15	19	29	9
The property will be sold	14	7	23	17	17
Additional land will be leased or share farmed	23	32	17	8	6
The enterprise mix will be changed to more intensive enterprises	9	11	3	8	6
All or most of the property will be leased or share farmed	24	20	44	25	18
Buying property outside of my current area to mitigate increased seasonal variability	13	17	9	8	4
The property will be subdivided & a large part of the property sold	7	5	10	0	10

Table X9: SUMMARY CHARACTERISTICS OF LANDHOLDER TYPES, 2023

Key attributes	Full time	Part-time	Hobby Farmer	Non-Farmer
Age of respondent	60 years (median=61)	61 years (median=62)	56 years (median=60)	63 years (median=64)
Percentage of Female respondents	14%	24%	52%	39%
Mean total area owned (median in brackets)	1356 ha (1100 ha)	430 ha (325 ha)	66 ha (40 ha)	220 ha (49 ha)
Mean length of family ownership (median)	80 years (80)	59 years (55)	27 years (17)	30 years (20)
Top attached value	Ability to pass on a healthier environment for future generations (92%)	Ability to pass on a healthier environment for future generations (92%)	Ability to pass on a healthier environment for future generations (82%)	Ability to pass on a healthier environment for future generations (84%)
Top held value	Looking after my family /loved-ones & their needs (97%)	Looking after my family /loved-ones & their needs (95%)	Looking after my family /loved-ones & their needs (93%)	Looking after my family /loved-ones & their needs (90%)
Top regional issue	Absence of important services & infrastructure (81%)	Water security (78%)	Water security (89%)	Impact of pest plants, animals on native plants & animals (73%)
Top property issue	Rising input costs (92%)	Rising input costs (82%)	Impact weeds, pest animals inc overabundant native species on productivity (67%)	Impact weeds, pest animals inc overabundant native species on productivity (49%)
Top knowledge item	Strategies to manage groundcover to minimise erosion (84%)	Strategies to manage groundcover to minimise erosion (81%)	Prepare property plan to allocate land use according to land, soil characteristics (56%)	Strategies to manage groundcover to minimise erosion (51%)
Top implemented practice (past 5 yrs)	Planting legumes or pulses (68%)	Use min/ no-tillage techniques to establish crops, pastures (68%)	Plant trees, shrubs incl. direct seeding (55%)	Plant trees, shrubs incl. direct seeding (43%)

Table X10. EXAMPLES OF DATA TRENDS with 2017 (2016 Survey) and 2023 Survey. 2023

Indicator	Wimmera 2016	Wimmera 2023
Property area median	765 ha	550 ha
Age median	57 yrs	61 yrs
Male	86%	76%
On-property hours work/ week	48	38
Top 3 property issues	Impact drought, changing rainfall patterns 79% Impact weeds, pest animals (inc native species) on profitability 66% Impact poor management. on public land of pest plants, animals 61%	Rising input costs 77% Weed resistance to herbicides, pesticides, fungicide 66% impact of weeds, pest animals incl over-abundant native plant species, on productivity 62%
Top 3 district issues	Impact reduced water flows on health rivers, streams, wetlands 63% Reduced opportunity for recreation as lakes dry out 61% Decline in soil heath e.g. fertility, structure 59%	Water security 75% Absence of important services & infrastructure e.g. health, schools, internet, phone coverage 73% Public opposition for agri practices e.g. GMs, animal welfare, pesticides 64%
Top 3 overall source information	Newspapers 69%, Field days 55%, Friends, neighbours 53%	Newspapers 49%, Field days 46%, Websites 45%
Self-assessed knowledge	Grazing, cropping strategies to maintain ground cover to minimise soil erosion 60% Use of containment areas to manage stock in drier seasons 47% Benefits of retaining native vegetation on property 46%	Strategies to maintain ground cover to minimise erosion 75% Preparing a farm/property plan allocating land use according to land/soil characteristics 68% How to identify the main constraints to soil productivity on your property 59%
On-property profit	57%	83%
Climate change view	Landholders should manage property in expectation of highly variable climate 85%	Landholders should manage property in expectation of highly variable climate 72%
The property will be sold Ownership will stay in family	19% 69%	14% 80%

