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UPPER COLIBAN CATCHMENT SOCIAL BENCHMARKING PROJECT

COLIBAN WATER & NORTH CENTRAL CATCHMENT MANAGEMENT AUTHORITY

PROFESSOR ALLAN CURTIS, DECOY MARKETING



NORTH CENTRAL
Catchment Management Authority
Connecting Rivers, Landscapes, People

Coliban
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RESEARCH COMMISSIONED BY:

COLIBAN WATER & NORTH CENTRAL CATCHMENT MANAGEMENT AUTHORITY

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Contact Details
Professor Allan Curtis
Email: al@decoymarketing.com.au

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EXECUTIVE SUMMARY

BACKGROUND AND PURPOSE

The Upper Coliban Catchment (UCC) is part of the Hepburn and Macedon Ranges shires and is located just to the north of Melbourne and south of Bendigo [Figure 1]. The UCC includes the Lauriston, Malmsbury and Upper Coliban reservoirs and provides drinking water for over 130,000 people.

The UCC provides a range of environmental, social, cultural and economic values and these values are threatened by existing and future developments, uncontrolled livestock access to waterways and riparian areas and from climate change. In response, Coliban Water (CW) and the North Central Catchment Management Authority (North Central CMA) worked with other stakeholders to develop an Integrated Catchment Management Plan (the Plan). The Plan has a 20 year horizon. At an estimated cost of $10.8 million over the first 10 years, the Plan is intended to ensure a safe and secure water supply for communities along with enhanced river, biodiversity and catchment health outcomes.

Rural landowners are key stakeholders in the Plan. Rural landowners own most of the land in the UCC, their management actions directly influence the condition of water and vegetation, and in turn, the condition of those assets influences their livelihoods, well-being and wealth (including property values).

Engaging rural landowners in practice change can be challenging. There is a large set of possible factors influencing landowner decisions and these vary according to each technology, landowner, social context, intervention and over time. Effecting change is often problematic because the private benefits of action by rural landowners to address environmental degradation are often uncertain and for some issues the way forward is not clear.

Further complicating the task for those implementing the Plan in the UCC is the scope and pace of social change in rural areas on the fringe of Melbourne. There are typically more landowners, increased numbers of smaller land parcels, more diverse land uses/ enterprise types, more non-resident landowners and more landowners with limited understanding of natural resource management (NRM) and connection to existing NRM networks.

Given this context, and North Central CMA staff experience with “social benchmarking” (Curtis and Mendham 2015), Decoy Marketing was contracted to complete such a study for the UCC. Social benchmarking data are gathered using surveys mailed to rural landowners. The surveys cover topics that will inform engagement with rural landowners; and benchmark implementation of best practice NRM. Data gathered are typically spatially referenced so that summaries can be prepared for different geographies (e.g. environmental assets or shires).

THE CONCEPTUAL FRAMEWORK

Changing human behaviour can be difficult, and engaging rural landowners in practice change is no exception. Unless there are strong economic drivers supporting implementation, effecting change is often problematic because the private benefits of action by rural landowners to address environmental degradation are often uncertain. There is also limited commitment by governments to legislate and/or enforce compliance. And, with some issues the way forward is uncertain (i.e. where we are headed and how to get there).

EXECUTIVE SUMMARY

Further complicating the task for those implementing the Plan in the UCC is the pace and scope of social change in many rural areas in Victoria. For example, Mendham and Curtis (2010) estimated that 40-50% of rural properties will change ownership in the next decade. New and longer-term property owners are different and those differences present both a challenge and opportunity for NRM practitioners. The nature of that change is perhaps best conceptualized by Holmes' (2006) Multifunctional Rural Transition (Holmes 2006). It is now widely accepted that land use and management over much of rural Victoria is being shaped by a mix of production (e.g. agriculture), consumption (e.g. recreation/ amenity) and conservation values (Barr 2005; Curtis and Curtis 2018). Agriculture typically remains the dominant land use, but primary production is not the principal focus of many landowners.

An individual's behaviour is derived from the core elements of their personality and belief structures (Stern 2000). That is, each person's values (i.e. guiding principles), beliefs (what they think is true) and personal norms (how they think they ought to behave) guide their intentions and actions. However, decisions by rural landowners are influenced by a much wider set of factors (e.g. markets, seasons, rules, knowledge, networks, social norms) and these vary according to each technology, landowner, social context, intervention and over time (Pannel et al. 2006).

The notes above set out the nature of the challenge facing social researchers setting out to provide guidance for NRM practitioners. Now for a nuanced way forward that draws on sound theory, empirical research and experience working with NRM practitioners in Victoria.

While it is possible that values, beliefs and personal norms (VBN) may mediate or moderate "other" factors, it is difficult to change these core elements of personality and belief structures (i.e. VBN) in the short or medium term. Nevertheless, it is critical to understand the values and beliefs of landowners if practitioners are to engage them effectively. So, there are some things we need to know about but which we should not set out to change, at least in the short term (say five years).

At the same time, researchers have identified what can be considered "levers" to effect change (e.g. improving knowledge and management skills). They have also identified processes or platforms that are effective ways to engage landowners in learning, dialogue and action (e.g. group-based approaches such as Landcare and commodity groups) that is a critical part of the way forward, particularly when there is uncertainty about how to proceed.

One of the responses of social researchers (and others) tasked with advising NRM practitioners is to develop typologies that distinguish groups/ types based on key attributes. Typologies appeal as a useful aid if they include all landowners (e.g. not just farmers by occupation); are soundly based (i.e. grounded in relevant theory); and are constructed using reliable methods (e.g. not based on the intuition of researchers). Unfortunately, there are few examples where those criteria have been met. It is also important that typologies enable NRM practitioners to readily identify different cohorts when they engage rural property owners.

Researchers exploring the transition to multi-functional landscapes have identified occupational identity as a key element of that process, and have highlighted differences in the motivations and management practices of

farmers and those with other occupations. Working with Professor Curtis, Theresa Groth (see Groth et al. 2016) developed a typology of landowners in the North Central CMA region based on the extent each landowner identified as a farmer. A four cohort classification was developed and has been employed in the Upper Coliban Catchment survey. The four cohorts are:

Full-time farmer (FTF), Part-time farmer (PTF), Hobby farmer (HF), and Non-farmer (NF).

DATA COLLECTION

The UCC is a relatively small area (i.e. 22,000 ha) and the decision was made to survey all property owners (i.e. take a census) with land of 2 hectares or more in the Hepburn and Macedon Ranges shires. When Council staff provided their lists and those with multiple properties were removed, there were 851 potential respondents.

The initial mail package of a survey, cover letter and return envelope was followed by three reminder/ thank you notes posted at weekly intervals. After another two weeks, a complete mail package was posted to non-respondents, followed by two reminder/thank you notes. After removing the small number of "return to sender" and other accepted reasons for nonresponses (combined total of 29), there were 413 returned surveys for a response rate of 50%.

The research team is confident that survey results are an accurate reflection of the Upper Coliban Catchment for the topics covered in the survey. The survey was a census of all property owners (2 ha and above), so there is no attempt to extrapolate from a sample to the population. Although a 50% response rate reflects best-practice for mail surveys, there is always the possibility of non-response bias. That is, the results may be different if data from non-respondents is included. It is possible to test for non-response bias, although that is difficult when survey recipient are rural property owners because of the limited availability of data. For example, census data is focussed on households and for those occupying a residence on census night. In this study, we used the Hepburn and Macedon Ranges ratepayer lists to compare the median property size of respondents and non-respondents. Apart from having access to those data, property size is a surrogate for other relevant attributes, including the extent of a farmer identity and enterprise type. Those comparisons resulted in a median property size of 15.6 ha for respondents and 15.4 ha for non-respondents suggesting there is not a response bias.

KEY FINDINGS

Upper Coliban Catchment is a multifunctional landscape

The data summarised in Table A is only part of the evidence presented throughout the report supporting the conclusion that the Upper Coliban Catchment (UCC) is a multifunctional landscape. That is, there is a mix of values shaping the land use and management of rural landowners in the UCC. It seems likely that agriculture is an important element of the appearance and condition of the UCC. However, other values, such as amenity (e.g. recreation and aesthetic) and conservation are likely to be more important for most UCC landowners.

EXECUTIVE SUMMARY

TABLE A: THE UPPER COLIBAN CATCHMENT IS A MULTIFUNCTIONAL RURAL LANDSCAPE
UPPER COLIBAN CATCHMENT SOCIAL BENCHMARKING STUDY, 2018 (N=413)

Topics and survey items	Upper Coliban Catchment
Area of property in UCC	16 ha (median)
% small properties based on local government ratepayer data	41% >2ha <10ha
Property normal place of residence	69% Yes
Dwelling on property	86% Yes
Years owned property in UCC	15 years
Any income from agriculture 2017/18 *% of those with a net profit*	31% Yes 21% a net profit
Land use in 2018: *Large garden* *Beef cattle* *Horses (stud to recreation)* *Cropping*	 42% Yes 40% Yes 17% Yes 9% Yes
Hours worked per week on-property	10 hours (median)
Days worked off-property last year	50 days (median)
Extent identify as a farmer	*Full-time* 10%, *Part-time* 15%, *Hobby farmer* 31%, *Non farmer* 44%
Values: *Attractive place/area to live*	 90% *Important*
Provides places for native birds to live	72% *Important*
An escape from the pressure of city living	68% *Important*
An asset that is an important part of family wealth	64% *Important*
A place or base for recreation	54% *Important*
Sense of accomplishment from producing food and fibre for others, including family	45% *Important*
An important source of household income	20% *Important*

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Extent of farmer occupational identity matters

In this study the extent of farmer identity was explored using self-identification as either Full-time farmer (FTF), Part-time farmer (PTF), Hobby farmer or Non-farmer. As explained earlier, this typology was applied first in the North Central CMA region.

In the UCC, most (i.e. 75%) of the owners of properties of 2 hectares and above identify as either Non-farmers (44%) or Hobby farmers (31%) [Table A]. This is an important finding. Furthermore, there are statistically significant differences for almost all topics and for about half of all the items included in the survey. This finding reinforces the relevance of the typology. The nature of those differences are explored in depth in the report that follows. Some of the key differences are illustrated in Tables B & C.

Although Full-time farmers have larger properties, they own (and manage) about a third of all land owned/ managed by the survey respondents. Indeed Part-time farmers own (and manage) a similar proportion of all land. Together, Hobby farmers and Non-farmers own (and manage) as much land as Full-time farmers. This finding has important implications for NRM practitioners, including in relation to:

1. the representation of property owners on advisory groups, at project meetings and project activities such as trials and demonstration site visits;
2. the priority of issues to be addressed within the project;
3. where resources are expended to address priority issues;
4. how engagement occurs (i.e. appeals made and mediums employed); and
5. the recruitment of volunteers to work on public land.

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TABLE B: A COMPARISON OF THE FOUR COHORTS BASED ON EXTENT OF FARMER IDENTITY: KEY ATTRIBUTES RELATED TO PROPERTY MANAGEMENT.
UPPER COLIBAN CATCHMENT SOCIAL BENCHMARKING STUDY, 2018 (N=413)

Key attributes **Medians unless indicated used mean**	**Full-time Farmer (11%)**	**Part-time farmer (15%)**	**Hobby farmer (31%)**	**Non-farmer (44%)**
Property size	84 ha 34% land area	40 ha 33% land	15 ha 17% land	8 ha 17% land
Resident on property	86%	77%	71%	61%
Length of ownership	36 years	20 years	11 years	15 years
Hours work on-property per week	50 hours	20 hours	10 hours	5 hours
Any income from agriculture 2017/18	83%	79%	28%	6%
Of those with income from agriculture, % reporting a net profit 2017/18	58%	31%	4%	2%
Property leased, share farmed or agisted from others	22%	14%	6%	9%
Landcare participant 2018	26%	29%	29%	15%
Attended a field day/farm walk last 12 months	62%	45%	33%	14%
Completed a short course related to property management past 5 years	50%	35%	21%	5%
Used a contractor last 12 months	57%	61%	51%	38%
Beef cattle	61%	64%	38%	11%
Cropping	34%	17%	4%	1%

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TABLE C: SIGNIFICANT DIFFERENCES IN VALUES ATTACHED TO PROPERTY BY COHORTS BASED ON EXTENT OF FARMER IDENTITY
UPPER COLIBAN CATCHMENT SOCIAL BENCHMARKING STUDY, 2018 (N=413, N=391-397)

Attached values items by % selected Important/Very Important rating	Full-time farmer	Part-time farmer	Hobby farmer	Non-farmer
Being able to pass the property to others in better condition	92%	93%	81%	69%
Sense of accomplishment building a viable business	89%	58%	27%	10%
Sense of accomplishment from producing food and fibre for others, including family	83%	62%	51%	25%
An asset that is an important part of family wealth	72%	70%	69%	57%
An important source of household income	69%	45%	12%	6%
An escape from the pressures of city living	31%	61%	75%	75%
A place or base for recreation	29%	44%	63%	57%
Work on the property is a welcome break from normal occupation	18%	53%	58%	45%

OTHER FINDINGS THAT SHOULD INFORM APPROACHES TO ENGAGEMENT

There are important similarities in the key attributes of each farmer identity cohort and these offer insights about ways to appeal to the broad cross section of property owners in the Upper Coliban Catchment. For example, almost all respondents rated *An attractive place/area to live* as an Important value for their property; over two-thirds gave an Important rating to *Provides places for native birds to live* and *Native vegetation provides habitat for birds and animals*; and a majority gave an Important rating to *Opportunity to conserve part of a unique Australian landscape*.

Although there is a difference on occupational identity for the item *Being able to pass the property to others in better condition*, over two-thirds of respondents in each of the four cohorts gave this value an important rating [Table D]. Different landowners may have different interpretations of what *better condition means*, but typically they will be thinking about some or all of the natural environment, soils and pastures, property infrastructure and the viability of on-property enterprises. Again, this information should provide insights about how to engage UCC property owners.

The median age of all respondents is 61 years. Those identifying as Full-time farmers are significantly older (i.e. 67 years) but half of all the respondents are older than 61 years. There are obvious implications in terms of the physical capacity of many of those elderly owners to undertake work, particularly in rugged terrain.

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The top five rated issues included items focussed on pest plants and animals, the risks posed by wildfires and the impact of changing rainfall patterns. There was no difference in the importance of these issues across the four cohorts. There are differences across the four cohorts for other issues, and the trend is for increased importance attached to issues as farmer identity declines. That is, NF and HF typically give a higher rating than do PTF and FTF to issues related to water quality and supply; the conservation of native vegetation; and climate change. The one exception to the overall pattern is for the item *Increasing numbers of kangaroos and wallabies*. For this item the FTF is the cohort most concerned.

Although there are some important differences in the beliefs and attitudes of respondents, most respondents in each of the four cohorts have views consistent with contemporary NRM policies and practices. For example, most respondents Agree that:

- *Human activities are influencing changes in climate.*
- *Reconnecting areas of native bush helps sustain threatened plants and animals.*
- *Fencing to manage stock access is essential to protect the health of waterways and wetlands.*
- *It is fair that the wider community asks landowners to take reasonable steps to ensure that water leaving their property is not polluted.*
- *Local governments should ensure landowners meet the requirements for septic tank management.*

Notwithstanding the above summary of key areas of agreement, many respondents have concerns about potential/ actual infringements on their private property rights and about the efficacy of some contemporary NRM policies. For example:

- 65% Disagree that *The public should have the right to access waterways on private land for recreation.*
- 45% Agree that *Landholders should have the right to harvest water that falls on their property, even if that impacts others.*
- 34% Agree that *Fencing waterways to manage stock access makes it more difficult to control pest plants and animals.*
- 33% Disagree (and 39% Unsure) that *Reducing the number of dams would lead to improved flows in waterways.*

Those implementing the Plan should acknowledge that substantial proportions of property owners are concerned about infringements on their private property rights and set out to understand the basis for those views and respond where that is likely to be productive. For example in relation to controls on water harvesting (e.g. by dams), 92% Agree that *Dams provide an important source of water to protect life and property during bushfires.* And, *Risk to life and property from wildfires was the highest rated issue* (83% gave an Important rating). Written comments included in surveys suggest at least some property owners believe others (i.e. governments acting on behalf of downstream interests) are imposing unreasonable limits on their property rights. In some instances the best approach may simply be to focus engagement around the priority issues and shared values identified through the survey. At least in the early years of Plan implementation as trust is established.

EXECUTIVE SUMMARY

Survey data suggests there is considerable scepticism about the motivations of others and that this predisposition not to trust is consistent across geography and the extent of farmer identity. For example, half of the respondents Agree that *People are almost always interested only in their own welfare*. Again, there are obvious implications for those setting out to engage property owners. The trustworthiness elements of capability (i.e. competence); benevolence (i.e. demonstrating that the other party's interests are important); and integrity (i.e. working from a foundation of shared values and "walking the talk") provide a useful framework to assess and improve engagement with property owners.

There is considerable variation in the extent best-practice management has been implemented by respondents over the past three years and their full period of management. For example, implementation across the period of management varied from 42% of respondents (*installed off-stream watering points*) to 1% (*decommissioned an existing dam*). Where there are differences on the extent of farmer identity, those with a stronger farmer identity were more likely to act. However, it seems the real difference is often between Non farmers and the other cohorts. Given that NF comprise 44% of UCC owners with properties of 2 hectares and above, those setting out to implement the Plan will need to consider the extent they need to engage the NF cohort.

Fifteen survey items explored respondent's knowledge of property management. There are large variations (i.e. from 69% to 20%) in the proportion of respondents indicating they had sufficient knowledge to act (i.e. Sound knowledge). Assuming that awareness and knowledge are precursors to action, it seems these are important constraints for many UCC property owners, especially those identifying as Hobby and Non-farmers.

The five most frequently reported sources of information for property management identified by respondents are:

- Friend/neighbours and relatives.
- Books/magazines/journals.
- Bureau of Meteorology.
- Newspapers.
- Internet.

These sources are spread across old and new technologies, government and non-government organisations and mass media and personal communication channels. A key point is that none of these sources is reported by >50% of respondents, reinforcing the need to employ multiple communication channels and approaches.

Non farmers were no more likely than Full-time farmers to identify the internet as a source of information about their property or use YouTube, Facebook, Twitter or Instagram to do that in the past 12 months. While it is possible this large cohort doesn't use these platform to any great extent, the more likely explanation is that they are simply not sufficiently motivated by aspects of property management to do so.

The importance of personal or one-to-one engagement is highlighted by the high proportion of respondents identifying friends/neighbours and relatives as a source of information. This finding also suggests that those setting out to engage property owners need to investigate the extent there are social norms and beliefs that are likely to enable or constrain achievement of their objectives. Landcare group/network was one of four sources identified by ~30% of all respondents across the four farmer identity cohorts.

EXECUTIVE SUMMARY

SOME CONCLUDING COMMENTS TO GUIDE ENGAGEMENT

The obvious place to begin is with the Plan which should include statements that address questions about:

1. The nature and extent of desired change in land use and management (spatial and temporal).
2. Where effort is to be focussed?
3. Which groups of property owners are to be engaged in those areas (based on extent of farmer identity; and different enterprise or land uses (e.g. horses; large gardens)?
4. For each area, and then each cohort, consider the appropriateness of the possible policy instruments: prescription; penalties; payments; persuasion (so not property rights).
5. As part of those deliberations, consider the extent:
    - there are best practices and level of confidence in those;
    - there are public and private benefits of best practice implementation and the balance between those;
    - that best practice represents a large shift in the duty of care of property owners;
    - of property turnover and the opportunities and challenges presented;
    - that success requires long-term commitment by property owners; and
    - volunteers will make a difference, are available and will be cost-effective.
6. If move to persuasion,
    - develop appeals based on property owners' values and priority issues;
    - address lack of confidence in best practices, including through trials and group-based learning;
    - use existing platforms (e.g. Landcare);
    - develop strategies to address constraints to engagement, including those related to concerns about private property rights and lack of trust; and
    - ensure that advisory groups, workshops, trials engage a cross section of property owners, including absentee owners.

1. INTRODUCTION

The Upper Coliban Catchment (UCC) is part of the Hepburn and Macedon Ranges shires and is located just to the north of Melbourne and south of Bendigo [Figure 1]. The UCC includes the Lauriston, Malmsbury and Upper Coliban reservoirs and provides drinking water for over 130,000 people. The UCC provides additional environmental, social, cultural and economic values and these values are threatened by existing and future developments, uncontrolled livestock access to waterways and riparian areas and from climate change.

In response to these threats, Coliban Water (CW) and the North Central Catchment Management Authority (North Central CMA) worked with other stakeholders (landholders, local Landcare groups, local and Victorian government agencies and Goulburn Murray Water) to develop an Integrated Catchment Management Plan (the Plan). The Plan has a 20 year horizon. At an estimated cost of $10.8 million over the first 10 years, the Plan is intended to ensure a safe and secure water supply for communities in central and northern Victoria along with enhanced river, biodiversity and catchment health outcomes.

Rural landowners are key stakeholders in the Plan. Rural landowners own most of the land in the UCC, their management actions directly influence the condition of water and vegetation, and in turn, the condition of those assets influences their livelihoods, well-being and wealth (including property values).

Changing human behaviour can be difficult, and engaging rural landowners in practice change is no exception. As is explained further in the next section, there is a large set of possible factors influencing landowner decisions and these vary according to each technology, landowner, social context, intervention and over time. Unless there are strong economic drivers supporting implementation, effecting change is often problematic because the private benefits of action by rural landowners to address environmental degradation are often uncertain. There is also limited commitment by governments to legislate and/or enforce compliance. With some issues the way forward is uncertain (i.e. where we are headed and how to get there).

Further complicating the task for those implementing the Plan in the UCC is the scope and pace of social change in rural areas in south eastern Australia. As conceptualised by the Multifunctional Rural Transition (Holmes 2006), many rural areas are increasingly shaped by a mix of production (e.g. agriculture), consumption (e.g. recreation) and conservation values (Barr 2005). Agriculture typically remains the dominant land use, but primary production is not the principal focus of most landowners.

The scope and pace of these changes is particularly acute in those parts of the North Central CMA region, including the UCC, that are close to Melbourne (Curtis and Mendham 2015). There are typically more landowners with more diverse interests, increased numbers of smaller land parcels, more diverse land uses/ enterprise types, more non-resident landowners and more landowners with limited understanding of natural resource management (NRM) and connection to existing NRM networks (Curtis and Curtis 2018).

Given this context, and the North Central CMA staff experience with “social benchmarking”, Decoy Marketing was contracted to complete a social benchmarking study for the UCC. Professor Curtis first developed the “social benchmarking for regional NRM” methodology in 1998 and has applied this approach across three Australian states, including most of Victoria’s NRM regions. Recent surveys have been completed in the North Central (Curtis and Mendham 2015) and Wimmera (Curtis and Mendham 2017).

1. INTRODUCTION (CONT.)

Social benchmarking data are gathered using mail surveys and typically cover topics that inform engagement (i.e. issues of concern, values, beliefs, knowledge); intended and past implementation of recommended NRM practices; and possible ways of effecting change (e.g. providing information and training, participation in groups, funding from government). Data gathered are spatially referenced so that summaries can be prepared for different geographies (e.g. environmental assets or shires).