Table X11 a: Modes of information used by all landholder categories, 2023

Mode of Information	% Overall	% Full-time farmer	% Part-time farmer	% Hobby farmer	% Non-farmer
Websites	46	46	43	54	47
Newspapers	42	52	41	7	19
Field days	39	49	39	14	14
Emails	30	39	28	11	10
Magazines	29	37	23	11	10
Brochures/leaflets/ newsletters	28	33	23	21	16
Radio	25	31	18	18	17
Television	23	20	21	44	16
Books	17	15	12	32	21
Academic journals/ research papers	14	18	10	18	5
Short courses	11	14	5	14	7
Extension officers	10	12	5	0	12
YouTube	10	8	13	21	9
Podcasts	9	10	8	11	5
Facebook	8	8	13	14	3
Twitter	7	11	3	0	2
Whatsapp, Messenger groups	2	2	3	0	3
Instagram	1	1	0	0	3

Table X11 b: Sources of information used by all landholder categories, 2023

Information Type, Organisation	% Overall	% Full-time	% Part-time	% Hobby farmer	% Non-farmer
Other farmers	62	73	77	43	26
My own knowledge from my own experiences	57	61	64	43	45
Independent agri consultants, agronomists, stock agents	43	59	41	11	5
Friends/neighbours/ relatives	41	45	44	32	33
Bureau of Meteorology	33	38	39	36	12
Commercial agricultural consultants, agronomists or stock agents	30	41	26	11	5
Farming systems groups e.g. Birchip, Southern Farming Systems	26	35	20	7	9
Landcare group, network	22	19	18	21	35
Rural R&D corporations e.g. GRDC	19	26	21	0	5
Commodity groups e.g. MLA, AWL	14	21	12	0	3
Ag Vic	14	14	21	11	7
Victorian Farmers, National Farmer Fedn	12	17	7	4	3
Wimmera CMA	11	11	8	7	14
Universities/CSIRO	8	10	3	7	5
Environmental organisations e.g. Greening Australia	8	5	5	14	17
Local Council	6	4	7	0	12
Other	3	3	5	0	4
Soil CRC	2	3	2	0	0

Table X11 c: Modes of information used by all landholders by generation, 2023

Mode of Information	% Baby Boomer	% Generation X	% Generation Y
Newspapers	50	34	33
Websites	43	57	50
Field days	41	42	42
Magazines	33	26	42
Brochures/leaflets/ newsletters	29	26	42
Radio	27	27	21
Television	27	14	19
Emails	26	37	41
Books	18	16	25
Academic journals/ research papers	15	15	21
YouTube	11	10	17
Extension officers	11	8	17
Short courses	10	15	17
Podcasts	6	9	21
Facebook	5	9	33
Twitter	3	12	25
Whatsapp, Messenger groups	1	3	8
Instagram	1	1	0

Table X11 d: Sources of information used by all landholders by generation, 2023

Information Type, Organisation	% Baby Boomer	% Generation X	% Generation Y
My own knowledge from my own experiences	64	55	54
Other farmers	62	69	58
Independent agri consultants, agronomists, stock agents	42	50	50
Friends, neighbours, relatives	41	48	46
Bureau of Meteorology	30	43	50
Commercial agricultural consultants, agronomists or stock agents	30	35	17
Farming systems groups e.g. Birchip, Southern Farming Systems	25	29	42
Landcare group, network	25	20	33
Rural R&D corporations e.g. GRDC	18	20	38
Commodity groups	10	23	29
Victorian Farmers, National Farmer Fedn	10	16	21
Wimmera CMA	10	11	29
Environmental organisations e.g. Greening Australia	10	4	13
Ag Vic	8	21	38
Universities/CSIRO	7	11	13
Local Council	7	5	0
Other	4	3	0
Soil CRC	1	3	4

9 APPENDIX 2 – SURVEY

SURVEY NO.