Information from the Hepburn and Macedon Ranges Councils suggested that approximately 1,300 landowners had properties 2ha and above and these owners managed most of the 22,000 ha within the UCC. The proposal was to survey half of those landowners. When Council staff provided their lists and those with multiple properties were removed, there were 851 potential respondents. The decision was taken to survey all landowners on this combined list (i.e. a census).

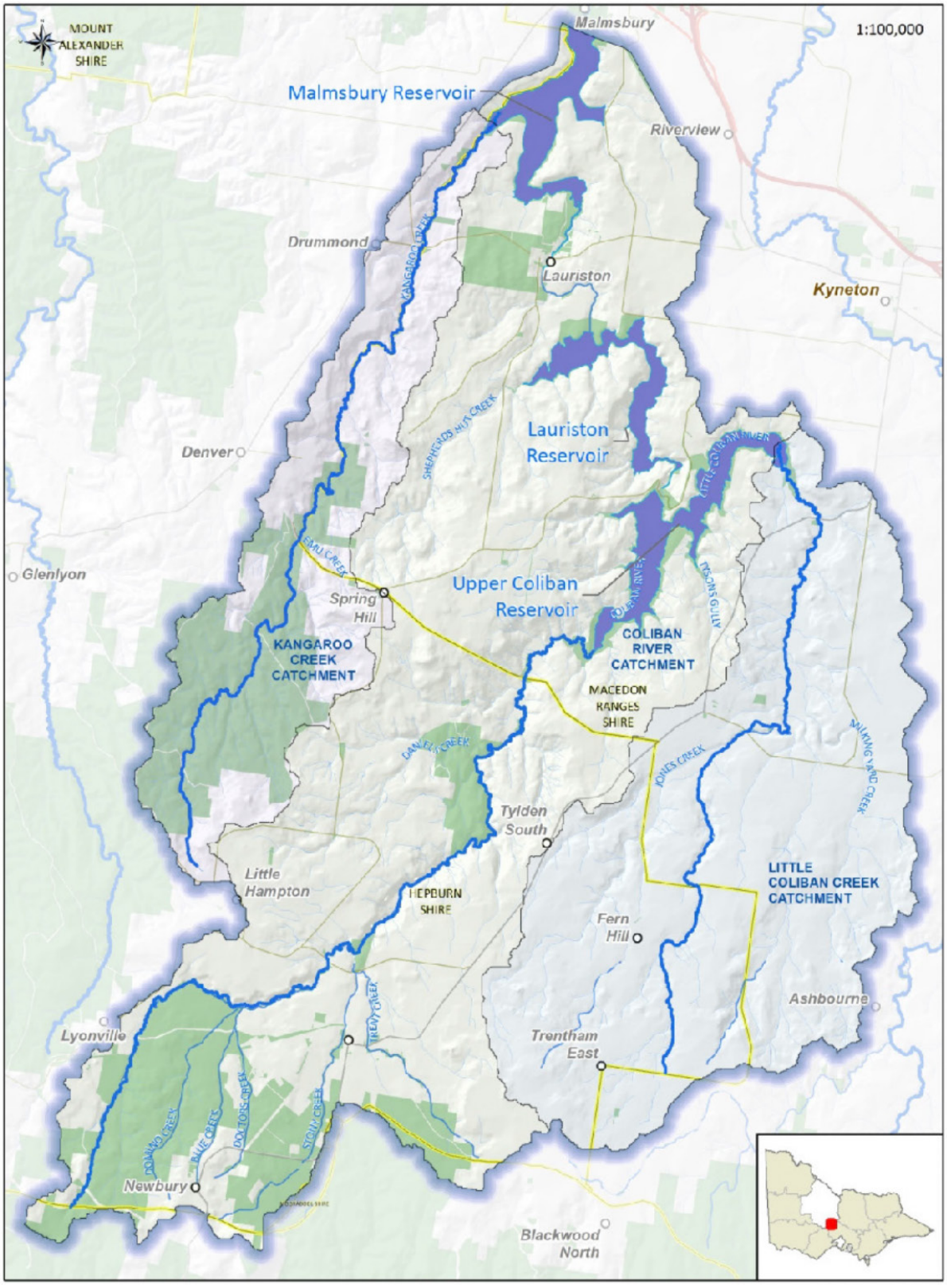
The survey and cover letter were developed through a series of workshops with CW and North Central CMA staff. Draft surveys were prepared and revised, including in response to feedback from Dr Emily Mendham.

The initial mail package of a survey, cover letter and return envelope was followed by three reminder/ thankyou notes posted at weekly intervals. After another two weeks, a complete mail package was posted to non-respondents, followed by two reminder/ thankyou notes. Survey recipients were provided with Professor Curtis' email and home phone number if they wanted to discuss the survey. About 25 people emailed or phoned and most of these people completed surveys.

After removing the small number of "return to sender" and other accepted reasons for nonresponses (combined total of 29), there were 413 returned surveys for a response rate of 50%.

1. INTRODUCTION (CONT.)

FIG 1. LOCATION OF UPPER COLIBAN CATCHMENT IN VICTORIA



2. CONCEPTUAL FRAMEWORK

2.1. KEY CONCEPTS EXPLAINED

- Values: guiding principles/what is important to people.
- Beliefs: what we think is true.
- Norms: how we/others think we ought to behave. These can be personal norms or social norms.
- Attitudes: what we think should happen in relation to a specific social issue.
- Knowledge: grasp of facts, understanding of process.
- Skills: ability to implement or perform a task.
- Trust: willingness of those who are vulnerable to rely on others, which in part depends on the trustworthiness of those seeking to be trusted. Trustworthiness is based on assessments by others of our ability, benevolence and integrity.
- Institutions: "rules of the game" (i.e. not the same as organisations).

2.2 WHAT THEORY AND EMPIRICAL RESEARCH TELLS US: A USEFUL NARRATIVE FOR THOSE SETTING OUT TO ENGAGE RURAL LANDOWNERS IN THE UCC

2.2.1 Responding to complexity

Changing human behaviour can be difficult, and engaging rural landowners in practice change is no exception. There is a large set of possible factors influencing landowner decisions and these vary according to each technology, landowner, social context, intervention and over time. How then should researchers and practitioners proceed? And what topics should be included in a survey setting out to inform engagement of rural landowners in the UCC?

Unless there are strong economic drivers supporting implementation, effecting change is often problematic because the private benefits of action by rural landowners to address environmental degradation are often uncertain. There is often limited commitment by governments to legislate and/or enforce compliance. And, with some issues the way forward is uncertain, in part because most landscapes have been modified (i.e. where we are headed and how to get there).

Further complicating the task for those implementing the Plan in the UCC is the scope and pace of social change in rural areas in much of Victoria. As conceptualised by the Multifunctional Rural Transition (Holmes 2006), many rural areas are shaped by a mix of production (e.g. agriculture), consumption (e.g. recreation) and conservation values (Barr 2005). Agriculture may remain the dominant land use in, but primary production is not the principal focus of many landowners.

The scope and pace of these changes is particularly acute in those parts of the North Central CMA region, including the UCC, that are close to Melbourne (Curtis and Mendham 2015). There are typically more landowners with diverse interests, increased numbers of smaller land parcels, a large variety of land uses/enterprise types, more non-resident landowners and more landowners with limited understanding of natural resource management (NRM) and connection to existing NRM networks (Curtis and Curtis 2018).

2.2.2 Are there best practices that managers can implement?

Pannell (2011) provides a useful framework for selecting policy instruments. That advice is based around evaluation of the adoptability of the technology (i.e. land use or management practice); and the relative costs of different approaches, including transaction costs.

Curtis and Lefroy (2010) expanded on Pannell's advice by emphasising that NRM occurs in modified environments (i.e. the objective should not be restoration to pre-1788 condition) where we often don't know "Where we are headed?" or "How to get there?" They argue that it is often important to engage landowners (and other stakeholders) in dialogue, learning and action which typically involves engaging and building human (i.e. knowledge and skills) and social capital (i.e. positive social norms, relationships built on trust and reciprocity, networks as platforms).

Where NRM practitioners are confident about the appropriateness of the outcomes they are seeking and the science that links proposed interventions and desired outcomes, they can apply best-practice recommendations. If that is the case, then practitioners need to make an assessment of the adoptability of those practices by rural landowners.

For example, if awareness, knowledge or management skills are an important constraint, then activities that address relevant issues are appropriate. If the constraint is lack of confidence in a recommended practice, perhaps because elements of the technology are unproven or complex, then activities to trial those practices in the local area might be appropriate. If the issue is that the change involves considerable expense and appears to offer limited financial returns to landowners, then some form of cost-sharing between government and private landowners might be appropriate.

For riparian management there are widely accepted best-practices that include fencing riparian areas to manage stock access, providing off-stream watering points for stock, eradicating pest plants and planting trees and shrubs. CW and North Central CMA staff identified important constraints to the adoption of those practices by landowners in the UCC, including lack of awareness of riparian degradation, insufficient knowledge of key threatening processes, insufficient confidence in recommendations and the cost of taking action. These topics were included in the UCC social benchmarking survey.

2.2.3 Values, beliefs and personal norms shape intended behaviour

An individual's behaviour is derived from core elements of their personality and belief structures (Stern 2000). Values–Beliefs–Norms (personal) (VBN) theory (Stern 2000) and related theories arising from the Theory of Planned Behaviour provide important guidance about the information needed to guide NRM practitioner engagement with rural landowners. That is, the focus should be on understanding the values, beliefs and personal norms that guide the intentions and actions of individuals.

Researchers typically distinguish between 'assigned values' and 'held values'. Assigned values are those that individuals attach to specific physical goods, activities or services (Lockwood, 1999). 'Held' values are ideas or principles that people hold as important to them (Lockwood, 1999) and are generally highly abstract, generic and conceptual, but guide personal action (McIntyre, Moore, & Yuan, 2008). Value orientations are the position

a person takes when a particular set of held values are more important to them than other held values (Axelrod, 1994).

The development of VBN theory focused on values and beliefs about environmental consequences based on three broad value orientations: biospheric (concerns about the biosphere), altruistic (concern for others) and egoistic (concern for self). VBN theory hypothesises that environmental behaviour is more likely if the individual believes that there may be adverse consequences for something that they value highly (Stern, Dietz, & Kalof, 1993).

Individuals can hold more than one value orientation simultaneously (Lockwood, 1999; Stern, 2000). This is an important point and one confirmed by results of social benchmarking surveys across Victoria. Indeed, across all regions, almost all respondents give a high rating to items measuring social, economic and environmental held and assigned values (Curtis and Curtis 2018).

The highest rated held value item in the North Central region in 2015 was *Looking after my family and their needs*. The reality is that most landowners have commitments beyond NRM and when there is a conflict between values, family is likely to come first.

For the UCC social benchmarking survey the focus is on assigned values (i.e. Why your property is important to you?). Previous research in the North Central (Curtis and Mendham 2015) demonstrated significant relationships between these items and items developed by Stern to measure biospheric and egoistic value orientations. The items developed for this topic in the UCC survey drew extensively on previous research by those working with Professor Curtis, including in the North Central region (Seymour, Curtis, Pannell, Allan, & Roberts, 2010). The 17 items focussed on the importance of the farm business, relationships with the family and wider community and the local environment.

Some beliefs and attitudes related to private property rights appear to be important for a minority of landowners who are likely to be difficult to engage in NRM. For example, about one in four landowners in the North Central region are concerned about protecting private property rights and this may be an impediment to their engagement in government programs. The UCC survey included items exploring landowners' beliefs about the primacy of private property rights; and the extent climate change is a human induced phenomenon.

VBN and related theories arising from the Theory of Planned Behaviour do not account for the larger set of factors, including seasonal conditions and markets that influence land use and management decisions by rural landowners (Pannell et al. 2006). While it is possible that values, beliefs and personal norms (VBN) may mediate or moderate some of these other factors, it is difficult to change these deep-seated personal attributes (i.e. VBN) in the short or medium term. Nevertheless, it is critical to understand the values and beliefs of landowners if they are to be effectively engaged.

2.2.4 Effective interventions

Researchers have also identified what can be considered "levers" to effect change (e.g. improving knowledge and management skills); and processes or platforms that are effective for engaging landowners in learning,

dialogue and action (e.g. Landcare and commodity groups). Government programs that engage landowners, including through cost-sharing where there are public benefits from work on private property, can also have a positive influence on adoption of best-practice NRM.

The UCC survey included a topic asking respondents to self-assess their knowledge across 15 items. The survey also included items exploring engagement through various platforms (e.g. Landcare and commodity groups) and processes (e.g. training, field days, government programs). The survey topic exploring implementation of best practices asked about the extent those actions were supported by resources from other sources.

Social norms are an important but often neglected aspect of a community's social capital. Of course, social norms can be both positive and negative influences on NRM (Minato et al. 2010). Indeed, a key outcome of Landcare participation has been the establishment of positive social norms about what sustainable farming involves in a local context (Curtis et al. 2014). Social norms are best identified through qualitative research within a community where there are "ties that bind". However it is possible to explore personal norms through surveys and these may reflect social norms. The UCC included one item exploring the extent each respondent thought they had a personal responsibility to maintain the quality of water leaving their property.

Trust (i.e. willingness to rely on others) is an important element of the social capital of organisations, whether they be government agencies, private businesses or volunteer organisations. Where trust in an organisation is high, partners will be more likely to accept advice, enter partnerships to develop and implement plans, forgive mistakes and provide positive recommendations to others (Sharp and Curtis 2014).

A key point from the limited number of studies examining landowner trust in NRM organisations is that many rural landowners are not predisposed to trust others (e.g. Curtis and Mendham 2017). Judgements about the trustworthiness of individuals and organisations also influence landowner willingness to trust. Trustworthiness involves assessments of three key elements: capability; benevolence; and integrity (Sharp and Curtis 2014).

The UCC survey included measures of respondent's predisposition to trust (Leahy and Anderson 2008; Smith, Leahy, Anderson and Davenport 2013); judgements of the trustworthiness of CW and the North Central CMA; and trust in (i.e. willingness to rely on) CW and the North Central CMA. The topics of focus were the management of land, waterways and biodiversity for North Central CMA; and managing water storages for CW.

2.2.5 The role of farmer identity

There is evidence that an increasing proportion of rural landowners in parts of Victoria are identifying as non-farmers by occupation (Curtis and Curtis 2018). Farmer identity is an important influence on the extent landowners are engaged in NRM, their knowledge and management skills and the adoption of best-practices for sustainable farming and biodiversity conservation (Curtis and Mendham 2015; Groth et al. 217).

An associated trend is for considerable change in property ownership, estimated at 4% to 5% per annum across Victoria, including the regions surrounding the UCC (Mendham and Curtis 2010). That rate of change suggests 40-50% of rural properties will change ownership in a decade. New and longer-term property owners are

different and those differences present both a challenge and opportunity for NRM practitioners. For example, new owners are typically less experienced and knowledgeable about NRM and less connected to existing NRM networks. At the same time, new owners are typically more committed to environmental values and less reliant on on-property income and are often seeking advice about ways to better manage their properties.

One of the responses of social researchers tasked with advising practitioners on effective landowner engagement is to develop typologies that distinguish groups/ types based on key attributes. Those attributes might include the main industry (e.g. forestry or farming), enterprise type (e.g. dairy, beef, sheep, horticulture), land class (e.g. floodplains or hills), management approaches (irrigation or dryland, adoption of conservation practices), property types (large or small), and/or personal characteristics such as values or attitudes.

Typologies appeal as a useful aid for NRM practitioners if they include all rural landowners (e.g. not just farmers by occupation); are soundly based (i.e. grounded in relevant theory); and are constructed using reliable methods (e.g. not based on the intuition of researchers). Unfortunately, there are few examples where those criteria have been met. It is also important that typologies enable NRM practitioners to readily identify different cohorts when the engage rural property owners.

As part of her PhD, Theresa Groth included a series of items in the 2014 North Central social benchmarking survey that measured the extent respondents held a farmer identity. Theresa's Farmer Collective Identity Construct scale (FCIC)) has 12 items across seven dimensions (i.e. self-categorisation; behavioural involvement; evaluation; importance; social embeddedness; attachment and sense of independence) (Groth et al. 2016).

The technical report for the North Central study (Curtis and Mendham 2015) and five journal papers provide a comprehensive explanation of how the FCIC scale was developed; the items included; the results of tests of scale reliability and validity; the approach to typology development; characteristics of the four types of landowners (Full-time farmers, Part-time farmers, Hobby farmers, Non- farmers); and implications of farmer identity for NRM. The key points for readers are that:

1. Farmer identity is an important influence on land use and management.
2. Part-time farmers are an important cohort, distinct from Hobby farmers and closer to Full-time farmers in that they typically have a strong business focus.
3. Occupational identity varies spatially with distance from Melbourne and Bendigo, across the three key environmental assets identified by the North Central Regional Catchment Strategy and with the agricultural capacity of land (refer to Groth and Curtis 2017).
4. Theresa Groth's typology provides a useful guide (heuristic) for NRM practitioners setting out to engage rural landowners, including because practitioners can readily classify property owners.

The UCC survey included items exploring the extent of a farmer identity. Given the limitations of space in the survey, Groth's FCIC scale was not included. Instead, respondents were asked to self-classify as either a Full-time farmer (FTF), Part-time farmer (PTF), Hobby farmer (HF) or Non-farmer (NF).

3. DATA COLLECTION AND ANALYSIS

3.1 DATA COLLECTION USING A MAIL SURVEY

Initial information from the Hepburn and Macedon Ranges Councils suggested there were approximately 1,300 landowners with properties of 2ha and above and these owners managed most of the 22,000 ha within the UCC. The proposal was to survey half of those landowners. When Council staff provided their lists and those with multiple properties were removed, there were 853 potential respondents. The decision was then taken to survey all landowners on this combined list (i.e. a census).

The survey and cover letter were developed through a series of workshops with CW and North Central CMA staff (i.e. the Technical Working Group or TWG). Those discussions and subsequent email correspondence were facilitated by Professor Curtis.

Applying the conceptual framework explained in the previous section, the TWG worked with Professor Curtis to identify the key survey topics. Dr Emily Mendham provided an independent peer-review of the final draft survey.

The number of topics and items within each topic were constrained by the reality that survey length affects response rates. Working with a 16 page booklet, a front cover page (including photos), an inside cover where much of the cover letter is repeated and a rear cover page with a map of the UCC left 13 pages for content. A large font was employed to ensure readability. Topics included in the final survey [refer to Appendix 1] were:

1. Why your property is important to you? (i.e. assigned values).
2. Long-term plans for your property.
3. Your assessment of issues.
4. Your views (i.e. beliefs, attitudes, confidence in best-practice management).
5. Predisposition to trust and belief in human induced climate change.
6. Trust in and trustworthiness of North Central CMA and also, Coliban Water.
7. Land use and enterprise mix.
8. Management actions on your property.
9. Knowledge of management actions expected to lead to better riparian condition, improved health of native vegetation and better water quality.
10. Sources of information.
11. Background information about the respondent and their property, including extent of a farmer identity.

The initial mail package of a survey, cover letter and return envelope was followed by three reminder/ thank you notes posted at weekly intervals. After another two weeks, a complete mail package was posted to non-respondents, followed by two reminder/ thank you notes. Survey recipients were provided with Professor Curtis' email and home phone number if they wanted to discuss the survey.

Removing the small number (n=29) of "return to sender" and other accepted reasons for nonresponses (e.g. owner overseas, owner incapacitated, owner deceased, property sold), resulted in 822 possible respondents. With 413 completed and returned surveys, the overall response rate is 50%. Three respondents had removed the number for their surveys and so these surveys could not be allocated to either the Hepburn (n=246) or Macedon Ranges (n=164) LGA. However, those data are included in the tables and charts summarising results for each survey topic.

3. DATA COLLECTION AND ANALYSIS (CONT.)

The advantages of a mail survey include that a large proportion of potential informants can be included (e.g. compared to public meetings, workshops or face-to-face interviews); a substantial number of topics can be covered (e.g. compared to a phone interview); informants can come to the survey when they are ready/ comfortable and without any travel costs (compared to a public meeting or workshop); they are accessible by all landowners (compared to a web-based survey or even a phone interview); and there is no bias imposed by the interviewer (mostly unintended).

However, all research instruments have their limitations. With a survey, the key issues are that topics and items are designed so that respondents are able to respond in ways that reflect their views; and achieving a response that gives confidence that results reflect the views of the population surveyed.

Many of the survey items had been previously employed by Professor Curtis and judged to be valid and reliable. The TWG and Dr Mendham also provided practitioner and expert assessments of each item.

About 25 people emailed or phoned with questions or comments about the survey. Most of these people completed surveys. The number of emails and phone calls was very low compared to other surveys led by Professor Curtis.

A survey response rate of ~50% is accepted as international best-practice. That is, this is the response rate that can be expected using best-practice for a postal survey. With this level of response it is also unlikely that the responses of non-respondents would be so different as to significantly change results. It seems that the topic was important/ relevant, partly because the survey covered a small area and it was clear that actions were to be taken based on information provided in the surveys; and the survey was well designed and easy to complete (e.g. few of the returned surveys had incomplete sections and this was not an issue raised in phone and email conversations).

Professor Curtis' experience is that there are many reasons for non-responses and these are unlikely to be consistent. For example, some non-respondents may be companies or religious groups with head offices and staff based outside the Upper Coliban Catchment (these were not removed from the list). Others may be busy professionals working in Bendigo or Melbourne who own small properties and think the survey is more relevant to larger property owners. Some non-respondents may be people who are absentee owners who don't have a strong connection with their property. Others may be property owners who don't trust government agencies and are unwilling to provide information to them or have reservations about assurances that their information will be not divulged to others.

It is possible to test for non-respondent bias. One way to do this is to compare respondents and non-respondents on some key attributes, such as age, education, property size or attitudes. With rural landowners it is difficult to obtain those data. For example, non-respondents are likely to be as unwilling to respond to a phone call as complete a survey received through the mail. In any case, we didn't have phone numbers for property owners and these would be difficult to obtain. Another issue is that there is limited readily available data for comparisons to be made. For example, data gathered through the Population and Household Census data are collected by the place of residence on census night (so unlikely to capture many absentee owners).

3. DATA COLLECTION AND ANALYSIS (CONT.)

The 2014 North Central CMA region social benchmarking survey covers some of the topics and items included in the UCC 2018 survey but the surveys are based on very different property sizes. The 2014 survey included properties of 10 hectares and above whereas the 2018 UCC survey included properties of 2 hectares and above. In the UCC survey 41% of properties surveyed were >2 hectares but < 10 hectares.

One option is to compare respondents and nonrespondents using property size data in the Hepburn and Macedon Ranges council data sets. This attribute is an excellent proxy for other attributes, including occupational identify and land use and enterprise type. Those comparisons revealed almost identical median property sizes for respondents (15.6 ha) and non respondents (15.4).

The UCC survey involved a census rather than a representative sample. As such, there is no question about extrapolating from a sample to a population.

3.2 DATA ANALYSIS

Descriptive statistics such as frequencies, means and medians were used to summarise responses to all survey questions ("Not applicable/ Don't know" and missing responses were removed from the analysis of means).

For survey items that asked respondents to specify an amount (e.g. days of paid off-property work in past 12 months) zeros were excluded in the calculation of means and medians (hence, these were treated as a 'no' response). In these situations, the means and medians should be treated as the mean or median of those who had undertaken the practice.

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

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

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

4. RESULTS BY RESEARCH TOPIC FOR UCC

4.1 INTRODUCTION

The following section includes tables and figures presenting descriptive statistics for each survey topic; results of analyses comparing different groups; and analyses exploring relationships between variable. The section begins with a summary of key attributes of "social structure" selected because they provide useful insights for those setting out to engage rural landowners in NRM. The attributes selected are focussed on the landowner and their property, including land use. Data are provided for the UCC and then the two Shires.

Some of the 2018 UCC survey items were also included in the 2014 North Central CMA regional social benchmarking survey (Curtis and Mendham 2015). Those comparisons provide some useful insights. But readers need to remember that four years have elapsed since the 2014 survey. They also need to consider that the UCC forms a distinctive part of the North Central region (closer to Melbourne, extensively subdivided into small properties and many owners are non-farmers by occupation; and the UCC survey included properties of 2 hectares and above whereas the North Central region survey included properties of 10 hectares and above.

For some survey topics, respondents were asked to rate how strongly they agreed with a particular statement, how important an issue was for them, or how likely an outcome or choice was for them. For these topics, respondents were asked to select from six response options (i.e. Likert-type scales). The six options typically ranged from: 1 (Highly unlikely, Not important, Strongly disagree) to 5 (Highly likely, Very important, Strongly agree). Not applicable and Not applicable/Don't know was a separate response option (i.e. number 6).

To simplify data presentation, the six response options have been collapsed into four categories: Unimportant (combining Not important and of Minimal importance), Some importance; Important (combining Important and Very important); and Not applicable/Don't know. For items asking respondents whether they agreed with a statement, the response options have been collapsed into Disagree (Strongly disagree and Disagree); Unsure; Agree (combining Agree and Strongly agree); and Not applicable/Don't know. For questions asking the likelihood of a certain outcome, response options have been collapsed into Unlikely (Highly unlikely and Unlikely); Unsure; Likely (Likely and Highly likely) and Not applicable/Don't know.

Mean values are reported in the tables for many survey items. Those tables are typically sorted according to means (highest to lowest). In each case the mean is calculated from a range between 1 (Strongly disagree/Not important/Highly unlikely) through to 5 (Strongly agree/Very important/Highly likely). That is, Not Applicable or Not applicable/Don't know were removed for the calculation of means. A mean of 4 can be interpreted as a high level of agreement, concern or knowledge, while a mean of 2 can be interpreted as a lower level.

4.2 SOCIAL AND FARMING STRUCTURE: A SUMMARY OF KEY ATTRIBUTES

Data presented in Table 1 illustrate some key attributes of the property owners (and their properties) in the Upper Coliban Catchment (UCC) who responded to the survey. For example, half the property owners are aged more than 60 years (typical of much of rural Victoria); their rural properties are very small by Victorian comparisons; and few owners are engaged in profitable agriculture. Other survey data for key social and farming attributes are summarised in Table 22.

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

Other research in the North Central CMA region has demonstrated that Full-time (FTF) and Part-time farmers (PTF) share a commitment to operating a profitable business. In this study, 75% of respondents identified as Hobby (HF) or Non-farmers (NF) and less than one in three respondents in the UCC said they had any income from agriculture.

Why each property is important to respondents is explored fully in the next section. However, it seems that many UCC property owners are motivated by values beyond the production of food and fibre as part of a farm business. Fewer than 10% of respondents said they had earned a net profit from agriculture last financial year. On the other hand, 40% of respondents reported a large garden as a land use in 2018.

Given the data about property size, enterprise type and the extent of farmer identity, it is not surprising that half the respondents spend less than 10 hours per week working on-property. With a median age of 61 years and what appears to be limited time working on or off-property, many respondents may be retired or semi-retired.

These data provide useful insights for those setting out to engage property owners in the UCC. However, summary statistics often conceal important differences across respondents. In Table 1, this heterogeneity is illustrated by notations indicating if there are statistically significant differences for each attribute with geography (in this case the two LGA) and the extent respondent's self-identify as a farmer. Some of the differences in these key attributes include:

- Full-time farmers (FTF) are typically older (median 67 years) than those in the other three cohorts.
- FTF own larger properties (84 hectares), followed by PTF (40 hectares), HF (15 ha) and NF (8 ha).
- Non-farmers (NF) are more likely (39%) to reside elsewhere compared to the other cohorts (e.g. 29% for Hobby farmers, 23% for Part-time farmers). FTF (14%) is the cohort most likely to reside on their property.
- Two-thirds of FTF said they cropped part of their property, but only 17% of PTF cropped and 4% of HF (only 1 NF).
- A large garden was identified as a land use by almost half of the HF (50%) and NF (46%) cohorts compared to 31% of PTF and 20% of FTF.
- NF (44%) are more likely to plan to sell their property than those in the other cohorts (all ~20%).

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

TABLE 1: SOCIAL AND FARMING STRUCTURE: KEY ATTRIBUTES UPPER COLIBAN CATCHMENT SOCIAL BENCHMARKING STUDY, 2018 (N=413)

Topic	Upper Coliban Catchment N=413	Hepburn LGA n=246	Macedon Ranges LGA n=164
Age of respondent (property owner) #	61 years	61 years	62 years
Property normal place of residence #	69% Yes	66% Yes	74% Yes
Dwelling on property	86% Yes	86% Yes	85% Yes
Years owned property in UCC * #	15 years	14 years	18 years
Area of property in UCC #	16 ha (median)	10 ha	21.5 ha
Income from agriculture 2017/18 #	31% Yes 9% a net profit	27% Yes 10% a net profit	36% Yes 9% a net profit
Land use in 2018: ***Large garden **** ***Beef cattle * #*** ***Horses (stud to rec) #*** ***Cropping * #***	 42% Yes 40% Yes 17% Yes 9% Yes	 41% Yes 25% Yes 12% 12%	 43% Yes 41% Yes 24% Yes 3% Yes
Hours worked per week on-property * #	10 hours (median)	12 hours	10 hours
Days worked off-property last year #	50 days (median)	45 days	50 days
Extent identify as a farmer *	*Full-t* 10%, *Part-t* 15%, *Hobby F* 31%, *Non F* 44%	*Full-t* 10%, *Part-t* 10%, *Hobby F* 28%, *Non F* 52%	*Full-t* 11%, *Part-t* 22%, *Hobby F* 35%, *Non F* 32%
Long-term plans: ***Property sold*** ***Stay in family #***	32% *Likely/Highly Likely* 47%	28% *Likely/Highly Likely* 49%	39% *Likely/Highly Likely* 44%

Note: Three surveys not allocated to LGA.
*Denotes significant difference across the LGA. #Denotes significant difference by extent of farmer identity. All tests were Kruskall-Wallis rank sum tests with chi-square outcomes, p values all <0.05.

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

4.2 WHY YOUR PROPERTY IS IMPORTANT TO YOU? (ASSIGNED VALUES)

The 17 items in this topic [refer to Table 2] explored the importance of a mix of social (blue shading), economic (grey) and environmental (green) values that respondents were expected to attach to their properties. As explained, it is difficult to change values but they are critical information for those setting out to effectively engage property owners in NRM. The results presented in Table 2 and Figure 2&3 provide useful insights about how practitioners can describe the benefits of NRM interventions in the UCC.

The five items with the highest mean scores were either social or environmental. Almost all respondents rated *An attractive place/area to live* as an Important value for their property. Over two-thirds of respondents gave an Important rating to *Being able to pass property to others in better condition, An escape from the pressures of city living* and *Provides places for native birds to live*.

The high ratings and rankings of these items, especially for A*n escape from the pressures of city living*, and the low ratings and rankings for most of the economic items illustrates the extent the UCC has transitioned from a productivist to a multi-functional landscape. For example, of the three items exploring economic values, two are ranked 16 and 17 out of a possible 17 on mean scores (i.e. *An important source of household income*, and *Sense of accomplishment building/maintaining a viable business*). It is interesting that the latter item does not refer to a farm business, suggesting most respondents are not interested in operating a business of any type, perhaps because they are retired/semi-retired. The highest ranked economic item is *An asset that is an important part of family wealth*.

There are only two examples where there are statistically significant differences across the two LGA [Table 2]: *A great place to raise a family* (higher for Macedon Ranges); and *Provides a sense of belonging to a community* (higher for Hepburn). For both LGA and both items ~half the respondents gave an Important rating. About 20% of respondents selected the Not Applicable response option.

There are eight examples of statistically significant differences in the ratings provided by the four cohorts based on the extent of farmer identity [Table 3 and Figure 3] suggesting that it will be more useful to focus on farmer identity as a way of exploring diversity amongst respondents. Those differences reveal some important trends:

1. No significant differences on farmer identity across the three environmental values items.
2. Positive linear relationships between farmer identity and two of three economic values items: *important source of household income; accomplishment from building a viable business* (i.e. FTF, PTF, HF and NF in that order on mean scores).
3. Negative linear relationships between farmer identity and two social values items focussed on *escaping the pressure of city living/break from normal occupation*; and a similarly negative linear relationship for property being a *place or base for recreation* (typically NF, HF, PTF and FTF in that order on mean scores).
4. Positive linear relationships between farmer identity and *passing property on in better condition*; and *accomplishment from producing food and fibre for others* (FTF, PTF, HF and NF in that order on mean scores).
5. A non-linear relationship between farmer identity and *an asset that is an important part of family wealth* (higher mean scores for PTF and HF compared to FTF and NF).

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

TABLE 2: VALUES ATTACHED TO PROPERTY
UPPER COLIBAN CATCHMENT SOCIAL BENCHMARKING STUDY, 2018 (N=413, N=391-397)

Attached values	Mean	Not important	Some importance	Important	Not Applicable
An attractive place/area to live	4.57	3%	4%	90%	3%
Being able to pass property to others in better condition #	4.22	5%	15%	78%	2%
An escape from the pressures of city living #	4.20	9%	9%	68%	13%
Location provides easy access to Melb and/or Bendigo	3.87	12%	17%	66%	4%
*A great place to raise a family **	3.82	16%	9%	53%	22%
Work on the property welcome break from normal occupation #	3.70	11%	18%	47%	24%
*Provides a sense of belonging to a community **	3.57	15%	29%	52%	4%
A place or base for recreation #	3.52	21%	18%	54%	8%
Sense of accomplishment from producing food and fibre for others, including family #	3.47	21%	20%	45%	16%
Opportunity to learn new things	3.26	21%	32%	41%	6%
Provides access to cultural activities/events, including food, wine, music, arts, sports	3.03	30%	29%	34%	7%
Provides places for native birds to live	4.09	8%	18%	72%	3%
Native vegetation provides habitat for birds and animals	3.99	9%	20%	69%	2%
Opportunity to conserve part of a unique Aust landscape	3.81	12%	24%	60%	3%
An asset that is an important part of family wealth #	3.87	14%	20%	64%	3%
Sense of accomplishment building a viable business #	2.98	29%	10%	31%	30%
An important source of household income #	2.49	42%	13%	20%	25%

Note. Mean scores calculated after removing N/A responses. So mean out of 5.
An escape from the pressures of city living identified as a significant difference but clouded by large % (40%) of Not applicable ratings for FTF.
*Denotes significant difference across the LGA. #Denotes significant difference by extent of farmer identity. All tests were Kruskall-Wallis rank sum tests with chi-square outcomes and p values <0.05.

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

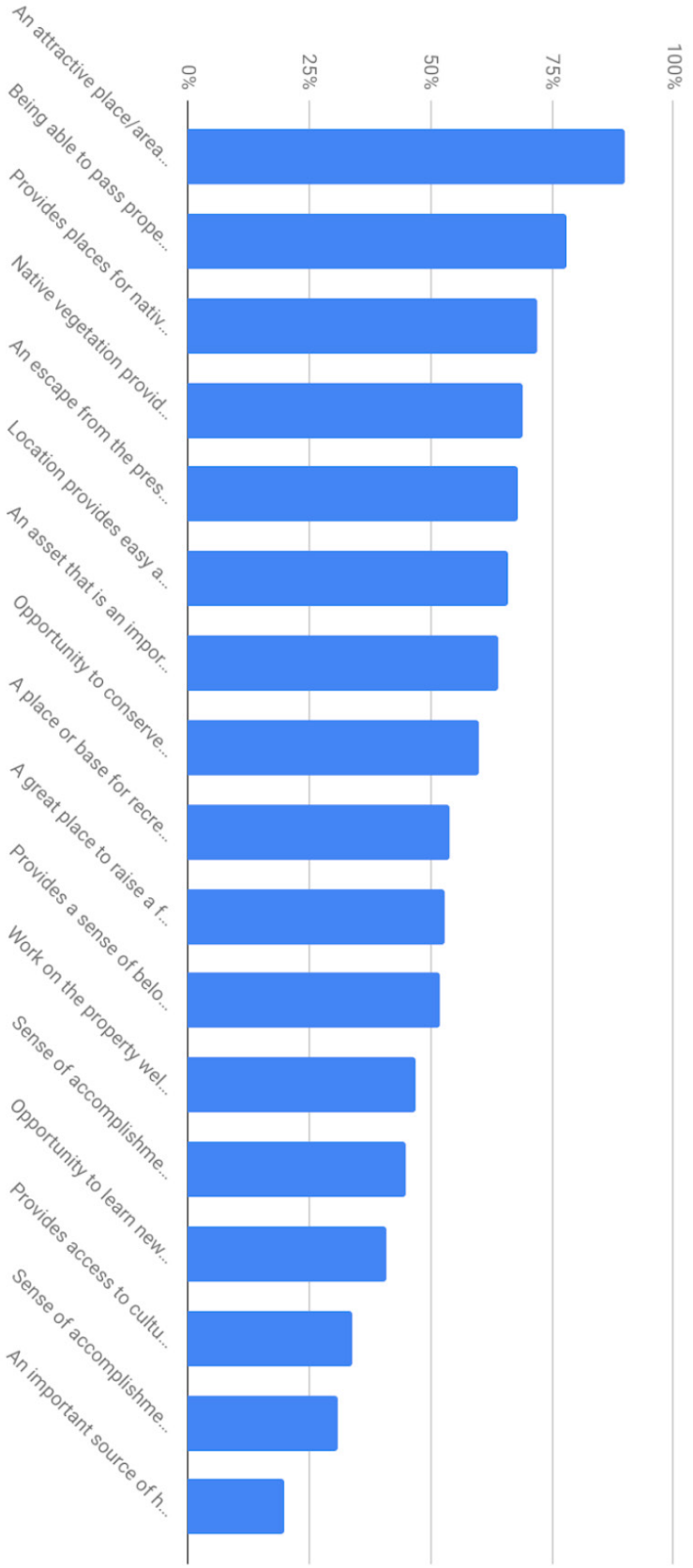


FIG 2. VALUES ATTACHED TO PROPERTY BY IMPORTANT RATING

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

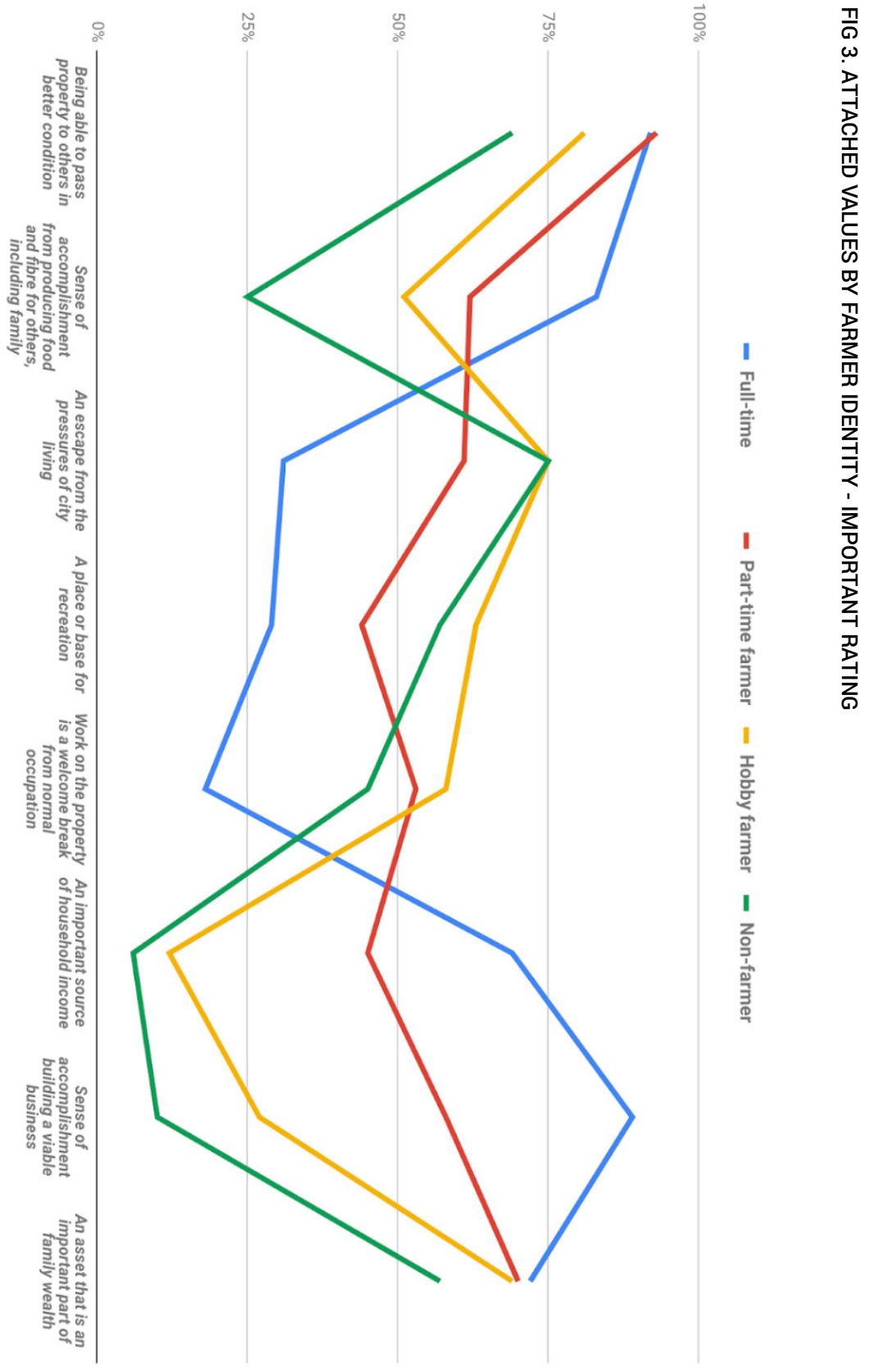
TABLE 3: SIGNIFICANT DIFFERENCES IN VALUES ATTACHED TO PROPERTY BY COHORTS BASED ON EXTENT OF FARMER IDENTITY
UPPER COLIBAN CATCHMENT SOCIAL BENCHMARKING STUDY, 2018 (N=413, N=391-397)

Attached values items by mean scores and % selected "Important/Very Important rating	Full-time farmer	Part-time farmer	Hobby farmer	Non-farmer
Being able to pass property to others in better condition	4.69 92%	4.47 93%	4.25 81%	4.02 69%
Sense of accomplishment from producing food and fibre for others, including family	4.53 83%	3.77 62%	3.51 51%	3.00 25%
An escape from the pressures of city living	3.52 31%	3.82 61%	4.31 75%	4.39 75%
A place or base for recreation	2.83 29%	3.28 44%	3.70 63%	3.66 57%
Work on the property is a welcome break from normal occupation	2.71 18%	3.64 53%	3.84 58%	3.77 45%
An important source of household income	4.12 69%	3.21 45%	2.23 12%	1.81 6%
Sense of accomplishment building a viable business	4.51 89%	3.5 58%	2.84 27%	2.16 10%
An asset that is an important part of family wealth	3.89 72%	4.16 70%	4.07 69%	3.68 57%

Note: *An escape from the pressures of city living* identified as a significant difference but p is 0.05928 (so >0.05). There is a consistent trend (i.e. inverse linear relationship with farmer identity) and the result is confounded by a very large % of Not applicable ratings for FTF (i.e. 40% compared to <12.5% for each of other cohorts). If these additional N/A for FTF (i.e. those >12.5%) are included as Not important, then the relationship would be statistically significant. All tests were Kruskall-Wallis rank sum tests with chi-square outcomes from 7.434 to 14.334; and p values <0.05 (exception of *An escape from the pressures of city living*).

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

FIG 3. ATTACHED VALUES BY FARMER IDENTITY - IMPORTANT RATING



4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

4.3 LONG-TERM PLANS FOR YOUR PROPERTY

The 15 items in this topic explored the long-term plans of property owners [Table 4 and Figure 4]. Although no time frame was provided, experience with pre-testing social benchmarking surveys suggests that most respondents consider "long-term" as about 10 years. The items focussed on the extent of change in ownership, the subdivision and consolidation of properties, changes in enterprise mix and plans for additional water storage.

A key finding is that most respondents expect there will be little change in their circumstance. For 12 of the 15 items the mean score was <3 out of a possible score of 5, suggesting most respondents were unlikely to implement most of the possible actions identified [Table 4]. The exceptions were *Ownership of the property will stay within the family* (suggesting less change than if property ownership went to a different family), *Increase on-property water storage capacity using tanks* and *I will reduce the extent of my off-property work*. Evidence of stability rather than change includes:

1. 82% said their property is unlikely (including N/A) to be *subdivided*.
2. 73% said they were unlikely (including N/A) to *move off the property around/soon after reaching age 65.*
3. 81% said they were unlikely (including N/A) to *lease or share farm all or most of their property*; and 79% said they were unlikely (including N/A) *to purchase, lease or share farm additional property*.
4. 71% said it was unlikely (including N/A) their *enterprise mix will change to diversify income sources*; and 78% said it was unlikely (including N/A) their *enterprise mix will change to more intensive enterprises*.
5. 77% said it was unlikely (including N/A) they would *place a conservation covenant over some part of their property*.
6. Only 16% (31% indicate they are absentee owners) said they would *shift from an existing residence to live on the property.*
7. 74% said it was unlikely (including N/A) they would *seek additional off-property work.*

Of the possible actions covered in the survey, those with the potential to have the most impact from an NRM perspective are the *transfer of property ownership through sale* (33% said this was likely); *move to a more intensive enterprise mix* (8% Likely); *increase on-property water storage capacity using dams* (19% Likely); *building a new house or substantially renovating an existing home* (28% Likely). Changes in property ownership can present an opportunity for engagement and positive outcomes for NRM or a threat to existing NRM works.

There are three examples where there are statistically significant differences across the two LGA [Table 4]: *The enterprise mix will be changed to diversity income sources* (higher for Hepburn Ranges); *The enterprise mix will be changed to more intensive enterprises* (higher for Hepburn); and *Some part of the property will be placed under a conservation covenant* (higher for Hepburn). Closer scrutiny indicates there is no difference in the proportions of respondents Likely to diversify or intensify their enterprise mix (i.e. 16% for Hepburn and 15% for Macedon Ranges). The statistically significant difference in the means reflects the higher proportion of Macedon Ranges respondents selecting Unlikely (46% compared to 34%).