SUPPORTING LANDHOLDERS IN THE WIMMERA

RURAL LANDHOLDER SURVEY 2023

SUPPORTING LANDHOLDERS IN THE WIMMERA

This comprehensive survey is a vital part of efforts to understand the important social and economic factors shaping landholder decision making in the Wimmera region. Your contribution will guide the Board and staff who develop and implement strategies, programs and activities for the Wimmera Catchment Management Authority (WCMA) and the Australian Soil Cooperative Research Centre (Soil CRC), who are co-funders of this survey. Similar surveys were undertaken in 2002, 2007, 2012 and 2017. There is no other way to obtain this property level information.

Surveys are being sent to landholders with properties in the Wimmera region, identified via ratepayer lists. Each survey has a serial number that links to the property, enabling us to spatially reference our survey results with soil and weather data. **No property or person will ever be identifiable in our reporting.** Our plans are to follow up this survey in about 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 person/s 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 postage-paid return envelope. We ask that you only provide information for your property/s within the Wimmera region.

This voluntary survey should take between 30-50 minutes to complete. There are no right or wrong answers and there is no need to think at great length about your responses. If you have any questions about the survey, please contact 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 or used in any of the reports. No group outside the research team will have access to the raw survey data. Information is published at the regional scale and individual data is never published.

Thank you for your assistance,

Dr. Hanabeth Luke
Senior Lecturer & Soil CRC Project Leader
Faculty of Science & Engineering,
Southern Cross University

1. OCCUPATIONAL IDENTITY

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

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

Who participates in decision making for your property? *(Please **circle** the most important)*

Mostly just me | Me and my partner | Multi-generations of my family | Property manager | Property manager and me | Agronomist

2. ENTERPRISE / LAND USE MIX

This topic is seeking **information about your current land use/enterprise mix.** *Place a tick besides any correct response in the **'Situation now'** column.* Please answer with the land you own/manage in the Wimmera in mind.

ENTERPRISES / LAND USE ON YOUR PROPERTY IN 2022	SITUATION NOW	ENTERPRISES / LAND USE ON YOUR PROPERTY IN 2022	SITUATION NOW
Cereal	○	Irrigated agriculture	○
Legumes/pulses	○	Area of remnant native vegetation (e.g. trees, grasslands, wetlands)	○
Oil seed	○	Farm forestry	○
Pasture	○	Other tree planting (e.g. shelter, habitat, erosion or recharge control)	○
Dairying	○	Farm-based tourism (e.g. farm stays, B&B)	○
Beef cattle	○	Heritage agreement/covenant with the Wimmera CMA or other organisation	○
Sheep	○	Area set aside for living/recreation (e.g. gardens, pets, vehicles)	○
Bee keeping	○	Broadacre farming	○
Other commercial livestock enterprises (e.g. goats, pigs, deer, horse studs, poultry, alpaca, dogs)	○	Dryland pasture	○
Viticulture	○	Other **(please specify):**	○
Horticulture	○	.....	

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 DISTRICT	YOUR VIEW
Absence of important services and sufficient infrastructure (e.g. phone, schools, internet, roads & transport) **If important, please provide an example:**	
Risk to life and property from wildfires	
Long-term negative impacts of property purchased by non-farmers or absentees	
The impact of pest plants and/or animals on native plants and animals	
Loss of native plants and animals in the landscape (e.g. due to cropping or draining wetlands)	
Water security	
Changes in weather patterns	
Public opposition for agricultural practices (e.g. GMs, animal welfare, pesticide use)	
Declining soil health and/or soil productivity	
Land use change/conflicting land use (e.g. solar, mining, residential) impacting/encroaching on farmland. **If important to you, please provide an example:**	
Salinity, nutrient or chemical runoff threatening water quality in rivers/ streams/ wetlands	
Impact of reduced water flows on the long-term health of rivers/ streams/ wetlands	
Loss of paddock trees	
Stock damage to native vegetation/ rivers/ streams/ wetlands	
Reduced opportunities for recreation as lakes dry out	