There are seven examples of statistically significant differences in the ratings provided by the four cohorts based on the extent of farmer identity [Table 5 and Figure 5]. Again, these results suggest that the extent of

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

a farmer identity is a useful way of exploring diversity amongst respondents. Those differences reveal some important trends:

1. Non-farmers are more likely to plan to *sell their property* than the other three cohorts (i.e. FTF, PTF and HF).
2. Most FTF expect their property will stay within the family, as is the expectation for substantial proportions of respondents (40% and above) within the other three cohorts (i.e. PTF, HF and NF).
3. Full-time farmers are more likely than PTF, HF and NF to change their enterprise mix to diversify income sources.
4. Part-time and HF are more likely than FTF and NF to seek additional off-property work.
5. Full-time farmers are ~two times as likely as PTF, HF and NF to say some part of their property will be placed under a conservation covenant. This difference may reflect their values, but also likely to reflect the increased opportunity to do so on much larger properties.

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

TABLE 4: LONG-TERM PLANS: UPPER COLIBAN CATCHMENT SOCIAL BENCHMARKING STUDY, 2018 (N=413, N=391-406)

Long term plans	Mean	Unlikely	Unsure	Likely	Not applicable
Ownership of the property will stay within the family #	3.39	25%	25%	47%	4%
The property will be sold #	2.79	44%	21%	33%	3%
The property will be subdivided and part of the property sold	1.73	72%	10%	8%	10%
I will shift from my existing residential address to live on the property	2.99	16%	10%	16%	57%
I will build a new house or substantially renovate an existing home on property	2.84	32%	12%	28%	27%
I will move off property around/soon after reaching age 65	2.15	52%	16%	10%	21%
All or most of the property will be leased or share farmed	1.86	60%	7%	12%	21%
Additional land will be purchased, leased or share farmed	1.8	63%	11%	10%	16%
*The enterprise mix will be changed to diversify income sources * #*	2.33	39%	13%	16%	32%
*The enterprise mix will be changed to more intensive enterprises * #*	2.05	46%	14%	8%	32%
I will reduce the extent of my off-property work #	3.04	22%	11%	26%	41%
Increase on-property water storage capacity using tanks	3.03	37%	15%	41%	7%
Increase on-property water storage capacity using dams	2.3	56%	14%	19%	10%
I will seek additional off-property work #	2.37	37%	9%	16%	37%
*Some part of the property will be placed under a conservation covenant * #*	1.94	61%	16%	8%	16%

Note: Mean scores calculated after removing N/A responses. So mean out of 5.
* Significant difference across the LGA. # Significant difference by extent of farmer identity. All tests were Kruskall-Wallis rank sum tests with chi-square outcomes and p values <0.05.

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

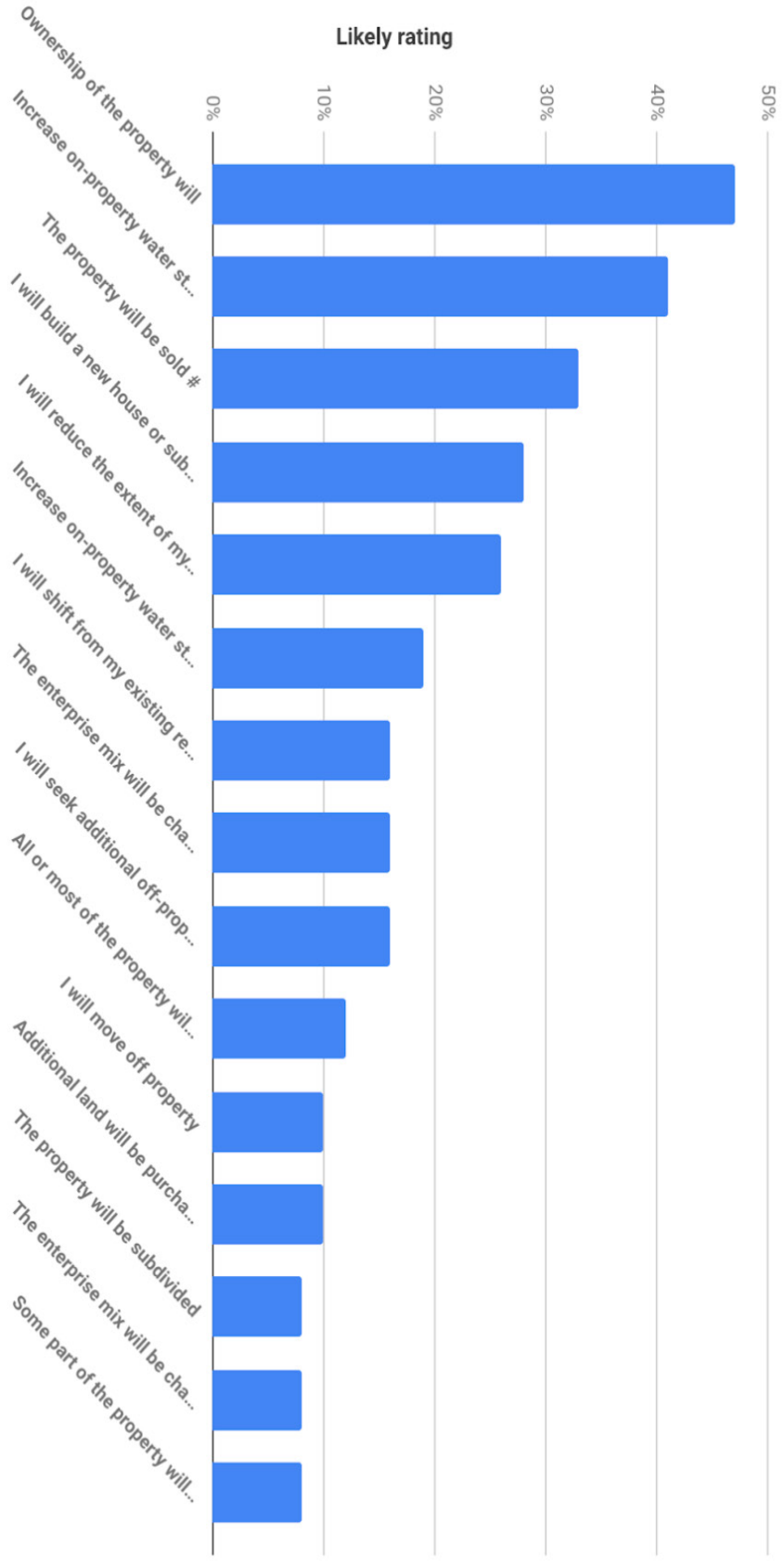


FIG 4. LONG TERM PLANS BY LIKELY RATING

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

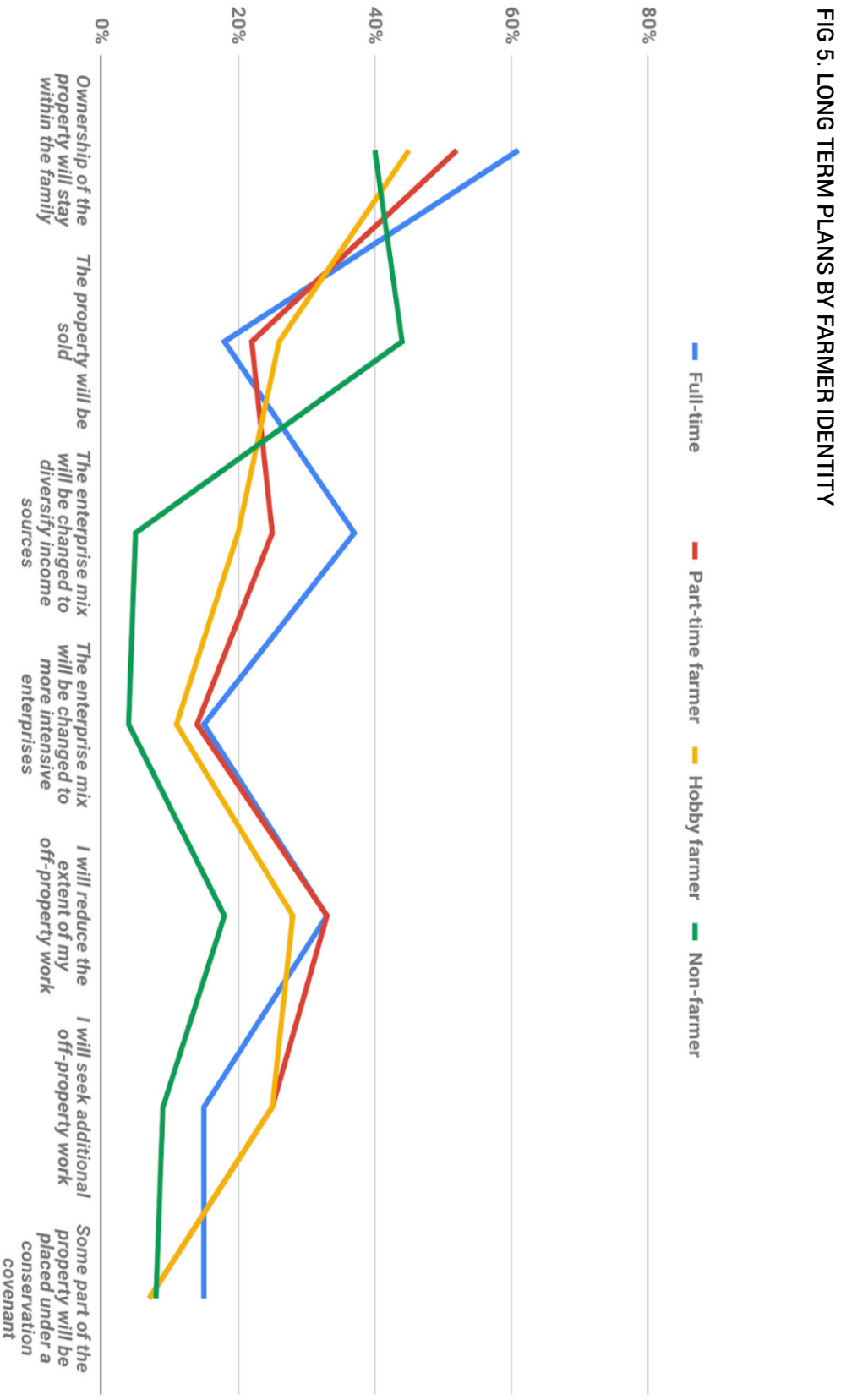
TABLE 5: SIGNIFICANT DIFFERENCES IN LONG-TERM PLANS BY COHORTS BASED ON EXTENT OF FARMER IDENTITY
UPPER COLIBAN CATCHMENT SOCIAL BENCHMARKING STUDY, 2018 (N=413, N=391-406)

Long-term plans items by mean scores and % selected "Likely/Highly likely rating	Full-time farmer	Part-time farmer	Hobby farmer	Non-farmer
Ownership of the property will stay within the family	4.03 61%	3.40 52%	3.37 45%	3.16 40%
The property will be sold	2.26 18%	2.5 22%	2.6 26%	3.2 44%
The enterprise mix will be changed to diversify income sources	3.09 37%	2.54 25%	2.40 20%	1.80 5%
The enterprise mix will be changed to more intensive enterprises	2.32 15%	2.30 14%	2.14 11%	1.68 4%
I will reduce the extent of my off-property work	3.13 33%	3.00 33%	3.13 28%	3.00 18%
I will seek additional off-property work	1.97 15%	2.59 25%	2.60 25%	2.26 9%
Some part of the property will be placed under a conservation covenant	2.15 15%	1.81 7%	1.86 7%	2.01 8%

Note: Mean scores calculated after removing N/A responses. So mean out of 5.
All tests were Kruskall-Wallis rank sum tests with chi-square outcomes from 9.951 to 24.656; and p values <0.05.

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

FIG 5. LONG TERM PLANS BY FARMER IDENTITY



4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

4.4 YOUR ASSESSMENT OF ISSUES

The 19 items developed to explore the importance of issues can be classified in seven groups. The seven groups are:

1. pest plants and animals (5 items);
2. water quality and supply (4 items);
3. native vegetation (3 items);
4. changing rural landscapes with development (3 items);
5. climate change (2 items);
6. wild fire threat (1 item); and
7. community service provision (1 item) [Table 6].

A key finding is that all of the issues listed resonate with most respondents. For example, all mean scores were >3 out of a possible 5. The top five rated issues all had mean scores >4. The high level of importance attributed to most issues amongst UCC survey respondents is highlighted by a comparison of similar data from the 2014 North Central CMA regional social benchmarking study (Curtis and Mendham 2015). Eight items were included in both surveys (indicated by the letter *(A)* in Table 6). UCC respondents gave higher ratings to six of the eight items. The exceptions were *Gaps or deficiencies in provision of community services*; and *Long-term negative impacts of property purchased by absentee owners*. There are plausible explanations for lower mean scores for UCC respondents on these items. For example, UCC is close to Melbourne and Bendigo where services are typically more readily available than those parts of the larger North Central CMA region. The items where UCC respondents expressed more concern than respondents to the regional survey focussed on pest plants and animals, native vegetation, climate change and water quality and supply.

The top five rated issues in Table 6 include three of the five items focussed on pest plants and animals. The other top five issues focus on the risks posed by wild fires and the impact of changing rainfall patterns. The bottom five issues include two items focussed on water quality and supply and these issues were rated as Not important by ~25% of respondents.

As indicated in Table 6, there are only two significant differences between the ratings of issues by respondents in Hepburn and Macedon Ranges LGA. The focus is on pest plants and animals and for both items a higher rating is given by property owners in Macedon Ranges:

1. *Poor management of pest plants and animals on private property:* (86% Important compared to 74% Important in Hepburn); and
2. *Increasing numbers of kangaroos and wallabies:* (64% Important compared to 48% in Hepburn).

There are eight items where there are significant differences based on the extent of a farmer identity [Table 6]. There are significant differences across the four farmer cohorts for each of the water quality and supply items; two of the three native vegetation items; one of the two climate change items; and one of the five items focussed on pest plants and animals. There are no significant differences for any items focussed on changing rural landscapes with development (3 items).

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

As is indicated in Table 7, for seven of the eight items there is a consistent trend for increased importance attached to issues as farmer identity declines. That is, NF and HF give a higher rating than do PTF and FTF to issues related to climate change; water quality and supply; and native vegetation. There are two instances where HF give a higher rating than NF but in each case, the NF give a higher rating than the PTF or FTF. The one exception to the overall pattern is for the item *Increasing numbers of kangaroos and wallabies*. For this item the FTF are the cohort most concerned and the trend is for declining level of important across the cohorts to NF.

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

TABLE 6: IMPORTANCE OF ENVIRONMENTAL AND SOCIAL ISSUES
UPPER COLIBAN CATCHMENT SOCIAL BENCHMARKING STUDY, 2018 (N=413, N=397-408)

Environmental and social issues	Mean	Not important	Some importance	Important	Not applicable/ Don't know
Poor management of pest plants and animals on public land	4.33	5%	10%	82%	3%
The impact of pest plants and animals on native fauna and flora (A)	4.20	9%	9%	79%	3%
*Poor management of pest plants and animals on private property **	4.20	6%	13%	79%	2%
Risks to human health from use of herbicides to manage pest plants	3.70	19%	20%	58%	4%
*Increasing numbers of kangaroos and wallabies * #*	3.54	26%	16%	55%	3%
Risk to life and property from wildfires	4.32	6%	10%	83%	1%
Loss of native plants and animals in the landscape (A) #	3.97	10%	18%	70%	2%
Loss of connectivity between patches of native vegetation #	3.67	17%	20%	57%	6%
Stock damage to stream banks and native vegetation along waterways (A)	3.62	17%	23%	54%	7%
Impact of changing rainfall patterns (A)	4.18	10%	13%	72%	3%
Negative impacts of climate change in this area in my lifetime #	3.70	19%	17%	57%	7%
Loss of prime farming land due to rural residential development	3.95	12%	18%	65%	5%
Loss of visual amenity as a result of development of rural land	3.87	13%	17%	65%	5%
Long-term negative impacts of property purchased by absentee owners (A)	3.06	30%	18%	33%	20%
Risks to human health from pathogens in water sources #	3.89	14%	18%	64%	4%
Run-off from rural and/or rural residential properties reducing water quality in rivers and streams (A) #	3.76	15%	20%	61%	4%
Nutrients from septic tanks polluting water #	3.36	26%	19%	48%	7%
Dams reducing river & stream flows (A) #	3.32	24%	24%	44%	7%
Gaps or deficiencies in provision of community services (A)	3.70	17%	18%	56%	8%

Note: Mean scores calculated after removing N/A responses. So mean out of 5.
* Significant difference across the LGA. # Significant difference by extent of farmer identity.
All tests were Kruskall-Wallis rank sum tests with chi-square outcomes from 9.0411 to 36.016 and p values <0.05. (A) Survey item in 2014 NC CMA social benchmarking study (Curtis and Mendham 2015).

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

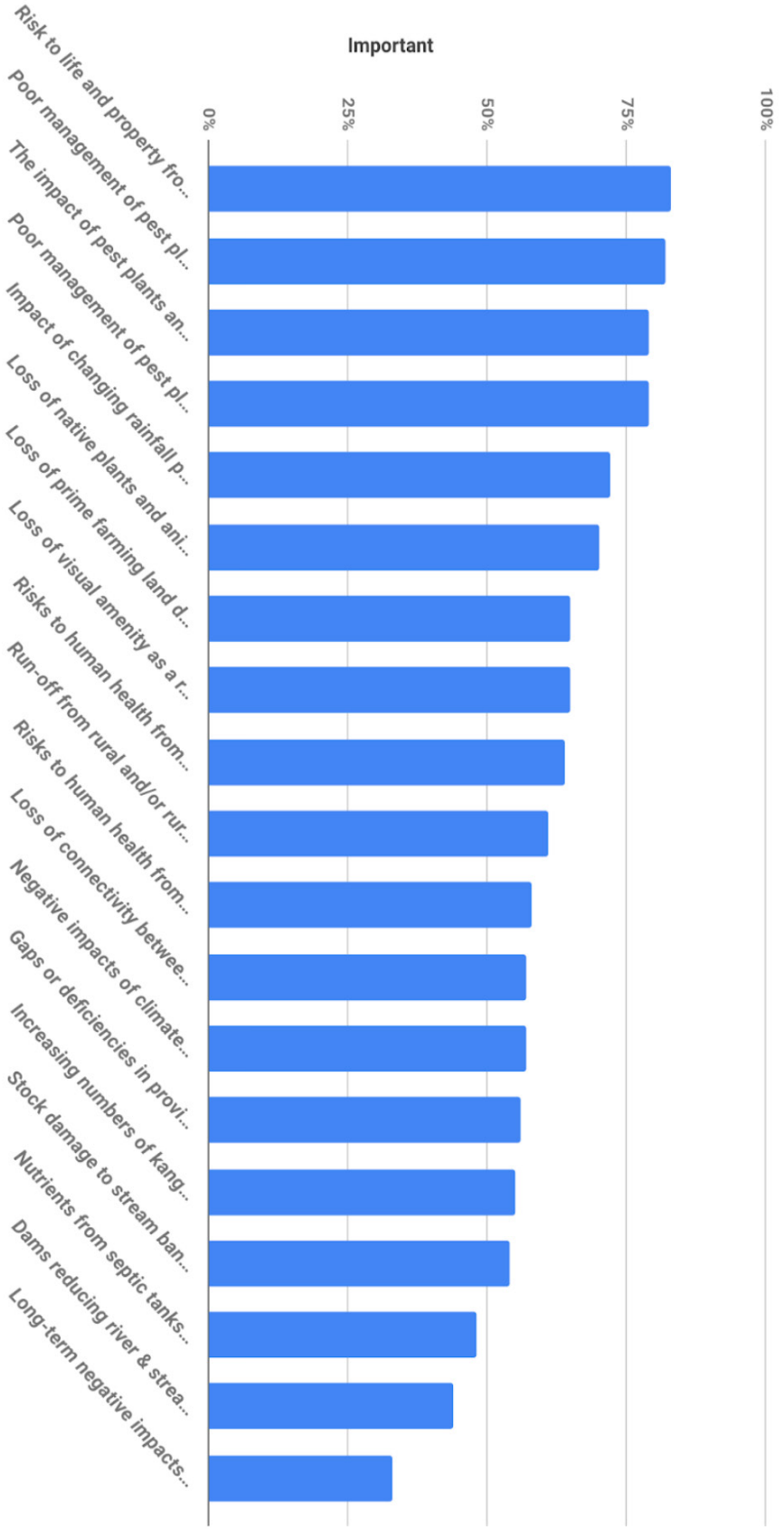


FIG 6. ENVIRONMENTAL AND SOCIAL ISSUES BY IMPORTANT RATING

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

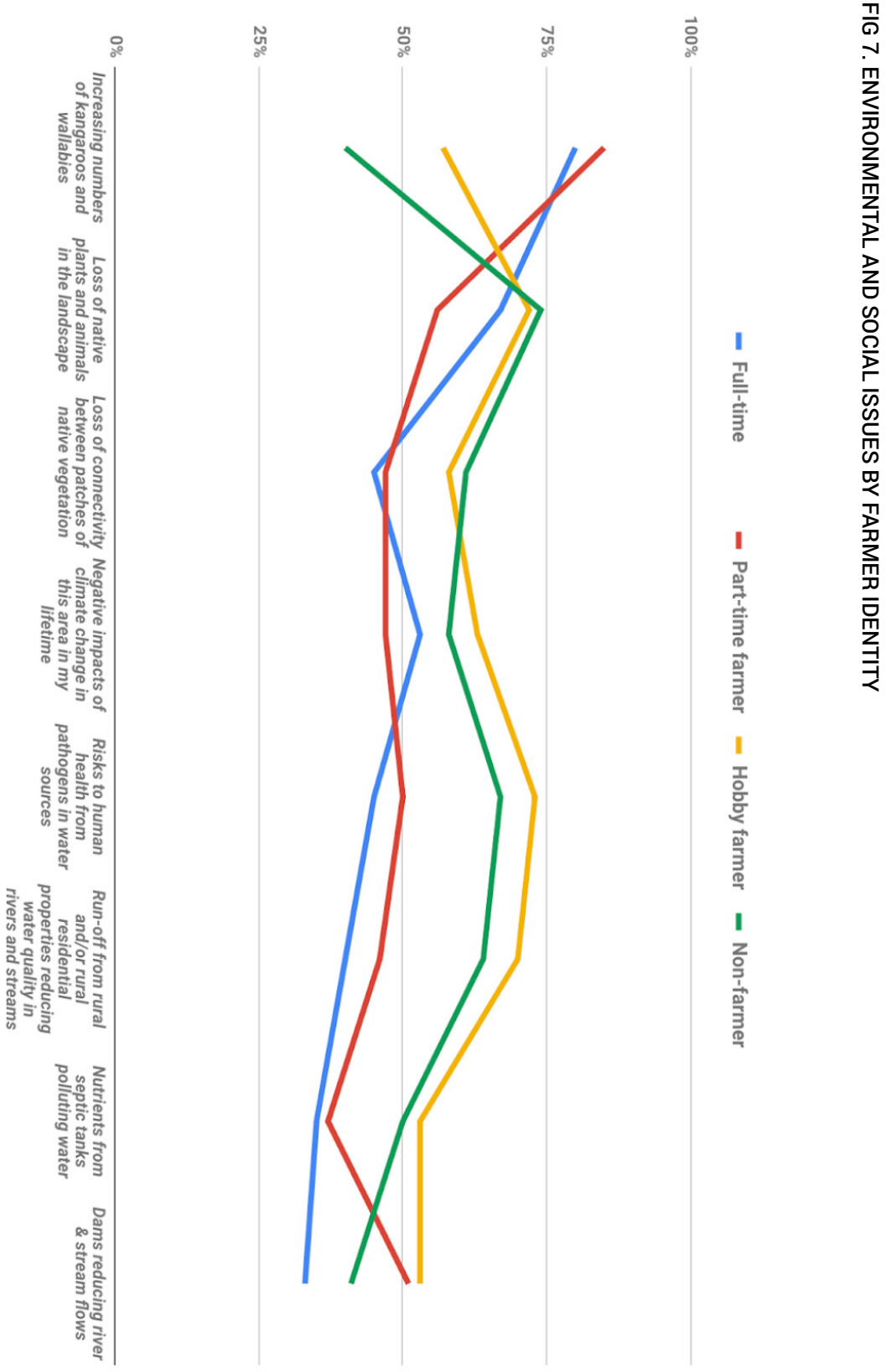
TABLE 7: SIGNIFICANT DIFFERENCES IN IMPORTANCE OF ENVIRONMENTAL AND SOCIAL ISSUES BY COHORTS BASED ON EXTENT OF FARMER IDENTITY.
UPPER COLIBAN CATCHMENT SOCIAL BENCHMARKING STUDY, 2018 (N=413, N=397-408)

Environmental and social issues items by mean scores and % selected "Important Very important rating	Full-time farmer	Part-time farmer	Hobby farmer	Non-farmer
Increasing numbers of kangaroos and wallabies	4.25 80%	4.32 85%	3.58 57%	3.10 40%
Loss of native plants and animals in the landscape	3.82 67%	3.6 56%	4.03 72%	4.07 74%
Loss of connectivity between patches of native vegetation	3.28 45%	3.31 47%	3.72 58%	3.86 61%
Negative impacts of climate change in this area in my lifetime	3.42 53%	3.49 47%	3.79 63%	3.83 58%
Risks to human health from pathogens in water sources	3.38 45%	3.48 50%	4.09 73%	3.99 67%
Run-off from rural and/or rural residential properties reducing water quality in rivers and streams	3.11 40%	3.41 46%	3.98 70%	3.87 64%
Nutrients from septic tanks polluting water	2.74 35%	3.07 37%	3.48 53%	3.5 50%
Dams reducing river & stream flows	2.88 33%	3.32 51%	3.47 53%	3.34 41%

Note: Mean scores calculated after removing N/A responses. So mean out of 5.
All tests were Kruskall-Wallis rank sum tests with chi-square outcomes from 9.3096 to 36.016; and p values <0.05.