IMPORTANCE OF ISSUES ON YOUR PROPERTY	YOUR VIEW
Uncertain returns limiting capacity to invest in my property	
Impact of temperature extremes and/or changing rainfall patterns on farm productivity	
Weed resistance to herbicides, pesticides and/or fungicides	
The activities of neighbouring landholders (e.g. such as overspray, building dams) **If important, please provide an example:**	
The impact of weeds and pest animals (including overabundant native species) on productivity	

IMPORTANCE OF ISSUES ON YOUR PROPERTY	YOUR VIEW
Impact of farm dams or groundwater extraction further up the catchment	
Lack of skilled labour to undertake important on-property work	
On-farm impact of poor management of pest plants and animals on public land	
Soil erosion (e.g. due to wind or water)	
Declining nutrient status of soils	
Salinity undermining productive capacity of soils	
Soil acidity (lower pH) undermining productive capacity of soils	
Low level of organic carbon in soils	
Low level of biological activity in soils	
Soil-borne diseases	
Effects of pesticide use on soil biota	
Water holding capacity of soils	
Rising input costs	

4. THE PRINCIPLES THAT GUIDE YOUR LIFE

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

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 each 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 environment for future generations	
Sense of accomplishment from building/maintaining a viable business	
Provides opportunities to learn new things	
A place or base for recreation	
An asset that will fund my retirement	
A great place to raise a family	
Its native vegetation 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	
Provides a sense of belonging to a place	
My property is an important part of who I am	
The productive value of the soil on my property	
Native plants and animals make the property an attractive place to live	
An asset that is an important part of family wealth	
Contributing to the local economy by providing work and supporting local businesses	

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)	NOT APPLICABLE
1	2	3	4	5	6

YOUR KNOWLEDGE OF DIFFERENT TOPICS	YOUR VIEW
Preparing a farm/property plan allocating land use according to land/soil characteristics	
The Aboriginal group/s who are connected to the area where your property is located	
Strategies to maintain groundcover to minimise erosion in this area	
Options and strategies to (re)establish perennial pastures (e.g. lucerne/native grasses) in this area	
How to identify the main constraints to soil productivity on your property	
The benefits of applying biological soil supplements (e.g. compost, manure, microbial inoculants)	
The processes leading to declining soil health or structure in this area	
Market mechanisms that support carbon farming	
How to build soil organic matter/soil carbon	
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/or holistic farm management	
The location of Aboriginal cultural sites in your district (e.g. scar trees, middens)	
The role of wetlands and native vegetation for filtering water entering rivers, lakes or streams	
The role of microbiology (e.g. bacteria & fungi) in soil health	
The use of stock containment areas, or time controlled, holistic or cell grazing strategies	
The extent and type of biological activity in soils on your property	
How to (re)introduce more legumes/pulses into your enterprise mix	
Laws and regulations that apply to the management of rural properties	
How to use soil moisture-probe data to make decisions about crop or pasture management	
How to effectively manage subsurface soil constraints (e.g. compaction, water holding capacity)	
How to protect and improve the health of native vegetation, waterways and wetlands	

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	NEUTRAL/ DON'T KNOW	AGREE	STRONGLY AGREE	NOT APPLICABLE
1	2	3	4	5	6