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

FIG 7. ENVIRONMENTAL AND SOCIAL ISSUES BY FARMER IDENTITY



4.5 BELIEFS ABOUT CLIMATE CHANGE, DAMS, CLEARING NATIVE VEGETATION AND THE EFFICACY OF BEST-PRACTICE NRM

The survey included 14 items exploring beliefs in climate change; dams; and the efficacy of best-practice NRM focussed on waterways and wetlands and native vegetation. Five items focussed on beliefs about the efficacy of fencing and off-stream watering to manage stock access to waterways and wetlands.

Beliefs about climate change

Almost three quarters of respondents to the UCC survey believe in human induced climate change; that if no action is taken there will be dire consequences; and that it is not too late to act. Those selecting the Unsure response option outnumber the proportion of those who selected Disagree or Strongly disagree [Table 8].

There is no difference across the two LGA for the items exploring belief in climate change. There is a difference based on the extent of farmer identity for one item: *Human activities are influencing changes in climate*. For this item, FTF and PTF are less likely to agree than HF and NF [Table 9]. However, only 10% of FTF and 15% of PTF disagree with the statement and >60% of both cohorts agree that *Human activities are influencing changes in climate* [Table 9 and Figure 8].

The three items exploring belief in climate change were also included in the 2014 North Central CMA social benchmarking study (Curtis and Mendham 2015). Comparison of the two data sets indicates that UCC respondents were more likely to Agree with each of the three statements (means ~4 compared to means ~3.5 and 70-74%% Agree compared to 53% Agree). Four years have elapsed since the regional survey and it is likely that public awareness of human induced climate change has increased. And the UCC represents a subset of the wider regional population that has a smaller proportion of farmers (e.g. 10% FTF in UCC study and 52% FTF in regional study). In both the 2014 survey (see the separate technical report by Curtis and Mendham 2014 that distinguishes those who said they were a farmer compared to other occupations) and this study in the UCC, farmers (2014) and FTF (2018) are less likely to believe in human induced climate change than non-farmers (2014) or PTF, HF and NF cohorts (2018).

Beliefs about the impacts of dams

Almost every respondent said they Agree that *Dams provide an important source of water to protect life and property during bush fires*. At the same time, a third of all respondents Disagree that *Reducing the number of dams would lead to improved flows in waterways*. Another third of respondents said they were Unsure [Table 8]. Taken together, these results suggest there is a strong case for further engagement by the North Central CMA and CW around this topic. However, those setting out to do this work need a sound/tested strategy for engaging those identifying as Full-time farmers.

For the item *Reducing the number of dams would lead to improved flows in waterways*, there are significant differences across the LGA and with the extent of a farmer identity. Hepburn respondents are more likely to Agree with this item (26% compared to 13% for Macedon Ranges) and less likely to Disagree (29% compared to 38% for Macedon Ranges). Those more strongly identifying as a farmer are more likely to Disagree with this item. For example, half the FTF cohort said they Disagree, compared to a third for the other cohorts [Table 9].

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

Somewhat surprisingly, similar proportions of respondents in each cohort said they Agree with the statement (from 19% to 24%). What seems an important difference is that far fewer FTF were Unsure about their views (25% FTF, 38% PTF, 41% HF and 42% NF).

Belief about the impacts of clearing native vegetation

Half the respondents said they Agree that Clearing native vegetation has substantially reduced number and variety of native plants in this district [Table 8]. There has been considerable effort by the Victorian Government, Non-government organisations (NGO) and the North Central CMA to raise awareness of the extent and impact of land clearing. Given that effort it is noteworthy that just under a third of respondents were Unsure. This item was included in the 2014 regional survey with very similar results (mean 3.6; 58% agree) (Curtis and Mendham 2015).

Belief about the efficacy of reconnecting patches of native bush and willow removal

Survey data suggests there is widespread acceptance of the environmental benefits of reconnecting areas of native bush [Table 8]. Indeed, only 5% of respondents said they Disagree. There is a significant difference on this item with the extent of a farmer identity: FTF less likely to Agree and the trend continues across PTF and HF to NF (more likely to agree). Having said that, almost two thirds of FTF agree (i.e. 64%) and only 12% Disagree [Table 9].

Willow removal has been a contentious issue in parts of the North Central CMA region, including Gunbower Island Forest and surroundings (Mendham and Curtis 2018). Information in Table 7 indicates that that half (i.e. 54%) the respondents Agree that the *Benefits of willow removal along waterways outweigh any short-term negative impacts*. Similar proportions said they were Unsure or Disagree with this item [Table 8]. A comparable item was included in the 2014 regional survey with very similar results to the more recent UCC survey (e.g. in 2014 the mean score was 3.7 with 57% Agree).

It seems the acceptability of willow removal along waterways remains contentious for a substantial proportion of property owners, especially those identifying as Full-time farmers. In this study stronger farmer identity was linked to significantly lower acceptance of willow removal [Table 9 and Figure 9]. Perhaps the most relevant statistic is that a substantial proportion (i.e. 30%) of FTF Disagree that the *Benefits of willow removal along waterways outweigh any short-term negative impacts*.

Belief about the efficacy of fencing and off-stream watering to manage stock access to waterways and wetlands

It seems that a large majority (i.e. about three quarters) of respondents believe that *fencing to manage stock access is an essential step in protecting the health of waterways and wetlands*. However, about a third of respondents expressed concerns about some of the unintended outcomes that can arise from fencing those areas to manage stock access. Indeed, a majority of respondents indicated they were either Unsure or Agree that issues arise because of pests, fire hazard or floods impacting fences [Table 8].

There were no differences across the two LGA for any of these items. There is a difference across the four cohorts based on farmer identity for the general proposition but not for any of the three statements exploring possible reservations [Table 9]. For the general statement, those with a weaker farmer identity are more likely to agree and less likely to disagree.

The single item exploring overall confidence in this recommended practice was also included in the 2014 regional survey. The results for the UCC survey are consistent with those of the regional study (mean of 3.8, 68% agree).

Although just over half the respondents to the UCC survey agreed that *Watering stock off waterways improves bank stability, streamside vegetation & water quality*, almost a quarter were Unsure and over a third were either Unsure or disagreed that this practice was beneficial [Table 8]. There were no differences across the two LGA or the four cohorts based on the extent of a farmer identity. This item was included in the 2014 regional survey and the results are identical with the UCC results (i.e. mean of 3.7 and 57% Agree).

Only a small proportion (6%) disagreed that *Allowing stock to graze along waterways for short periods is usually better for native vegetation than set stocking*. There were no differences across the two LGA or the four cohorts based on the extent of a farmer identity.

4.6 ATTITUDES ABOUT THE ROLES AND RESPONSIBILITIES OF PROPERTY OWNERS AND GOVERNMENTS

Results for this topic suggest there is almost universal acceptance of personal responsibility to take actions that maintain water quality. That is, property owners accept they have a duty of care (i.e. take reasonable steps to avoid foreseeable harm) to the environment and to other people to *ensure water leaving my property is not polluted by my actions* and have internalised that as a personal norm. As is consistent with that norm, most respondents agree that *Local governments should ensure landowners meet the requirements for septic tank management* [Table 10]. There are no differences across the LGA for these items but there are differences with the extent of a farmer identity [Table 10]. For both items, those with a weaker farmer identity were more likely to agree [Table 11].

It seems many UCC property owner attitudes about the primacy of private property rights vary with the topic under consideration. As indicated above, almost all respondents accepted they had a personal responsibility to maintain water quality and that local governments should ensure landowners discharged their responsibilities in relation to septic tank management. However, almost half (45%) agreed that landholders should have the right to *harvest water that falls on their property, even if that impacts others*; and more than two-thirds (66%) disagreed with the statement that *The public should have the right access to waterways on private land for recreation.*

There were no differences for either item across LGA or with the extent of farmer identity [Table 10]. The item focussed on harvesting water was included in the 2014 regional survey and the results are similar to those for the UCC survey (mean of 3.4 and 50% agree in 2014).

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

TABLE 8: BELIEFS ABOUT CLIMATE CHANGE, DAMS, CLEARING NATIVE VEGETATION AND THE EFFICACY OF BEST-PRACTICE NRM
UPPER COLIBAN CATCHMENT SOCIAL BENCHMARKING STUDY, 2018 (N=413, N=405-410)

Beliefs about climate change	**Mean**	**Disagree**	**Unsure**	**Agree**	**Not applicable/ Don't know**
Human activities are influencing changes in climate # (A)	4.12	7%	16%	74%	3%
If we do nothing, climate change will have dire consequences for all living things, including humans (A)	4.07	10%	14%	71%	5%
It is not too late to take action to address climate change (A)	3.96	10%	15%	70%	5%
Beliefs about dams and impacts of clearing native veg					
Dams provide an important source of water to protect life & property during bush fires (n=410)	4.43	2%	6%	92%	1%
Reducing the number of dams would lead to improved flows in waterways * #	2.82	33%	39%	21%	7%
Clearing native vegetation has substantially reduced number and variety of native plants in this district (A)	3.66	11%	30%	51%	8%
Beliefs about the efficacy of best-practices					
Reconnecting areas of native bush helps sustain threatened plants & animals #	4.10	5%	18%	75%	3%
Benefits of willow removal along waterways outweigh any short-term negative impacts # (A)	3.61	17%	22%	54%	7%
Fencing to manage stock access is essential to protect health of waterways & wetlands # (A)	4.03	7%	14%	73%	6%
Allowing stock to graze along waterways for short periods is usually better for native vegetation than set stocking	3.74	6%	26%	55%	14%
Watering stock off waterways improves bank stability, streamside vegetation & water quality (A)	3.70	14%	22%	57%	7%
Fencing waterways to manage stock access makes it more difficult to control *pest plants and animals*	3.17	24%	32%	34%	9%
Fencing waterways to manage stock access leads to substantially increased fire hazard	3.14	23%	33%	32%	12%
Fencing waterways doesn't work because floods damage fences and repairs are costly	2.89	35%	28%	26%	11%

Note: Mean scores calculated after removing N/A responses. So mean out of 5.
Underlined items are expressed as negative outcomes from fencing waterways.
* Significant difference across the LGA. # Significant difference by extent of farmer identity. All tests were Kruskall-Wallis rank sum tests with chi-square outcomes from 8.2827 to 10.82827 and p values <0.05. Survey item in 2014 NC CMA social benchmarking study (Curtis and Mendham 2015).

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

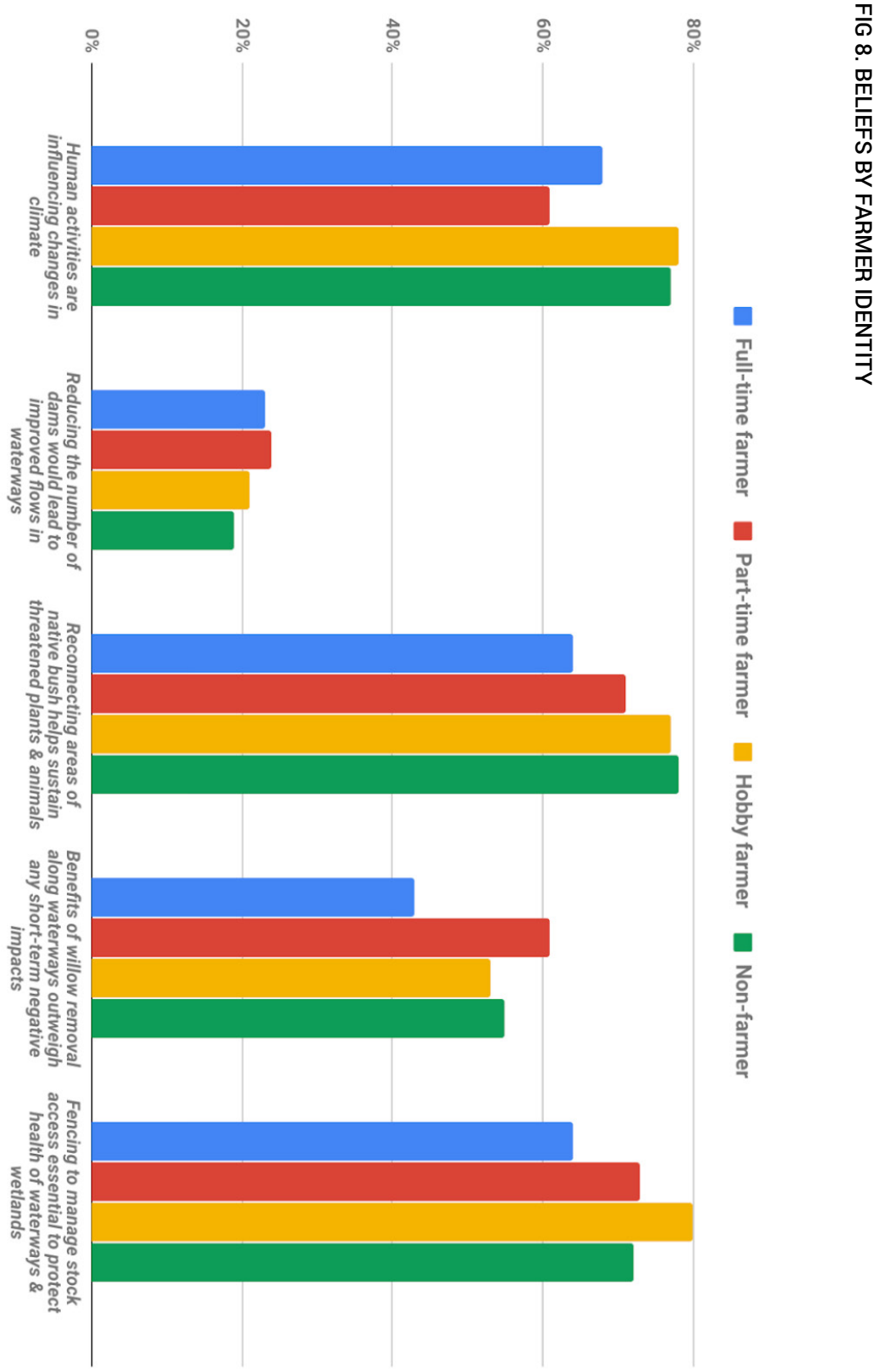
TABLE 9: SIGNIFICANT DIFFERENCES BY FARMER IDENTITY IN BELIEFS ABOUT CLIMATE CHANGE, DAMS AND THE EFFICACY OF BEST-PRACTICE NRM.
UPPER COLIBAN CATCHMENT SOCIAL BENCHMARKING STUDY, 2018 (N=413)

Beliefs by mean scores and % selected Agree/ Strongly agree rating	Full-time farmer	Part-time farmer	Hobby farmer	Non-farmer
Human activities are influencing changes in climate	3.80 68%	3.80 61%	4.24 78%	4.21 77%
Reducing the number of dams would lead to improved flows in waterways	2.46 23%	2.80 24%	2.78 21%	2.92 19%
Reconnecting areas of native bush helps sustain threatened plants & animals	3.79 64%	4.05 71%	4.12 77%	4.22 78%
Benefits of willow removal along waterways outweigh any short-term negative impacts	3.20 43%	3.67 61%	3.60 53%	3.77 55%
Fencing to manage stock access essential to protect health of waterways & wetlands	3.63 64%	3.95 73%	4.20 80%	4.06 72%

Note: Mean scores calculated after removing N/A responses. So mean out of 5.
All tests were Kruskall-Wallis rank sum tests with chi-square outcomes from 8.2827 to 10.818 and p values <0.05.

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

FIG 8. BELIEFS BY FARMER IDENTITY



4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

TABLE 10: ATTITUDES ABOUT THE ROLES AND RESPONSIBILITIES OF PROPERTY OWNERS AND GOVERNMENTS.
UPPER COLIBAN CATCHMENT SOCIAL BENCHMARKING STUDY, 2018 (N=413, N=404-406)

Roles and responsibilities of property owners and local government	Mean	Disagree	Unsure	Agree	Not applicable/ Don't know
I feel a personal responsibility to ensure water leaving my property is not polluted by my actions	4.43	2%	4%	92%	4%
It is fair that the wider community asks landowners to take reasonable steps to ensure that water leaving their property is not polluted #	4.29	4%	5%	90%	1%
Local governments should ensure landowners meet the requirements for septic tank management #	4.15	7%	8%	84%	1%
Landholders should have the right to harvest water that falls on their property, even if that impacts others (A)	3.32	26%	26%	45%	3%
The public should have the right to access waterways on private land for recreation	2.06	69%	14%	15%	1%

Note: Mean scores calculated after removing N/A responses. So mean out of 5. # Significant difference by extent of farmer identity. All tests were Kruskall-Wallis rank sum tests with chi-square outcomes from 4.2632 to 9.4387 and p values <0.05.
(A) Survey item in 2014 NC CMA social benchmarking study (Curtis and Mendham 2015).

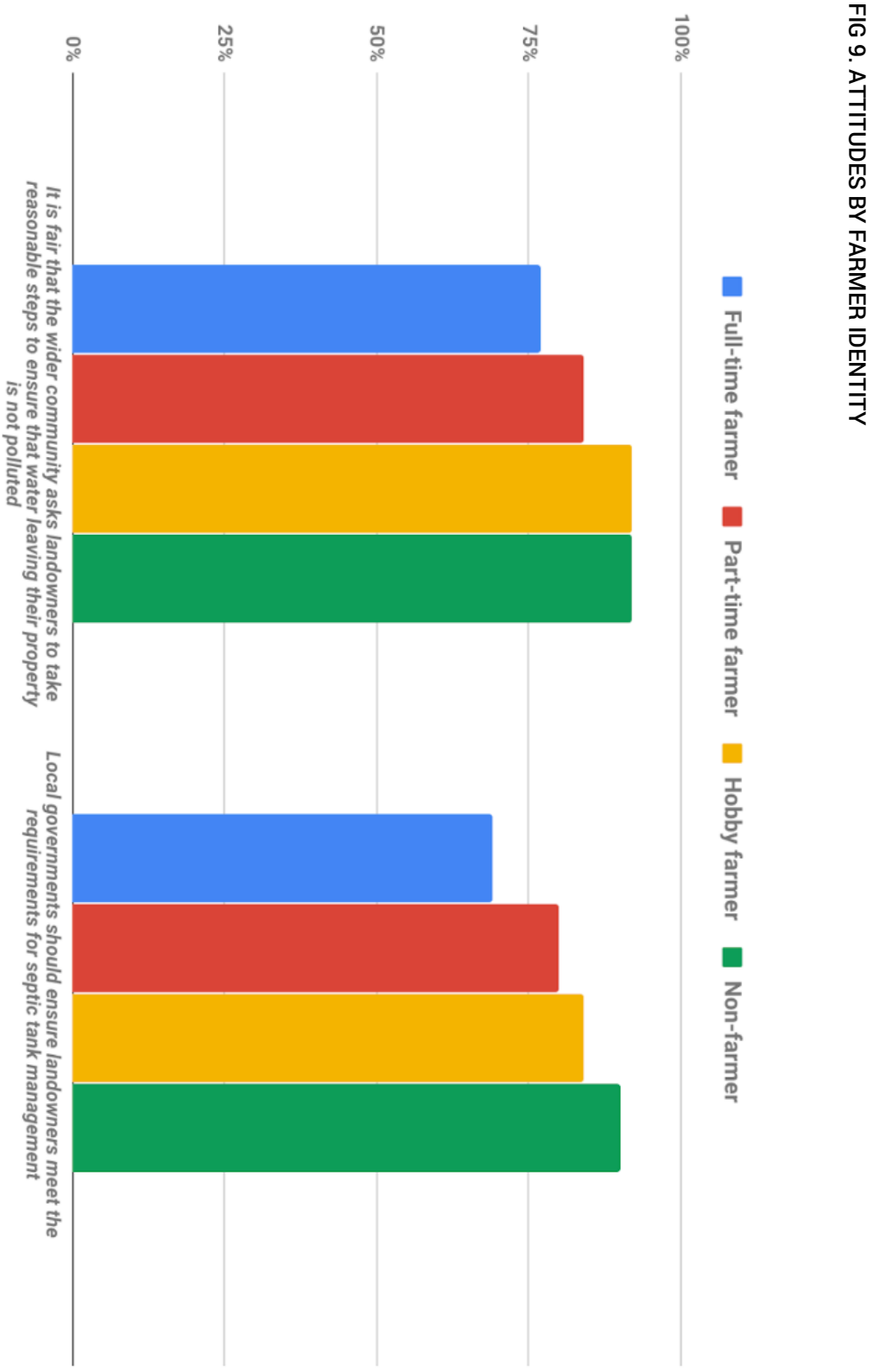
TABLE 11: SIGNIFICANT DIFFERENCES BY FARMER IDENTITY IN ATTITUDES ABOUT THE ROLES AND RESPONSIBILITIES OF PROPERTY OWNERS AND GOVERNMENTS.
UPPER COLIBAN CATCHMENT SOCIAL BENCHMARKING STUDY, 2018 (N=413)

Attitudes by mean scores and % selected Agree/ Strongly agree rating	Full-time farmer	Part-time farmer	Hobby farmer	Non-farmer
It is fair that the wider community asks landowners to take reasonable steps to ensure that water leaving their property is not polluted	3.85 77%	4.17 84%	4.42 92%	4.33 92%
Local governments should ensure landowners meet the requirements for septic tank management	3.78 69%	4.03 80%	4.18 84%	4.26 90%

Note: Mean scores calculated after removing N/A responses. So mean out of 5.
All tests were Kruskall-Wallis rank sum tests with chi-square outcomes from 8.4123 to 9.4387 and p values <0.05.

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

FIG 9. ATTITUDES BY FARMER IDENTITY



4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

4.6 TRUST: PREDISPOSITION TO TRUST AND TRUST IN NORTH CENTRAL CMA AND COLIBAN WATER

Predisposition to trust

Three items based on the work of Smith et al. (2013) explored respondent's predisposition to trust [Table 12]. These items were included in the 2014 regional survey (Curtis and Mendham 2015).

Results presented in Table 12 suggest there is considerable scepticism about the motivations of others and that this predisposition not to trust is consistent across geography and identity. For example, half of the respondents Agree that *People are almost always interested only in their own welfare*. And there are no differences by LGA or the extent of farmer identity. Results for the UCC survey are also consistent with those for the 2014 regional survey (Curtis and Mendham 2015).

TABLE 12: PREDISPOSITION TO TRUST.
UPPER COLIBAN CATCHMENT SOCIAL BENCHMARKING STUDY, 2018 (N=413, N=403-406)

Predisposition to trust items	Mean	Disagree	Neutral	Agree	Not Applicable / Don't know
You can't be too careful when dealing with people	3.52	15%	32%	48%	5%
People are almost always interested only in their own welfare	3.44	17%	29%	51%	2%
One has to be alert or someone is likely to take advantage of you	3.28	27%	27%	44%	2%

Note: Mean scores calculated after removing N/A responses. So mean out of 5.
No significant differences by LGA or extent of farmer identity. All tests were Kruskall-Wallis rank sum tests with chi-square outcomes and p values >0.05. All Survey items included in the 2014 NC CMA social benchmarking study (Curtis and Mendham 2015).

Trustworthiness and trust in Coliban Water and North Central CMA

The results for the two organisations are presented separately because they are not comparable. The two organisations have very different responsibilities and approaches to engagement with property owners and the topics selected to explore trustworthiness and trust are different for each organisation [Tables 13&14]. For Coliban Water the focus is on management of three water storages and the land around them. For the North Central CMA the focus is on the management of land, water and biodiversity. Although trust and trustworthiness items were included in the 2014 regional survey, the items were different and data from the 2014 are not considered here.

Coliban Water

Most respondents (93%, n=392, N=413) said they were aware of the existence of Coliban Water (CW). These respondents (i.e. 363) were then asked to complete the set of items exploring trustworthiness and trust (from

371 to 372 completed these items). Most items for this topic referred to CW as an organisational unit. One item referred to the staff of CW.

Respondents to this topic have all indicated they are aware of CW. However, from 17% to 32% selected the Not applicable/Don't know response option. It is likely that these respondents thought they didn't know enough about CW to make a determination about the trustworthiness of CW or about the extent they trust CW for the topics identified. For most items there is also a substantial proportion of respondents selecting the Neutral response option. Taken together, those selecting these options represent from 37% to 63% of respondents [Table 13].

A second key point is that few respondents (i.e. from 2% to 9%) selected the negative response option (i.e. Disagree) for any of the items exploring trustworthiness or trust in CW.

Assessments about the trustworthiness of CW staff (1 item) and the organisation itself (2 items) were similar [Table 13]. It is not uncommon for there to be markedly more positive assessments of staff, particularly where they work and live in local communities.

Another finding is that more positive assessments for both trustworthiness and trust were for the items focussed on CW's role in *providing safe drinking water* and *making sound decisions about the management of the three water storages and the land around them* [Table 13].

Another finding is that there are no significant differences for any items in Table 13 across the two LGA or for the extent of farmer identity.

North Central CMA

Less than half of all respondents (41%, n=394, N=413) said they were aware of the existence of the North Central CMA. These respondents (n=163) were asked to complete the set of items exploring trustworthiness and trust. From 178 to 179 completed these items. Most items for this topic referred to the North Central CMA as an organisational unit. One item referred to the staff of North Central CMA but there is little difference in the mean scores for that item and other items focussed on the organisation [Table 14].

Respondents to this topic have all indicated they are aware of the North Central CMA. However, from 20% to 32% selected the Not applicable/Don't know response option. As noted for CW, it is likely that these respondents thought they didn't know enough about the North Central CMA to make a determination in relation to trustworthiness and trust. An additional quarter of respondents selected the Neutral response option. Taken together, those selecting these options represent from 47% to 63% of respondents [Table 14].

As for CW, only a few respondents (i.e. from 7% to 12%) selected the negative response option (i.e. Disagree) for any of the items exploring trustworthiness or trust in the North Central CMA. The item exploring the benevolence element of trustworthiness has the highest mean score and largest proportion of respondents selecting Agree [Table 14].

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

There are no significant differences in mean scores for any item across the LGA but there are significant differences for the extent of farmer identity. In each case, those with a stronger farmer identity (i.e. FTF and PTF) are more likely to report less positive assessments for trustworthiness (1 item) and trust (both items).

For the trustworthiness item, the difference appears to be that FTF respondents were more than twice as likely to select Disagree (17% for FTF compared to 8% PTF, 7% HF and 2% NF). That pattern also held for the trust item focussed on financial support where FTF and PTF were twice as likely to select Disagree (20% for FTF and 19% for PTF compared to 5% for HF and 10% for NF). The finding of less positive assessments of trust amongst FTF is noteworthy given that there is not a significant difference in predisposition to trust on the extent of farmer identity.

Although Not applicable/Don't know (NA/DK) responses are not included in mean scores, for each of the items in this topic, FTF were less likely to select the N/A response option than any of the other cohorts. Indeed, for every item, the proportion of FTF selecting NA/DK was typically half of that for HF and NF cohorts. For example, for the trustworthiness item focussed on knowledge, 17% of FTF selected NA/DK compared to 33% for HF and 37% for NF; the trust items focussed on advice, 17% of FTF selected NA/DK compared to 21% for HF and 35% for NF; and for the trust item focussed on finance, 20% of FTF selected NA/DK compared to 36% for HF and 43% for NF. It is important to note that ~30 FTF, 37 PTF, 58 HF and 51 NF responded to these items. And survey data clearly indicates that FTF are a small proportion of all property owners in the UCC (10% for FTF and another 15% for PTF).

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

TABLE 13: TRUSTWORTHINESS AND TRUST IN COLIBAN WATER
UPPER COLIBAN CATCHMENT SOCIAL BENCHMARKING STUDY 2018 (N=413), (N=392, N=371-372)

Trustworthiness & Trust items	Mean	Disagree	Neutral	Agree	Not applicable/ Don't know
Coliban Water staff are very knowledgeable about the management of water storages (i.e. Malmsbury, Lauriston, Upper Coliban reservoirs) & the land around them (capability)	3.41	6%	31%	32%	32%
Coliban Water keeps the community's interests in mind when making decisions managing these three water storages & the land around them (benevolence)	3.52	9%	25%	46%	20%
Sound principles guide Coliban Water decisions about managing these three water storages & the land around them (integrity)	3.43	8%	30%	35%	27%
I can rely on Coliban Water to provide safe drinking water to local communities from the storages it manages (trust)	3.85	2%	20%	61%	17%
I can rely on Coliban Water to provide useful information about the management of Malmsbury, Lauriston, Upper Coliban water storages (trust)	3.37	9%	33%	35%	24%

Note: Mean scores calculated after removing N/A responses. So mean out of 5.
No significant differences by LGA or extent of farmer identity. All tests were Kruskall-Wallis rank sum tests with chi-square outcomes and p values >0.05.

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

TABLE 14: TRUSTWORTHINESS AND TRUST IN NORTH CENTRAL CMA
UPPER COLIBAN CATCHMENT SOCIAL BENCHMARKING STUDY, 2018 (N=413) (N=393, N=178-179)

Trustworthiness & Trust items	Mean	Disagree	Neutral	Agree	Not applicable/ Don't know
North Central CMA staff are very knowledgeable about the management of land, waterways and biodiversity *(capability)* #	3.5	7%	28%	37%	28%
The North Central CMA keeps the wider communities interests in mind when making decisions about land,waterways and biodiversity management (benevolence)	3.52	9%	27%	44%	20%
Sound principles guide North Central CMA decisions about the management of land, waterways & biodiversity (integrity)	3.4	10%	29%	35%	26%
I can rely on the North Central CMA to provide useful advice about waterways & wetlands management *(trust)* #	3.5	7%	32%	38%	23%
I can rely on the North Central CMA to provide appropriate financial assistance for land, waterways & biodiversity management in the North Central region *(trust)* #	3.23	12%	31%	25%	32%

Note: Mean scores calculated after removing N/A responses. So mean out of 5.
Significant difference by extent of farmer identity. All tests were Kruskall-Wallis rank sum tests with chi-square outcomes from 8.4575 to 9.5782 and p values <0.05.

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

4.7 LAND USE AND ENTERPRISE MIX IN 2018

For this topic respondents were asked to indicate the land uses and enterprises on their property for 2018 by simply ticking the relevant options [Table 15]. There was an additional item exploring change in enterprise mix in the past 3 years.

The list of possible land uses and enterprises in Table 15 is split (i.e. colour coded) with a set focussed on amenity/lifestyle; a set on livestock production; another set on production of plants and plant based products; and one item focussed on dogs. Indications of the relative importance of amenity/lifestyle land uses include that the proportion of respondents selecting pasture is matched by those selecting a large garden; and the proportion selecting cropping is matched by those with an area set aside for living or recreation [Table 15].

There are some differences in land use across the LGA (beef cattle, horses and cropping); and many more, when respondents are compared on the basis of the extent of farmer identity [Table 15]. Those with weaker farmer identity are more likely to report having a large garden (HF and NF rather than FTF or PTF), other livestock (HF rather than NF) and horticulture (HF rather than NF). Those with a stronger farmer identity are more likely to report beef cattle, sheep for meat and wool, pasture, vegetables and cropping. HF are more likely to report dairy enterprises but the n values are small and there is not much difference between HF and FTF [Table 15].

The final item in this topic asked respondents if they had *made a substantial change in the mix of land uses or enterprise types in the past three years*. Only 8% of all respondents (n=33, N=406) said they had made a substantial change in the past three years. The types of changes identified varied widely and in some instances, some had taken up an enterprise while others had abandoned that enterprise. The overall pattern is of change consistent with the shift from a productivist to a multi-functional landscape where a combination of agriculture, recreation and amenity values drive land use and management.

Evidence of this trend to multifunctionality include:

- Three respondents said they had discontinued their agricultural enterprises (e.g. #1 *Property is not being used for anything at the moment; #2 Removed cattle and goats.* #3 *Was farmland, now accommodation and garden*).
- Four respondents said they had added a tourism enterprise (e.g. #1 *Farm based tourism;* #2 *Horse trail rides*; #3 *More money in accommodation, functions, open days and tourism*; #3 above).
- Two respondents said they were using grazing to manage weeds or fire hazard (e.g. #1 Sheep grazing to better manage bushfire risk; Sheep and Alpaccas grazing for fire management).
- Two respondents said they had added a garden (e.g. #1 *Exotic/ native mix garden including more than 300 trees planted*; #2 *Planted lots and lots of trees – deciduous and garden rooms*).
- Two respondents said they had built a house.
- Three respondents said they had cleared or removed weeds, including gorse and blackberries.
- Two respondents said they had changed their management by fencing off creek from stock and planting trees for conservation.
- One respondent said they had made a change in their management to *Use the land without herbicides/ pesticides (organic permaculture practice*).

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

Consistent with the concept of multifunctionality, a small number (3) of respondents said they had intensified their land use or sought to increase the productive capacity of their farmland. Those examples include:

- # 1 *Resown pastures, introduced sheep, more cropping.* #2 *Planted rye grass/ clover to improve pasture and harvest*. #3 *Sheep for meat.*

Two respondents said they had moved to agistment and one respondent said they were *leasing paddocks*.

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

TABLE 15: LAND USE AND ENTERPRISE MIX IN 2018
UPPER COLIBAN CATCHMENT SOCIAL BENCHMARKING STUDY, 2018 (N=413, N=408-409)

Land use and enterprise types	% Yes	Difference by LGA	Difference by extent farmer identity
A large garden	42%	No	FTF 20%, PTF 31%, HF 50%, NF 46%
Area set aside for living/recreation	9%	No	No
Accommodation (e.g. long/ short-term rentals, B&B)	5%	No	No
Farm-based tourism (e.g. farm stays)	3%	No	No
Area under conservation covenant	3%	No	No
Restaurant/ café/ function centre	0.5%	No	No
Beef cattle	32%	% > Macedon Ranges	FTF 61%, PTF 64%, HF 38%, NF 11%
Sheep for meat or wool	25%	No	FTF 56%, PTF 31%, HF 33%, NF 11%
Horses (stud, agistment, riding school, recreation)	17%	% > Macedon Ranges	No
Other livestock (e.g. goats, deer, alpaca)	10%	No	FTF 12%, PTF 3%, HF 18%, NF 5%
Dairying (cows, sheep or goats)	4%	No	FTF 7%, PTF 3%, HF 8%, NF 1%
Pasture (Irrigated or dryland)	41%	No	FTF 73%, PTF 66%, HF 50%, NF 1%
Horticulture (flowers, fruits and nuts)	12%	No	FTF 12%, PTF 7%, HF 18%, NF 6%
Vegetables (e.g. potatoes)	10%	No	FTF 27%, PTF Nil, HF 13%, NF 5%
Cropping	9%	% > Hepburn	FTF 34%, PTF 17%, HF 4%, NF 1%
Farm forestry	5%	No	No
Viticulture/ winery	2%	No	No
Dogs (breeding, kennels, training)	1%	No	No

Yes/No response options. All tests were Kruskall-Wallis rank sum tests with chi-square outcomes from 9.802 to 69.301 and p values <0.05.

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

4.8 ACTIVITIES ON YOUR PROPERTY FOR THE LAST 3 YEARS AND FULL PERIOD OF MANAGEMENT AND SUPPORT FROM OTHERS

Respondents were invited to complete two tables exploring their implementation of management across a range of topics (from septic tank management to installation of off-stream watering points) over the last 3 years and for the full period of their management (Tables 16 & 17). Most of the actions listed form part of what is widely accepted as best-practice NRM. At the same time it is important to acknowledge that non-adoption can be a sensible strategy for some property owners for most of the practices listed (some are mandatory).

Respondents were asked to indicate if they had undertaken each practice (i.e. for each item) by selecting Yes, No or Not relevant (N/A). For a limited number of actions over the full period of management, they were asked to indicate if they had received resources (i.e. funds or technical advice) from other organisations.

The results presented in Tables 16 & 17 include both the % of respondents indicating they had taken the action and the % who indicated that action was Not appropriate for them. The summary results provide a benchmark for those implementing the UCC Integrated Catchment Management Plan over the coming decade.

Management actions past three years

Results presented in Table 16 reveal considerable variation in the extent best-practice management has been implemented by respondents over the past three years. More than half of all respondents said they implemented four of the six practices listed. Respondents in Macedon Ranges LGA are more likely to implement four of the six practices, including those related to septic tank management and the control of pest plants and animals. Respondents with a stronger farmer identity were more likely to implement actions to control pest plants and animals and employ crash grazing [Table 16].

Management actions for full period of management

Implementation of the eight actions listed in Table 17 varied from 42% of respondents (installed off-stream watering points) to 1% (decommissioned an existing dam). There are differences across the LGA, with property owners in Macedon Ranges more likely to implement five of the eight listed actions. There are also differences for six of the eight items with the extent of farmer identity. In all case, those with a stronger farmer identity are more likely to act. For most of those items, the real difference appears to be between Non-farmers and the other cohorts. Remember that in the UCC, 44% of all respondents identified as Non-farmers.

Resources from others to implement practices over the full period of management

Relatively small proportions (from 8% to 28%) of respondents indicated they received financial or technical support from outside organisations to assist them implement actions listed in Table 17.

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

TABLE 16: MANAGEMENT ACTIONS PAST THREE YEARS (SINCE START OF 2016)
UPPER COLIBAN CATCHMENT SOCIAL BENCHMARKING STUDY, 2018 (N=413)

Management actions	% Yes % N/A	Difference by LGA	Difference by extent farmer identity
Mowed, slashed or grazed to reduce fire risk (n=408)	93% Yes	No	No
Maintained septic tank as required by Council (n=404)	74% Yes 14% N/A	% Yes > Macedon Ranges	No
Actions to control pest plants along waterways and wetlands or other areas of native vegetation	63% Yes 8% N/A	% Yes > Macedon Ranges	FTF 80%, PTF 80%, HF 72%, NF 48%
Maintained septic tank land application area as required by Council (n=393)	53% Yes 15% N/A	% Yes > Macedon Ranges	No
Actions to control pest animals along waterways and wetlands or other areas of native vegetation	32% Yes 10% N/A	% Yes > Macedon Ranges	FTF 52%, PTF 56%, HF 38%, NF 15%
Employed crash grazing of fenced areas along waterways, wetlands or other native vegetation	8% Yes 12% N/A	No	FTF 23%, PTF 14%, HF 9%, NF 3%

Yes/No/ Not Applicable response options. All tests were Pearson's Chi-squared tests with chi-square outcomes from 10.59 to 56.465 and p values <0.05 (all but one at <0.001).

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

TABLE 17: MANAGEMENT ACTIONS FOR FULL PERIOD OF MANAGEMENT AND EXTENT SUPPORTED BY RESOURCES FROM OTHER ORGANISATIONS.
UPPER COLIBAN CATCHMENT SOCIAL BENCHMARKING STUDY, 2018 (N=413)

Management actions	% Yes % N/A	Difference by LGA	Difference by extent farmer identity	Resources from others
Established a stock containment area to manage grazing pressure during dry periods (n=400)	31% Yes 13% N/A	% Yes > Macedon Ranges	FTF 46%, PTF 46%, HF 45%, NF 13%	n=123 8% Yes (n=10)
Action to conserve native grasses (n=400)	25% Yes 9% N/A	% Yes > Macedon Ranges	FTF 28%, PTF 27%, HF 27%, NF 23%	n=101 15% Yes (n=15)
Erected fencing to manage stock access to waterways and wetlands (n=401)	29% Yes 8% N/A	No	FTF 50%, PTF 46%, HF 40%, NF 11%	n=115 28% Yes (n=32)
Planted trees and shrubs to connect remnant patches of bush (e.g. as part of a biolink) (n=399)	30% Yes 8% N/A	% Yes > Macedon Ranges	FTF 41%, PTF 41%, HF 35%, NF 19%	n=118 23% Yes (n=27)
Installed off-stream watering points (e.g. troughs) for stock (n=401)	42% Yes 9% N/A	% Yes > Macedon Ranges	FTF 70%, PTF 61%, HF 59%, NF 19%	n=169 11% Yes (n=19)
Sowed perennial pastures (n=399)	23% Yes 6% N/A	% Yes > Macedon Ranges	FTF 56%, PTF 53%, HF 22%, NF 8%	
Decommissioned an existing dam (N=401, n=5)	1% Yes 6% N/A	Insufficient cases	Insufficient cases Spread over all cohorts	
Constructed a new dam (401, n=31)	8% Yes 4% N/A	No	No	

Yes/No/ Not Applicable response options. All tests were Pearson's Chi-squared tests with chi-square outcomes from 10.59 to 103.63 and p values <0.05 (all but two at <0.001).

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

4.9 YOUR KNOWLEDGE

Respondents were asked to self-assess their knowledge on a range of NRM topics [Table 18]. For example, there are five items focussed on native vegetation/habitat, three on each of water quality and septic tanks (clearly related) and soil management. The 15 items were they were expected to be relevant to most property owners rather than be linked to specific enterprise types (e.g. croppers or dairy farmers).

The 2014 regional survey included 16 items exploring knowledge of NRM. The 2014 survey items were mostly focussed on sustainable agriculture, particularly soil health topics.

As with many other UCC survey topics there were six response options. For this topic, those options were very specific: No knowledge, Very little knowledge, Sound knowledge (i.e. sufficient to act), Very sound knowledge (can give a detailed explanation) and Not applicable. This approach to assessing the level of respondent knowledge has been used extensively by Professor Curtis' research team and published in peer-reviewed journals. To present the results in Table 14, the first two response options (i.e. No knowledge and Very little knowledge) are combined, as are Sound knowledge and Very sound knowledge. Mean scores for each item do not include the Not applicable responses.

There are large variations in self-assessed knowledge for the 15 items (e.g. from 69% to 20% reporting Sound knowledge. And there are only two items where most respondents said they had Sound knowledge: *The type and location of septic tanks on your property*: and *The habitat value of fallen timber such as logs and branches*. Close to a third or more respondents said they had Little knowledge for four topics. Three of these items address facts that appear to be relevant to most property owners about *Which CW water storages provide drinking water to local people; % of ground cover needed to prevent soil erosion;* and *What are Council rules for managing septic tanks* [Table 18 and Figure 10].

There are also substantial variations in the proportion of respondents selecting the Not applicable option (e.g. from 2% to 25%) [Table 18]. In most cases, the items where respondents were more likely to select N/A are focussed on livestock and grazing management and many respondents are not engaged in these land uses.

There are no statistically significant differences in responses for any item across the two LGA. However there are differences for eight of the 15 items based on the extent of farmer identity [Table 15]. For each of these items higher self-reported knowledge is associated with stronger farmer identity. For each item the mean scores for the cohorts descend from FTF to PTF, HF and NF in that order. In addition, there are three other items where the trend is for those with a stronger farmer identity to be more likely to report higher knowledge [Table 18].

More detailed information is presented in Table 19 for those knowledge items where there is a difference with farmer identity. Perhaps the key point is that while assessments provided by FT and PTF are similar, the assessments provided by HF and in particular NF, are much lower. It is important to note that there is a Not applicable response option and for items focussed on livestock and grazing management the proportion of respondents selecting this option is higher [Table 19]. Indeed, for the NF there are four items with a score

<30% for the Sound rating in Table 19. The positive in Table 19 is that NF respondents reported much higher knowledge for four of the five vegetation management topics.

Assuming that knowledge is a precursor to action, it seems insufficient knowledge (and probably awareness) will be a constraint to action by many UCC property owners CW and the North Central CMA want to engage in their new project. This point is especially relevant given that the NF and HF cohorts based on farmer identity represent 75% of respondents to the UCC survey. Yes, properties of FTF are larger and they may manage critical elements of the landscape (e.g. river frontages or wetlands). However the weight of numbers suggest the greatest opportunity to engage volunteers will be outside the FTF (only 10%). There are also important differences in the values, beliefs and attitudes of the four cohorts.