STATEMENTS	YOUR VIEW
The benefits of stubble retention outweigh problems arising from the practice	
If relevant, which of the following do you use to manage your stubble: ◯ cool burning ◯ hot burning ◯ full retention ◯ incorporation ◯ other	
The costs of applying lime to balance soil acidity is justified by increased production	
The costs of establishing perennial pasture are justified by the returns	
Soil testing is an essential step in understanding soil condition	
Biological activity is an important indicator of the productive capacity of soils	
Fencing to manage stock access is an essential element of protecting waterways and native vegetation	
I feel a personal responsibility to be part of a group working to improve land/natural resource management	
I feel a personal responsibility to maintain the productive capacity of my soil	
There is adequate compensation or support provided for improving soil carbon on my property	
There is adequate compensation or support provided for good land/soil stewardship	
Decision-making needs to be strongly influenced by data/scientific evidence	
Internet or mobile phone connectivity is a barrier to my using on-farm data more effectively	
Most years I'm satisfied with my farm's productivity given the seasonal conditions experienced	
I am coping well with the associated stresses and challenges of managing my farm	
I am interested in learning more about regenerative/holistic farming approaches	
I'm confident that adopting regenerative/holistic farming practices is justified by the returns	
Landholders should have the right to harvest water that falls on their property, even if it impacts others	
The public should have the right to access rivers/ streams/ wetlands on private land	
It is fair that the community expects land managers to not cause foreseeable harm to the environment	
Reduced production in the short-term is justified where there are long term benefits	
I am confident making management decisions based on the data from my farm	

STATEMENTS	YOUR VIEW
Overall, I find that I am increasing synthetic fertiliser/chemical inputs per hectare	
I'm confident that landholders in this region can adapt to expected changes in rainfall patterns	
I'm confident that my land is in a better condition than when I took on the management of this farm	
I feel adequately supported to conduct farming and land management activities on my property	

OPEN QUESTIONS

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

What is the most important influence on your soil health?

What testing/indicators do you use to assess soil/land health?

Approximately, how often are your soils tested? ◯ At least annually ◯ Every 3-5 years ◯ Once ◯ Never

Where are your soils tested? ◯ One preferred location ◯ Systematically in one paddock ◯ Systematically across paddocks

To a usual depth of *(tick one only)*: ◯ 0-15cm ◯ 0-30cm ◯ Deeper than 30cm

If you don't soil-test, why not?

Are you aware of the existence of the Wimmera CMA? ◯ No ◯ Yes

Please use the following response options to respond to the statements below:

STRONGLY DISAGREE	DISAGREE	NEUTRAL/ DON'T KNOW	AGREE	STRONGLY AGREE	NOT APPLICABLE
1	2	3	4	5	6

STATEMENTS (indicate the extent to which you agree with the following)	YOUR VIEW
The Wimmera CMA provides valuable information about soil, land, water and natural resource management (NRM).	
The Wimmera CMA can be relied on to keep landholders' interests in mind when making decisions about land, water and NRM.	
I can rely on the Wimmera CMA to provide appropriate financial assistance for land, water and NRM.	
Sound principles guide Wimmera CMA's decisions about land, water and NRM.	
In the past 5 years, did government programs or Wimmera CMA provide financial support for work on your property? ◯ No ◯ Yes, as part of a community grant ◯ Yes, through a specific grant to you as a landholder	

What kind of support would you most like to see from the Wimmera CMA?

8. PREFERRED SOURCES OF INFORMATION

In the past 12 months, what have been your **top** sources of **information about topics related to the management of your property in the Wimmera?** *Please place a tick besides your key sources in the table below.*

MODE OF INFORMATION		ORGANISATION/PERSONS	
Television	○	Other farmers	○
Books	○	Wimmera CMA	○
Magazines	○	Farming systems group (e.g Birchip, Southern Farming Systems)	○
Newspapers	○	Landcare group/ network / coordinator	○
Emails	○	Local Council	○
Radio	○	Ag Vic	○
Field days	○	Soil CRC	○
Websites	○	Rural R&D corporations (e.g. GRDC)	○
Instagram	○	Environmental organisations (e.g. Greening Australia)	○
Twitter	○	Commodity groups (e.g. MLA, AWL)	○
Brochures/leaflets/newsletters	○	Friends/neighbours/relatives	○
YouTube	○	Universities/CSIRO	○
Podcasts	○	Bureau of Meteorology	○
Academic journals/research papers	○	**Independent** agricultural consultants, agronomists or stock agents	○
Facebook	○	**Commercial** agricultural consultants, agronomists or stock agents	○
Whatsapp or Messenger groups	○	Victorian Farmers / National Farmers Federation	○
Extension officers	○	My own knowledge from my own experiences	○
Short courses	○	Other	○

For your selection/s above, please indicate the title of your preferred top source (e.g. name of newspaper or website)

.....