The CW and North Central CMA project team will need to prepare cohort specific engagement strategies (i.e. develop messages based on appeals to each cohort's values and consistent with their beliefs and attitudes; engage using mediums/platforms/processes that are relevant for each cohort; identify constraints to engagement and action and ways to effectively respond). As part of their preparation when setting out to engage individuals or small groups, project team staff should again reflect on the key attributes of those individuals and respond accordingly. The project team is also encouraged to monitor the level of effort (i.e. resources) focussed on each cohort.

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

TABLE 18: SELF-ASSESSED KNOWLEDGE OF NRM
UPPER COLIBAN CATCHMENT SOCIAL BENCHMARKING STUDY, 2018 (N=413, N=397-403)

Knowledge items	Mean	Little knowledge	Some knowledge	Sound knowledge	Not Applicable
The type and location of septic tanks on your property	4.14	4%	14%	69%	13%
Council rules for managing septic tanks in your area	3.21	21%	34%	38%	6%
Council rules for managing land application areas for septic tanks in your district	3.00	32%	28%	32%	8%
The quality of runoff leaving my property #	3.41	19%	30%	48%	4%
*How to establish stock watering systems away from waterways and wetlands ******	3.30	20%	20%	36%	25%
Which water storages provide drinking water to each community in the Upper Coliban #	2.60	45%	29%	20%	6%
The habitat value of fallen timber such as logs and branches	3.52	12%	34%	51%	2%
The role of vegetation along waterways in filtering water entering waterways #	3.46	15%	36%	44%	5%
The benefits of retaining native grasslands on properties #	3.27	22%	36%	37%	5%
*How to identify plant species, including weeds in understorey vegetation ******	3.23	23%	40%	36%	1%
How to protect and improve the health of vegetation along waterways #	3.09	28%	32%	32%	8%
Grazing & cropping strategies to manage paddock ground cover & minimise erosion #	3.41	18%	21%	42%	20%
*The proportion of ground that should be covered by plants at the end of summer to prevent soil erosion from paddocks ******	2.90	36%	24%	31%	9%
How to use soil samples to guide pasture management #	2.96	30%	19%	31%	19%
How to prepare farm/property plan where consider goals and existing property situation to identify future approaches to management & development #	2.86	34%	24%	26%	16%

Note: Mean scores calculated after removing N/A responses. So mean out of 5. # Significant difference by extent of farmer identity. All tests were Kruskall-Wallis rank sum tests with chi-square outcomes from 12.615 to 18.757 and p values <0.01. *** Trend for positive relationship with extent of farmer identity.

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

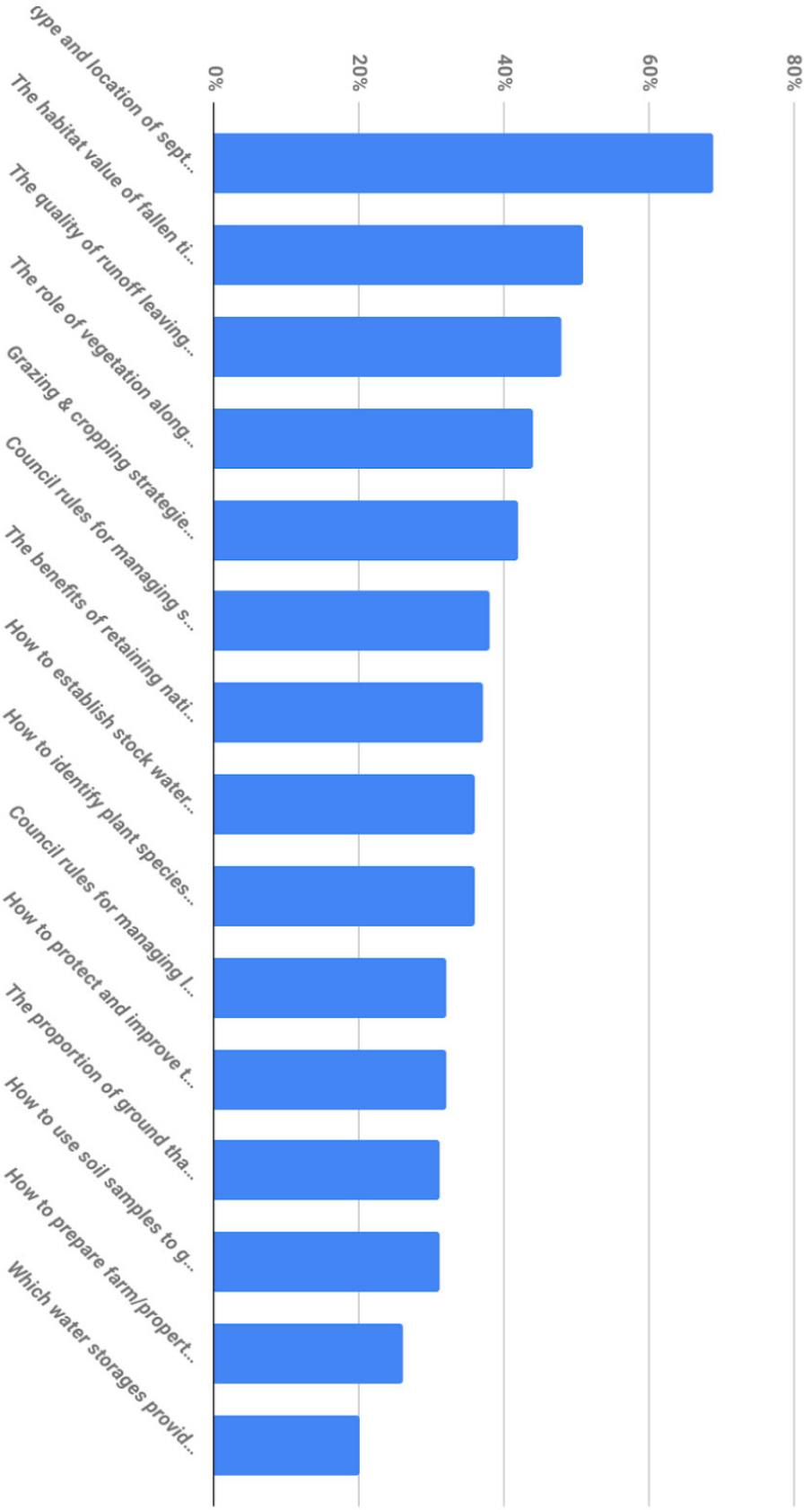


FIG 10. SELF ASSESSED KNOWLEDGE BY SOUND RATING (SUFFICIENT TO ACT)

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

TABLE 19: SIGNIFICANT DIFFERENCES IN SELF-ASSESSED KNOWLEDGE BY COHORTS BASED ON EXTENT OF FARMER IDENTITY.
UPPER COLIBAN CATCHMENT SOCIAL BENCHMARKING STUDY, 2018 (N=413, N=397-403)

Assessed knowledge by mean scores and % selected Sound and Very sound ratings	Full-time farmer	Part-time farmer	Hobby farmer	Non-farmer
The quality of runoff leaving my property #	4.00 69%	3.69 62%	3.50 52%	3.12 36%
*How to establish stock watering systems away from waterways and wetlands ****	4.21 67%	3.96 64%	3.34 42%	2.61 15%
Which water storages provide drinking water to each community in the Upper Coliban #	3.28 43%	2.97 32%	2.50 17%	2.23 14%
The role of vegetation along waterways in filtering water entering waterways #	4.00 68%	3.77 60%	3.48 45%	3.23 34%
The benefits of retaining native grasslands on properties #	3.77 53%	3.49 48%	3.25 36%	3.12 31%
*How to identify plant species, including weeds in understorey vegetation ****	3.83 58%	3.57 49%	3.46 35%	2.90 29%
How to protect and improve the health of vegetation along waterways #	4.25 80%	4.32 85%	3.58 57%	3.10 40%
Grazing & cropping strategies to manage paddock ground cover & minimise erosion #	4.38 85%	4.13 81%	3.39 41%	2.79 20%
*The proportion of ground that should be covered by plants at the end of summer to prevent soil erosion from paddocks ****	3.79 54%	3.54 50%	3.08 29%	2.75 22%
How to use soil samples to guide pasture management #	4.03 75%	3.95 63%	2.96 33%	2.09 9%
How to prepare farm/property plan where consider goals and existing property situation to identify future approaches to management & development #	4.14 69%	3.45 47%	2.81 24%	2.25 11%

Note: Mean scores calculated after removing N/A responses. So mean out of 5. # Significant difference by extent of farmer identity. All tests were Kruskall-Wallis rank sum tests with chi-square outcomes from 12.615 to 18.757 and p values <0.01. *** Trend for positive relationship with extent of farmer identity.

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

4.10 SOURCES OF INFORMATION ABOUT PROPERTY MANAGEMENT PAST 12 MONTHS

For this topic respondents were asked to identify (using a tick) any relevant sources of information related to the management of their property in the past 12 months from amongst the 24 possible sources listed [Figure 11]. In Table 20 the 24 items have been split into five groups: government and non-government organisations; traditional media; internet and web-based platforms; group-based extension (including field days as a subset); and one-to-one extension. Almost all respondents completed this topic (N=413, n=408).

It is important to note that respondents were not asked to indicate if they had used these sources of information for any reason in the past 12 months (i.e. only for information about property management). It is therefore likely that the results presented in Table 17 under-represent the use of most sources, particularly those not focussed on property management, such as newspapers, television, twitter etc.

The five most frequently reported sources of information identified in Table 20 are:
Friend/neighbours and relatives (#1 for HF and NF, #4 for PTF).
Books/magazines/journals (#1 for PTF, #2 for HF, #3 for FTF, #5 for NF).
Bureau of Meteorology (#1 for FTF, #2 for PTF and NF, #4 for HF).
Newspapers (#2 for FTF and PTF, #5 for HF and NF).
Internet (#3 for HF).
These sources are spread across old and new technologies, government and non-government organisations and mass media and personal communication channels. A key point is that none of these sources is reported by >50% of respondents, reinforcing the need to employ multiple communication channels and approaches.

While the internet was identified as a source of information about property management in the past 12 months by 37% of respondents, none of the specific web-based platforms was reported as a source by >11% of respondents. An important finding here is that Non-farmers were no more likely than Full-time farmers to identify the internet as a source of information about their property or use YouTube, Facebook, Twitter or Instagram to do that in the past 12 months. While it is possible this large cohort doesn't use these platform to any great extent, the more likely explanation is that they are simply not sufficiently motivated by aspects of property management to do so.

The importance of personal or one-to-one engagement is highlighted by the high proportion of respondents identifying friends/neighbours and relatives as a source of information. This finding also suggests that those setting out to engage property owners need to investigate the extent there are social norms and beliefs that are likely to enable or constrain achievement of their objectives.

There are significant differences for 12 of the 24 items across the four cohorts based on farmer identity [Table 20]. For six of those sources, those with a stronger farmer identity are more likely to say they use each source of information. In each case that trend is consistent, with a decrease in listing across FTF, PTF, HF and NF. This set includes three government organisations, the Victorian Farmers Federation, newspapers and field days.

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

There is a different pattern for most of the new technologies where HF are more likely to report use of the internet and Facebook than FTF. However, PTF and HF are more likely than NF to report the Internet, YouTube and Facebook; and NF are no more likely to report these sources than FTF do. The current reality is that outside the internet, very few NF used the new technologies listed in Table 20 as sources of information about property management over the past 12 months.

Those sources listed by ~30% of all respondents but there are no significant differences across the four farmer identity cohorts included:

- Local Council
- Television
- Mailed brochures/leaflets and community newsletters
- Landcare group/network

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

TABLE 20: SOURCES OF INFORMATION ABOUT PROPERTY MANAGEMENT BY COHORTS BASED ON EXTENT OF FARMER IDENTITY.
UPPER COLIBAN CATCHMENT SOCIAL BENCHMARKING STUDY, 2018 (N=413, N=408)

Possible sources of information	% Yes: Total	Full-time farmer	Part-time farmer	Hobby farmer	Non-farmer
Friends/neighbours & relatives	50% (1)	46%	44% (4)	61% (1)	47% (1)
Agric consultants, agronomists and stock agents	21%	54% (3)	39%	23%	4%
Extension officers #	3%	7%	3%	7%	1%
Bureau of Meteorology #	43% (2)	59% (1)	53% (2)	49% (4)	33% (2)
Local Council	34%	32%	34%	33%	33% (2)
North Central CMA	11%	20%	17%	9%	8%
Coliban Water #	22%	42%	24%	18%	20%
Government agencies/depts. #	18%	27%	23%	21%	12%
Environmental organisations	14%	15%	19%	11%	15%
Victorian Farmers Federation #	6%	20%	12%	7%	1%
Books/magazines/journals #	43% (2)	54% (3)	59% (1)	52% (2)	31% (5)
Newspapers #	39% (4)	56% (2)	53% (2)	36% (5)	31% (5)
Television	29%	29%	36%	32%	24%
Radio #	18%	39%	22%	17%	12%
Mailed brochures/leaflets & community newsletters	34%	44%	32%	30%	33% (2)
Internet #	37% (5)	29%	42%	50% (3)	30%
YouTube #	11%	10%	15%	20%	4%
Facebook #	7%	7%	15%	8%	7%
Podcasts	5%	Nil	7%	8%	3%
Twitter	1%	Nil	3%	1%	Nil
Instagram	3%	5%	3%	3%	1%
Landcare group/network	30%	37%	41% (4)	33%	24%
Commodity groups	4%	2%	7%	7%	3%
*Field days * #*	21%	51% (5)	37%	23%	9%

Note: Mean scores calculated after removing N/A responses. So mean out of 5.
Significant difference by extent of farmer identity. All tests were Pearson's chi-squared test, outcomes from 6.5961 to 69.715 and p values <0.05.

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

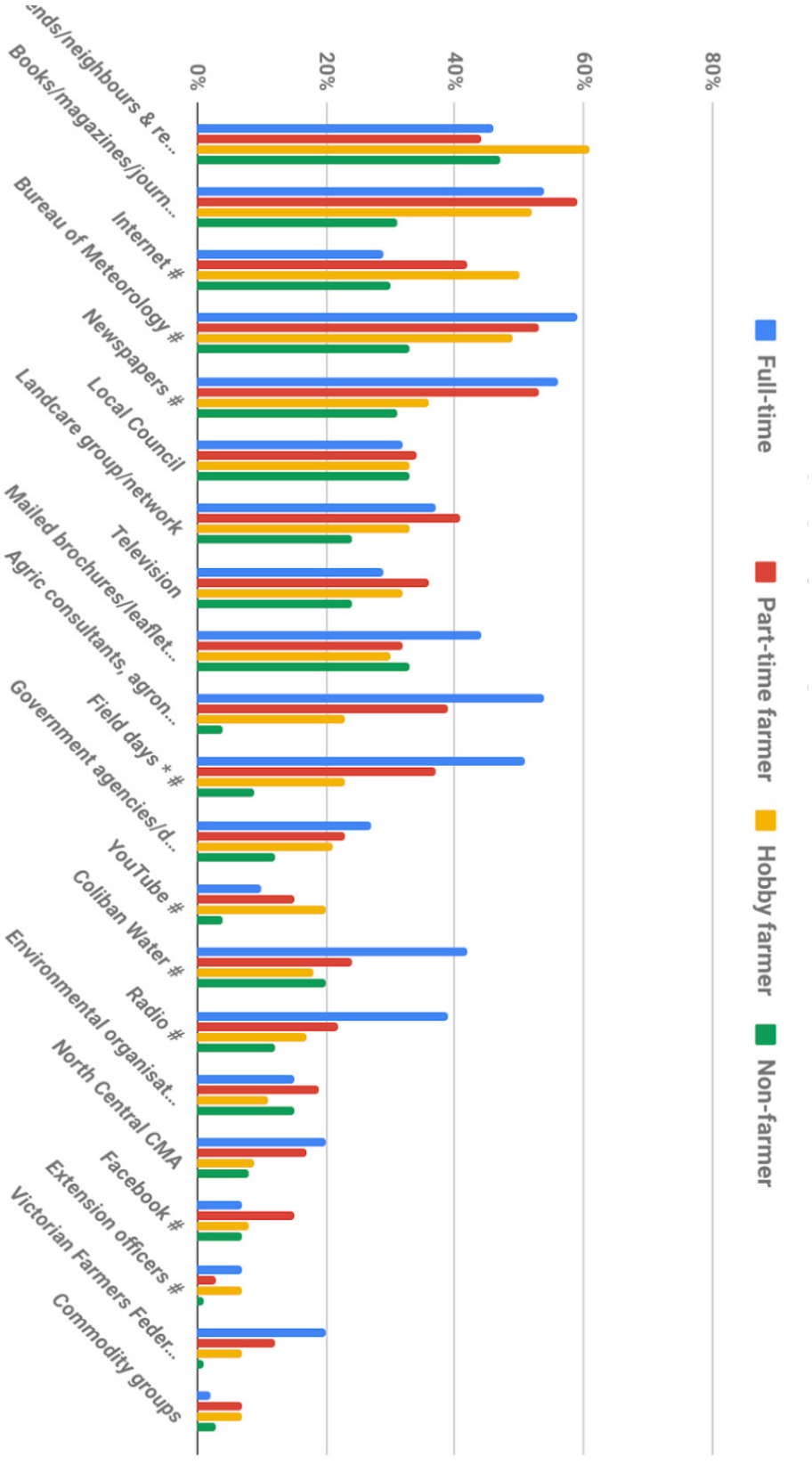


FIG 11. SOURCES OF INFORMATION ABOUT PROPERTY MANAGEMENT LAST 12 MONTHS

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

4.11 FARMER IDENTITY AS THE BASIS FOR EFFECTIVE ENGAGEMENT WITH PROPERTY OWNERS

Background

Social researchers have employed typologies of rural property owners to assist practitioners setting out to engage property owners in NRM. Until recently there have been important limitations with most typologies developed. For example, some typologies do not include all property owners and focus on just farmers. Others have no theoretical foundation and are based on researcher intuition or the outcomes of statistical analyses based on available data. And some typologies are difficult for practitioners to apply because they are overly complex (e.g. large number of types) or the attributes used to distinguish types are not readily observed.

As explained earlier, Theresa Groth's phd and related publications broke new ground by developing a typology that addresses each of the major criticisms of past typologies. Theresa's phd drew on data in the 2014 North Central social benchmarking survey. The technical report (Curtis and Mendham 2015) provides a succinct explanation of the theoretical foundation of Theresa's approach; the set of items employed by Theresa to assess the extent of a farmer identity; and some of the key findings.

Key elements of Theresa's research were published after the 2015 technical report was completed. In particular, with Professor Curtis, Theresa settled on a four cohort classification of rural property owners in the North Central CMA region: Full-time farmers; Part-time farmers; Hobby farmers; and Non-farmers. Perhaps the best explanation of this typology is in the *Australian Geographer* paper (Groth and Curtis 2017). In this paper the authors establish that these are indeed distinct cohorts based on the concept of farmer identity, describe the key attributes of each cohort; and map the distribution of the cohorts across the North Central CMA region.

Professor Curtis and Dr Mendham (with advice from Dr Groth) included a survey item in the recent Wimmera social benchmarking survey (Curtis and Mendham 2017) asking respondents to self-classify in one of the four farmer identity cohorts (Curtis and Mendham 2017).

Professor Curtis has employed the four cohort farmer identity typology with NRM practitioners setting out to engage rural property owners in multi-functional landscapes in Victoria (e.g. Curtis and Curtis 2018). Applications of the typology with North Central CMA staff, the Victorian Serrated Tussock Working Party and with Landcare facilitators in the Barwon district confirm that the typology reflects lived experience and can be readily applied to guide engagement.

As published in the *Australian Geographer* paper, analysis of the 2014 North Central social benchmarking study established that FTF represented 48% of rural property owners with property of 10 ha or more. Part-time farmers were 31%; Hobby farmers 11% and Non-farmers 10% (Groth and Curtis 2017). Further analysis established significant variation in the relative importance of each cohort across the North Central region and these variations were presented using a series of maps. Those data were not presented in tabular form so a summary is not available for the four cohorts for the Hepburn or Macedon Ranges LGA.

The 2014 regional survey did include an item that asked respondents to select from one of three farmer identity cohorts. Results were presented in the technical report for the region, LGA (so both Hepburn and Macedon

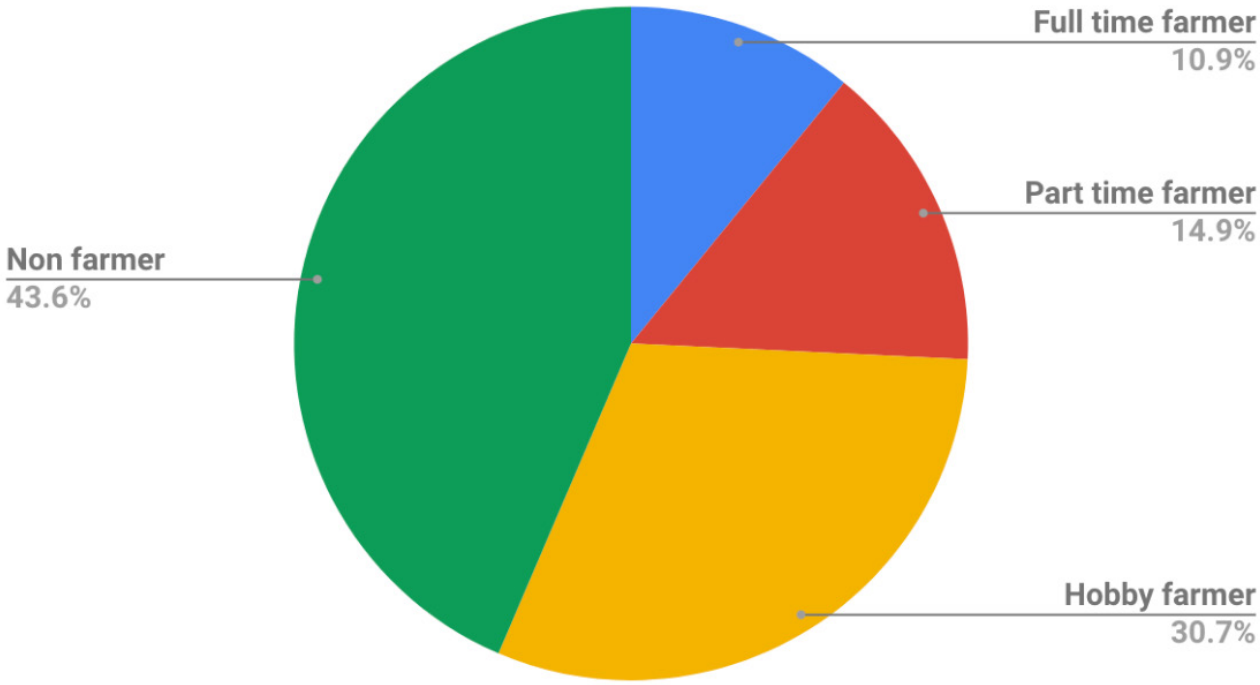
4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

Ranges) and for the Upper Coliban Catchment (pp 107-107, Curtis and Mendham 2015). For the region, FTF were 52%, PTF 30% and NF 18%. For the Upper Coliban Catchment, FTF represented 25% of respondents, PTF 50% and Non-farmers 25%. Clearly, on these data from 2014, the UCC is atypical of the North Central region. As is also illustrated in Table 1, there is a significant difference on the extent of farmer identity across the two LGA. For example, Macedon Ranges has a higher proportion of Part-time farmers and a lower proportion of Non-farmers.