9. YOUR VIEWS ABOUT RISK, TRUST AND CLIMATE

In this section we would like to explore your **views about 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	NEUTRAL/ DON'T KNOW	AGREE	STRONGLY AGREE
1	2	3	4	5

STATEMENTS	YOUR VIEW
You can't be too careful when dealing with people	
I am usually an early adopter of new agricultural practices and technologies	
People are almost always interested only in their own welfare	
This may not be the best farm around, but I see no reason to change	
I prefer to see evidence of local success before trying a new practice	
I prefer to avoid risks	
I am open to new ideas about farming and land management	
I usually view risks as a challenge to embrace	
Financially, I can afford to take a few risks and experiment with new ideas	
I have sufficient time available 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	
Primary producers should do all they can to reduce carbon emissions from their activities	
Landholders should manage their properties in expectation of a highly variable climate	
Fundamental changes are required to make farming systems in our region more resilient	

10. MANAGEMENT PRACTICES ON YOUR PROPERTY

This section asks about **practices undertaken** on your main or 'home' property in the Wimmera during the full period of your management; and the past 5 years. *Tick all relevant.*
Some actions may not be relevant to your situation: Please ignore those topics.

PRACTICES CARRIED OUT ON YOUR MAIN OR "HOME" PROPERTY IN THE WIMMERA	AT SOME POINT PRIOR TO 2017	PAST 5 YEARS (2017-present)	INTEND TO IMPLEMENT/ CONTINUE IN NEXT 5 YEARS
Planting of trees and shrubs (incl. direct seeding) for environmental purposes (e.g. shelterbelts, pollination, wildlife corridors)	○	○	○
Removal of an area of trees and/or shrubs	○	○	○
Fencing of native bush/grasslands to manage stock access	○	○	○
Use of time-controlled, cell, or holistic grazing	○	○	○
Sowing perennial pastures	○	○	○
Use of no-tillage or minimum tillage techniques	○	○	○
Used precision-farming techniques	○	○	○
At least one lime application to arable land	○	○	○
Application of biological soil supplements (e.g. compost-tea, effluent)	○	○	○
Maintaining at least 70% groundcover (in non-drought years)	○	○	○
Testing of soils to understand soil condition	○	○	○
Preparation of a nutrient budget for all/most of the property	○	○	○
Plant legumes (e.g. lucerne, clover, pulses)	○	○	○
Use of stock containment areas	○	○	○
Encourage native grasses/grains to grow at scale	○	○	○
Value-add processes (e.g. on-farm processing, retail)	○	○	○
Carbon farming	○	○	○
Farming practices you consider to be regenerative **If important, provide an example:**	○	○	○
Brown or green manure crops	○	○	○
Multi-species pastures	○	○	○
Fencing erected to manage stock access to rivers/ streams/wetlands	○	○	○
Number of off-stream stock watering points established	○	○	○
Cover crops	○	○	○

11. YOUR PROPERTY AND YOU

BACKGROUND INFORMATION	PLEASE TICK OR FILL IN YOUR RESPONSE
What is the total area of land you own in the Wimmera region? (excluding land you manage but do not own)	..... total Ha owned
Is this Wimmera property your principal place of residence?	◯ No ◯ Yes
What area of additional land do you manage (lease/sharefarm/agist from others) in the Wimmera (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?	..... years
How many rural properties do you own **within** the Wimmera?	..... No. of properties
What area of your property is leased, share farmed or agisted by others?	..... Ha