Proportion of respondents in each farmer identity cohort

Of course, the 2014 survey included those owning properties of 10 ha or more. The current UCC survey includes properties of 2 ha and above. The expectation was that the UCC survey will include a higher proportion of NF and HF. Results summarised in Table 1 and Figure12 are consistent with that assumption in that in the UCC in 2018, FTF accounted for 11% of respondents, PTF 15%, HF 31%, and NF 44%. So, HF and NF combined ~75% [Figure 12].

FIG 12. FARMER IDENTITY



4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

Attributes of each farmer identity cohort

For each of the topics covered in this report analyses have compared respondents in the two LGA and also across the four cohort typology based on farmer identity. While there have been some significant differences across the LGA, most of differences identified are for the extent of a farmer identity. Together, those results form a coherent pattern(s). Details of those differences for most survey topics have already been presented and discussed. A summary is presented below.

This section also includes a summary of differences across the four cohorts for the personal and property attributes gathered in the You and Your Property section of the survey. For most items there is a significant difference across the four cohorts. Only results for those items are presented in Table 21.

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

TABLE 21: A COMPARISON OF THE FOUR COHORTS BASED ON EXTENT OF FARMER IDENTITY: SIGNIFICANT DIFFERENCES FOR KEY PROPERTY AND PERSONAL ATTRIBUTES RELATED TO PROPERTY MANAGEMENT.
UPPER COLIBAN CATCHMENT SOCIAL BENCHMARKING STUDY, 2018 (N=413)

Key attributes **Medians unless indicated used mean**	**Full-time Farmer (11%)**	**Part-time farmer (15%)**	**Hobby farmer (31%)**	**Non-farmer (44%)**
Property size	84 ha	40 ha	15 ha	8 ha
Age	67 years	62 years	60 years	61 years
Resident on property	86%	77%	71%	61%
Length of ownership	36 years	20 years	11 years	15 years
Days paid off property work last 12 months (mean)	36 days	114 days	128 days	110 days
Hours work on-property per week	50 hours	20 hours	10 hours	5 hours
Income from agriculture 2017/18	83%	79%	28%	6%
Of those with income from agric, % reporting a net profit 2017/18	58%	31%	4%	2%
Landcare participant 2018	26%	29%	29%	15%
Used a contractor last 12 months	57%	61%	51%	38%
Property leased, share farmed or agisted by others	10%	9%	19%	18%
Property leased, share farmed or agisted from others	22%	14%	6%	9%
Attended a field day/farm walk last 12 months	62%	45%	33%	14%
Completed a short course related to property management past 5 years	50%	35%	21%	5%

Note: Mean scores calculated after removing N/A responses. So mean out of 5.
Significant difference by extent of farmer identity. All tests were Pearson's chi-squared test, outcomes from 4.0184 to 162.89 and p values <0.05.

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

4.12 BACKGROUND PERSONAL AND PROPERTY INFORMATION

Likely implications of the more noteworthy results in Table 22 include:

1. Very small median property size limits the scope for viable dryland farming enterprises, especially those based on grazing and cropping.
2. Less than a third of respondent reported any income from agriculture in the last financial year and only one in five of those reported a net profit. It seems reasonable to conclude that while agriculture remains a very important land use and influence on NRM outcomes, the production of food and fibre and the goal of establishing a viable farm business appear to be relatively minor influences on property management decisions.
3. A surprisingly high proportion of respondents (almost 50%) said they employed a contractor for aspects of property management (e.g. weed control, fencing, pasture establishment and fertilizer spreading) in the last year. This item didn't specifically exclude non-NRM work, but all the examples were NRM focussed. This trend may reflect the limited capacity of older owners to undertake some activities (e.g. spray weeds in steep locations); smaller property owners being unable to justify purchasing some equipment (e.g. tractors); NTF and HF not having the expertise to perform some activities (e.g. spraying weeds); and the time constraints on those working off-property. That almost 50% of respondents used a contractor suggests that many property owners have the financial capacity to employ others to perform work they consider important.

4. RESULTS BY RESEARCH TOPIC FOR UCC (CONT.)

TABLE 22: BACKGROUND PERSONAL AND PROPERTY INFORMATION.
UPPER COLIBAN CATCHMENT SOCIAL BENCHMARKING STUDY, 2018 (N=413)

Attributes **Medians unless indicated used mean**	**All**	**Hepburn**	**Macedon Ranges**
Property size (n=386)	16 ha	10 ha	21ha
Property leased, share farmed or agisted from others (n=397)	10%	12%	8%
Median area managed owned by others (n=42)	19 ha	12 ha	25 ha
Property leased, share farmed or agisted by others (n=393)	16%	18%	14%
Property is normal place of residence (n=394)	69%	66%	74%
If not residence, times visited 2018 (n=95)	30 visits	30 visits	25 visits
Length of ownership (n=396)	15 years	14 years	18 years
There is a dwelling on property (n=395)	86%	86%	85%
If no dwelling, intend to build on property (n=79)	58%	64%	50%
Age (n=367)	61 years	61 years	62 years
Attended a field day /farm walk past year (394)	29%	23%	38%
Prepared/preparing a property management or whole farm plan (n=400)	25%	23%	29%
Completed short course relevant to property management past five years (n=400)	19%	18%	20%
Hours worked on-property per week on farming or property activities last 12 months (n=365)	10 hours	10 hours	12 hours
Days of paid off property work last 12 months (n=332)	50 days	45 days	50 days
Commodity group participant (n=399)	6%	8%	4%
Landcare participant 2018 (n=399)	21%	19%	27%
Used a contractor last 12 months (n=399)	47%	44%	53%
Income from agriculture 2017/18 (n=397)	32%	27%	37%
Of those with income from agric, % reporting a net profit 2017/18 (n=183)	21%	27%	37%

5. SPECIFIC COMMENTS

About half a page was set aside on the inside rear cover of the survey for Other Comments. Specific comments were provided by 128 respondents. Some respondents provided an explanation of why they had not completed the survey or had returned the survey a considerable time after receiving it. A smaller number of comments referred to the future intentions of landowners. Most comments were relatively brief (i.e. one or two sentences). Seventy-eight comments are included in the section below under four broad headings:

1. Issues of concern (34 comments).
2. Suggestions of ways to do better (16).
3. Feedback on the survey instrument (13).
4. Comments for Coliban Water, North Central CMA and the two Shire Councils (15).

There has been no attempt to sum the number of times a topic is listed under each broad heading. Applying a small number of broad headings and listing each comment verbatim allows each comment to reflect the intended meaning of the respondent. It will become obvious that some of the issues of concern are listed more frequently than others. For example, there are several comments referring to the need for action to better manage pest plants and pest animals; for action on what respondents believe are problems arising from uncontrolled populations of kangaroo; and consideration of the impacts of pumping groundwater.

ISSUES OF CONCERN

1. *Reducing farm dams will reduce fire-fighting capacity in region.*
2. *Lack of fox and rabbit control.*
3. *High rainfall areas, land more expensive so must be able to harvest water.*
4. *If the use (groundwater) is not capped the Little Coliban will become a seasonal creek. The Loddon/Coliban and Campaspe will suffer the same fate as well if action is not taken. The little Coliban has dried out 3 times in the last 5 years.*
5. *Concerned about productive farming land being used for housing development.*
6. *Concerned have little or no control about using our water.*
7. *Lack of action by local and water authorities is allowing a property owner to continue denuding forest floor of all undergrowth, to run sheep in fenced muddy pens with no grass or vegetation to hinder runoff and the stockpiles of large quantities of rusting vehicles and machinery on his property.*
8. *Control of willows along waterways.*
9. *Depletion of water table by quarry activity e.g. Tylden is of concern. Better management of quarry activity in relation to water table is important.*
10. *One thing that bothers me is what impact the quarry extension is going to have on our underground water. I grew up on the property they have taken over it was covered in springs. My dam relies on a spring and I am straight across the road from their extension.*
11. *No access to stock water after fencing of waterway. Costly repairs to fencing after floods.*
12. *Farms need dams to water stock. Dams do not stop water catchment as dams overflow and water continues to catchment areas.*
13. *Gorse is a shocking weed all landowners should be forced or helped to control this weed. There is help out there but some landowners just ignore the problem.*

5. OTHER COMMENTS

14. *Have belonged to 2 different landcare groups in the past - quite some number of years back. Could possibly revisit but know that depending on people running them can be extremely diverse and sometimes purely about obtaining max resources for vested interests.*
15. *There appears to be no activity with regard to Willows etc in Tylden Township.*
16. *Lack of action to control motor bike activity along waterways in the Coliban catchment area is detrimental to water quality.*
17. *I have 48 acres. I can run only 2 horses on agistment; some years have to be supplementary fed, due to the number of kangaroos. In the 70s and 80s I had (seasonally) up to 40 head of cows (and calves). 90s 4-6 horses on agistment (seasonally). Late 90s onwards the kangaroo numbers have my property like a bowling green! In 1975 if we (neighbours) saw a kangaroo we would phone one another. Now we just grind our teeth.*
18. *Have a concern about the growing number of cypress type hedges being planted along roadside boundaries. They give a tunnel-like effect when traveling along roads, block greater views of the district and are possibly a fire hazard.*
19. *See that some of the questions relate to people using their property for 'holiday' homes, I feel this is an issue in regard to weeds, particularly blackberries and their management.*
20. *I feel that property owners damming sections of the waterways for no good purpose is unfair and unreasonable given Australia's current water issues.*
21. *In an ideal world, I would love to see the properties surrounding me, forced to clear noxious weeds (e.g. Gorse/ blackberries/weeds) from their properties, as I have spent thousands of dollars & so many hours trying to keep my property clean and clear of those, all to no avail! Roadsides are full of them too. Thank you for the opportunity to at least have a say re these matters.*
22. *Kangaroos, wallabies destroying fences. Kangaroos around house worried about attack on children, adults - something has to be done.*
23. *Kangaroos, deer and wild pigs are a major problem in this area. You can count over 1000 on my place at one time and I can only run a 1/4 of the stock I should.*
24. *Similarly for exploding kangaroo populations.*
25. *We currently have issues with blackberries which we are looking at ways of eradicating.*
26. *There are several septic systems that provide safe usage in catchment areas. Restrictions are far too extreme.*
27. *Increasing rabbit population.*
28. *We are finding that we have a list of new neighbours who love the bush but know little about it.*
29. *There is an overriding fear of bushfire compounded at Fireguard meetings. The result is destruction of bushland, mowing and burning; no appreciation of rare plants and lower order plants in the canopy. Worse, we see the planting of exotics and conifers!*
30. *We have deferred moving to the site and establishing a business because mobile and internet access has not been addressed.*
31. *I have observed considerable change in flora over 12 years, and new weed threats, especially Spanish Heath is establishing, spreading.*
32. *Large trees stressed by changed rainfall, restricted growing season/climate change.*
33. *We have tried very hard over the last few years to manage our property - weed eradication, tree planting or regrowth, fire hazard control. However the worst areas near our property are roadsides, State Forest and adjoining elderly or disinterested landholders.*
34. *Rates and insurance, fuel costs are too high for profitable farming.*

5. OTHER COMMENTS

SUGGESTION OF WAYS TO DO BETTER

1. *All bores should be metered, all users should pay for the water they use.*
2. *Provide information to new residents (we received nothing).*
3. *I have over the last 20 years spent thousands of dollars in an effort to rid the property of gorse. Last year I made progress with the help of a grant from the Land Department. I will apply and hope I get the same this year! My contact number is … (comment #42).*
4. *All state forests should be left only for the wildlife. No bike tracks. No car access only walking tracks and dogs on leash.*
5. *Keen to see holistic management of water and pests (plants and animals) across the private and public property boundaries.*
6. *Management of pest plants, particularly gorse, appears to be a major issue in the Upper Catchment adversely impacting the quality of land and fostering the growth of animal pests. A focused education and management program is required.*
7. *Need help to control rabbits.*
8. *Would like to see revegetation happen along water catchment land adjacent to our property - willows have gone, now just bare and has been for years - ugly! No habitat for fauna.*
9. *Need much better understanding of ground water and the impact of bores over the aquifer.*
10. *Rain collection should be encouraged and incentivised with sensible limits of course. Bore water and trucked in water is not sustainable use of water as it depletes a resource from another area.*
11. *The properties adjoining Mulcahys Road and the old railway line need desperate cleaning up. If you rented the railway siding you were expected to keep it clear of growth. This seems to have gone by the wayside. It is a disgrace and a fire danger.*
12. *Also trespassers who damage, and cut fences, illegal parking inside properties to reservoirs, in long grass, another fire danger risk. People also pollute along our road, and cameras to catch culprits would help catch the polluters.*
13. *Councils must take responsibility to communicate the "how to look after the bush" and enforce if not encourage greater respect for the existing environment to new residents.*
14. *We do not support the creation of walking paths by the Upper Coliban River for these reasons: 1. Rubbish isn't managed/Trentham Falls is a good example. 2. Smoking by the public can lead to fires. 3. Trespassing on private property along walking paths is a problem. We have been advised of this by people who have a lot of experience in tourism areas and relevant qualifications.*
15. *We would love to be able to swim in local reservoirs in summer.*
16. *Fencing waterways does work but repairing fences is costly.*

THE SURVEY INSTRUMENT

1. *Who is Professor Curtis?*
2. *A lot of questions are not relevant to our situation- our property is 70% bush.*
3. *Good job on making this and its questions as confusing as possible. I question the veracity of the results you'll obtain. Before undertaking a survey such as this a focus group should be used to ensure readability, understanding of the questions*

5. OTHER COMMENTS

4. *I appreciate it is important for you to gather this information. We have this place as a weekend retreat, get away. Hoping to live on it one day. Love the area (Lyonville). Love the environment, fresh air, birds, animals and bushland. Hoping to preserve all.*
5. *Found many questions in this survey difficult to respond to as my property is only 2.93 Ha.*
6. *Not sure why this survey was designed. I will be interested in the results. The TRUE results. People in this region have constantly been hit in their pockets financially, so just wondering where this survey outcome is headed.*
7. *Poor quality and subjective-leading questions. No questions as to the value of agriculture to individuals, families and communities. You assume that water leaving farm properties is contaminated. No indication of contamination from urban runoff. Usual climate change bullshit. NC CMA are agenda driven and predominantly liaise against agriculture.*
8. *Q.4 - It seems we are trying to receive a certain response based on the types of questions here. Worded poorly for a political question.*
9. *So many unnecessary questions. How much did all this cost taxpayers?*
10. *Some of the questions were not well worded/defined and others could not be answered as they assume a level of scientific knowledge not held by us.*
11. *Sorry Professor that I did not answer all the questions in the survey, but many of them did not seem relevant to our situation.*
12. *Thank you for your interest in my farm. I have done a lot of work to improve the land. New fences, new water troughs, removing gorse and weeds, planting native trees - native to the area. Unfortunately I own less than 100 acres so I can't build a house so I don't spend the time and effort I would if I could one day live there.*
13. *There is nothing in this survey that addresses or details the declining terms of trade and lack of value of agricultural products produced in this area -Q.5 This section makes assumptions that are popular but not proven. While climate is always changing there is no clear scientific evidence as to the proportion due to human activity.*

COLIBAN WATER, NORTH CENTRAL CMA, LOCAL GOVERNMENT

1. *I have no idea of the 20 year vision/plan - it wasn't readily available on CW's website. North Central CMA seems to fly beneath the radar. I am unaware of the availability of extension officers.*
2. *There needs to be more weed and pest animal control on Coliban land. Infestations of gorse, blackberries, fallen trees and leftover logs/branches from pine clearing are a fire hazard that increases risks of more fire danger.*
3. *Unmanaged noxious weeds on Hepburn Shire and Macedon Ranges Shire, Coliban property (blackberries, gorse, thistle).*
4. *Provided works and engagement are appropriate I support the work of NC CMA and CW in the Upper Coliban Catchment area. Apologies.*
5. *Several years ago I applied to batter the banks of existing creeks and plant out with native vegetation. This application was refused "we like to see creek banks erode naturally". I thought this was dumb! The area is now infested with gorse, blackberries and foxes.*
6. *Poor practices by Coliban Water assuming they are right. The appalling mess around the Upper Coliban tree removal. If you are going to take out non-natives then take them all! Clear and properly replant mixed natives. This was just an appalling incompetent mess.*

5. OTHER COMMENTS

7. *We were made to install a water treatment style waste water system on our property even though our septic would have run away from the waterways. Yet our neighbours who are new to area are allowed standard septic tanks - why is this the case and will the water catchment reimburse us for wasted money?*
8. *Would like to see any plans Coliban Water has regarding flora & fauna assessments & conservation protection for wildlife (native) on property owned by Coliban Water i.e. Trees that are home to bird species. How many kangaroos, echidnas, turtles, platypus etc? What plans does Coliban Water have in place to protect native wildlife & plants? I have asked about this previously but never had an answer.*
9. *You have no right to manage something that God given right to all of humanity, to use as needed, our planet it 75% water and there will never be a shortage, agenda 21 has infiltrated our government to control every aspect of humanity.*
10. *Your concerns relating to the impact on water quality by responsible property owners may mean nothing while the water storage facilities are available for unmonitored public access, leaving them open to dumped vehicles; rubbish; batteries; people and dogs splashing around in the water, and countless other forms of misuse.*
11. *Want an answer to this question: Was the replaced chlorinated water from Trentham swimming pool, resulting from routine maintenance procedures, still being dumped in Trent Creek where that stream comes away from Camp Street to flow through the reserve to Watson Bridge on High Street or not? The usual response has been to the effect that this was a matter for the local Municipal Authority. I would be most pleased if you could advise on the present status of this wastewater practice.*
12. *Disappointing that we do not get continuity when dealing with NC CMA. Projects started, weed control enforced on some but not adjoining properties.*
13. *Had some difficulties in Woodend township proper with regard to inconsistent application of flood zone rulings.*
14. *Increasing new government/council regulations increase the difficulty to do things. For example, I need to do owner builder course to do construction.*
15. *Regard your organisation as being self-righteous who virtually have little or no contact with many of the people. There is plenty of water in Australia but poorly distributed, a huge amount runs into the sea.*

REFERENCES

1. Ashmore, R. D., Deaux, K., & McLaughlin-Volpe, T. 2004. An organizing framework for collective identity: Articulation and significance of multidimensionality. *Psychological Bulletin, 130*(1), 80-114.
2. Barr N. 2005. *The changing social landscape of rural Victoria.* Tatura, Victoria: Victorian Government.
3. Curtis, A., and Curtis, S. 2018 Social research to motivate disengaged landowners: A summary. A report to the Victorian Serrated Tussock Working Party. Decoy Marketing + Media. Albury, NSW
4. Curtis, A., and Mendham, E. 2014. Rural landholder beliefs about climate change. Report to the North Central Catchment Management Authority. Charles Sturt University, Wagga Wagga, NSW.
5. Curtis, A., and Mendham, E. 2015. *The social drivers of natural resource management: North Central Victoria.* Report to the North Central Catchment Management Authority. Institute for Land, Water and Society (Technical report 80) Charles Sturt University, Albury, NSW.
6. Curtis, A., and Mendham, E. 2017. *The social drivers of natural resource management: Wimmera*. A report to the Wimmera Catchment Authority. Charles Sturt University, Wagga Wagga, NSW.
7. Curtis, A., Ross, H., Marshall, G.R., Baldwin, C., Cavaye, J., Freeman, C., Carr, A., and Syme, G. 2014. The great experiment with devolved NRM governance: lessons from community engagement in Australia and New Zealand since the 1980s. *Australasian Journal of Environmental Management* 21:2, 179-199.
8. Curtis, A., and Mendham, E. 2012. *The social drivers of natural resource management in the Wimmera region*. A report to the Wimmera Catchment Management Authority. Institute for Land, Water and Society (Technical report 68) Charles Sturt University, Albury, NSW.
9. Curtis, A., and Lefroy, T. 2010. Beyond threat and asset-based approaches to natural resource management in Australia. *Australasian Journal of Environmental Management* 17: 6-13.
10. Curtis, A., Cooke, P., McDonald, S., & Mendham, E. 2006. *Corangamite regional social benchmarking survey 2006.* Albury: Institute for Land, Water and Society, Charles Sturt University.
11. de Vaus, D. 2002. *Analysing social science data. 50 key problems in data analysis.* London: Sage.
12. Groth, T., and Curtis, A. 2017. Mapping farmer identity. Why? How? What it tells us? *Australian Geographer*, 48:3, 365-383.
13. 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.
14. Holmes, J. 2006. Impulses towards a multifunctional transition in rural Australia: Gaps in the research agenda. *Journal of Rural Studies* 22: 142-160.
15. Lockwood, M. 1999. Humans Valuing Nature: Synthesising Insights from Philosophy, Psychology and Economics. *Environmental Values* 8(3): 381-401.
16. Leahy, J. E., & Anderson, D. H. 2008. Trust factors in community–water resource management agency relationships. *Landscape and Urban Planning,* 87(2), 100-107.
17. 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
18. Mendham, E., and Curtis, A. 2010. Taking over the reins: trends and impacts of changes in rural property ownership. *Society and Natural Resources* 23(7): 653-668.
19. Mendham, E., and Curtis, A. 2018. Social benchmarking of North Central Catchment Management Authority Gunbower Island projects. Report to the North Central CMA. Graham Centre for Agricultural Innovation. Wagga Wagga, NSW.

REFERENCES (CONT.)

20. Minato, W., Curtis, A., and Allan, C. 2010. Social norms and natural resource management in a changing community. *Journal of Environmental Policy & Planning,* 12:4, 381-403.
21. Pannell, D.J., Marshall, G.R., Barr, N., Curtis, A., Vanclay, F., and Wilkinson, R. 2006. Understanding and promoting adoption of conservation technologies by rural landowners. *Australasian Journal of Experimental Agriculture.* 46 (11): 1407-1424.
22. Pannell, D.J. 2011. Policy perspectives on changing land management pp 177-189. In, Pannell, D.J., and Vanclay, F. (eds). 2011. C*hanging land management: adoption of new practices by rural landholders*. CSIRO Publishing, Melbourne, Australia.
23. Seymour, E., Curtis, A., Pannell, D., Allan, C., & Roberts, A. 2010. Understanding the role of assigned values in natural resource management. *Australasian Journal of Environmental Management,* 17, 142-153.
24. Sharp, E., and Curtis, A. 2014. Can NRM agencies rely on capable and effective staff to build trust in the agency? *Australasian Journal of Environmental Management,* 1-13.
25. Smith, J. W., Leahy, J. E., Anderson, D. H., & Davenport, M. A. (2013). Community/agency trust and public involvement in resource planning. *Society & Natural Resources*, 26(4), 452-471.
26. Stern, P. C., Dietz, T., & Kalof, L. 1993. Value orientations, gender and environmental concern. *Environmental Behavior,* 25, 322-348.
27. Stern, P. C. 2000. Toward a coherent theory of environmentally significant behaviour. *Journal of Social Issues* 56(3): 407-424.