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?	◯ No ◯ Yes
Have you subdivided or sold part of your property in this region over the past 20 years?	◯ No ◯ Yes
Estimate the number of **hours per week** that you **worked on farming/property** related activities **(average over the past 12 months)**.	..... hrs/week
What is your **age?**	..... years
What is your gender (tick both if filling this in together)? ◯ Male ◯ Female ◯ Non-binary	
Do you identify as Aboriginal and/or Torres Strait Islander?	◯ No ◯ Yes
What is your main occupation (e.g., farmer, teacher, investor, retiree)?	
What is the highest level of formal education you have completed? ◯ Trained in life but no formal quals ◯ Year 10 ◯ Year 12 ◯ Vocational Certificate ◯ Tertiary/Uni	
Are other **family members** working on your property **on a daily or weekly basis?** **If yes, please indicate who they are:** ◯ Spouse/partner ◯ Children ◯ Parents ◯ Siblings ◯ Others	◯ No ◯ Yes
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?	◯ No ◯ Yes
Is any proportion of your land presently lost to production due to soil problems? If yes, how many hectares have been lost? ..... Ha **Please specify the issue:**	◯ No ◯ Yes
Did you irrigate in 2021? IF YES: How much surface water was used? How much groundwater was used?	◯ No ◯ Yes ..... ML ..... ML

11. YOUR PROPERTY AND YOU (CONT)

INFORMATION ABOUT YOU AND YOUR MAIN OR 'HOME' PROPERTY	PLEASE TICK OR FILL IN YOUR RESPONSE
In the past 12 months have you changed your financial or on-property operations as a result of seasonal changes in weather patterns?	◯ No ◯ Yes
In the past 12 months have you changed your operations to increase the soil carbon on your property (e.g. by revegetation, soil management)	◯ No ◯ Yes
In the past 12 months have you changed your on-property operations as a result of considering opportunities to reduce carbon emissions (e.g. generating wind power, improved grazing practices)	◯ No ◯ Yes
Did you earn income from agriculture on your Wimmera property during the 2020/2021 financial year?	◯ No ◯ Yes
Did your Wimmera property return a net profit during the 2020/2021 financial year? (i.e. income exceeded all expenses before tax)	◯ No ◯ Yes
If yes, was your net 2020/2021 agricultural income above $50,000?	◯ No ◯ Yes
Did you or your spouse/partner receive a net off-property income (after expenses and before tax) in the financial year (2020/2021)?	◯ No ◯ Yes, me ◯ Yes, my partner
If yes, was the total off-property income for you and/or your spouse above $50,000?	◯ No ◯ Yes
In the 2020/2021 financial year, what percentage of you (and your spouse's) income was earned off farm? (e.g. from shares, rental income, employment, other business)	..... %
Estimate the number of **days** you were involved in paid off-property work in the past 12 months	..... days per year
Has your Wimmera 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)	◯ No ◯ Yes
In the past 5 years have you or your partner completed a short course/workshop relevant to property management? (e.g. financial planning, integrated pest management, whole farm planning)	◯ No ◯ Yes, me ◯ Yes, my partner
In the last 12 months, did you attend field days, webinars, farm walks and other activities focused on soil health and productivity?	◯ No ◯ Yes

What is the longest time-frame you consider when making strategic decisions on your farm/land?
◯ Opportunistic ◯ Seasonal ◯ Year to year ◯ Up to 5 years ◯ 6-20 years ◯ Over 20 years ◯ Over 100 years

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

Over the last **10 years**, what **management decision** was the most important influence on your **profitability?**

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

Is there a **particular technology/tool/innovation/knowledge** that would support your farm management goals?

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
1	2	3	4	5

LONG TERM PLAN OPTIONS	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	
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	

Is this a corporate-owned farm? (*Please tick your answer*) ○ No ○ Yes

What proportion of your property contains an area of remnant, restored or planted native vegetation or wetland?

○ 0% ○ 1-25% ○ 26-50% ○ 51-75% ○ 76-100%

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

○ No ○ Yes ○ Unsure/too early to know

If Yes, does your family have a **succession plan** underway? (*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 water management in the Wimmera? 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 postage-paid envelope provided.**

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

If you would like to be contacted as a part of further research, please write your email address or other contact here:

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