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Bureau of Rural Sciences

Providing social and economic data to support regional natural resource management in the Burnett Mary

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Executive summary

Introduction

This report presents a summary of key findings from a mailed survey to 1,000 landholders in the Burnett Mary region in 2004. The final response rate for this survey was 60%. The survey gathered base-line information regarding the key social and economic factors affecting landholder decision-making about the adoption of practices expected to improve the management of natural resources in the Burnett Mary region.

Characteristics of landholders and their properties

- The median age of property owners in the Burnett Mary region was 54 years.
- The average property size for respondents to the survey was 408 ha. Only 10% of respondents had a property over 1,000 ha but this small group of respondents managed 77% of the combined area of all properties surveyed.
- Farming was the single most common occupation reported by respondents with 42% saying this was their primary occupation. While over half of all respondents said farming was not their primary occupation these respondents managed only 12% of all land surveyed.
- Less than half of all respondents (32%) in the Burnett Mary made an on-property profit for the 2003/2004 financial year and the average on-property income was approximately \$10,000.
- Over two thirds of respondents (67%) reported an off-property income for the 2003/2004 financial year with an average off-property income of approximately \$26,000.
- The average total household income for all respondents in 2003/2004 was \$36,000 and less than one third of respondents (32%) reported a combined annual income in excess of \$50,000.
- Native bush and grasses, beef cattle and dryland pasture were the most common land uses/enterprises reported by respondents in the Burnett Mary region.

Assessment of issues

- Social issues such as lack of long-term opportunities for young people, availability of services, and reduced employment opportunities were rated amongst the most important issues affecting respondents' local district.
- The majority of respondents also said that the availability of surface and groundwater for agriculture and the cost of managing weeds and pest animals were important issues in their district.
- Government policy and regulations limiting management options, uncertain or low returns limiting investment in the long-term health of their property and the time and expense of managing regrowth were the only issues most respondents said were important on their property.

- Dryland salinity, soil acidity, decline of native vegetation, deteriorating water quality and lack of awareness about Aboriginal cultural heritage sites were not rated as important issues by most landholders.

Values attached to property

- A very wide range of social, environmental and economic values were attached to respondents' properties.
- Providing the lifestyle respondents wanted, being an attractive place to live, and being able to pass the property on in better condition were rated as the most important values of respondents' properties.
- Most respondents also said that providing a sound long-term economic investment, being an asset that will fund retirement, building/maintaining a viable business, and contributing to the environmental health of the district were important values of their property.
- Providing the only job they had ever done and preserving family tradition were not rated as important values of their property for most respondents.

Knowledge

- Most respondents said they had sound knowledge about the benefits of spell pasture and crop rotation in maintaining soil health and productivity.
- Respondents reported more moderate knowledge about the benefits of ground cover on grazing and cropping paddocks, the ability of vegetation to improve water quality, the effects of uncontrolled stock access on native vegetation and how to recognise signs of salinity.
- The survey highlighted limited knowledge of the processes leading to soil acidification, the processes leading to herbicide resistance, the extent and quality of groundwater resources and the processes leading to soil salinity.

Attitudes towards natural resource management

- The most common attitudes towards natural resource management were that grasses could stabilise river banks as well as trees and that clearing regrowth plays an important part in maintaining a viable business.
- While the availability of surface and groundwater for agriculture was considered an important issue, over three quarters of respondents also acknowledged that diverting water flows could cause problems for downstream landholders and the environment.
- The majority of landholders in the Burnett Mary were confident that action at the property level can improve the environmental health of the region. Most respondents also thought that landholders should be paid for providing environmental services. At the same time, respondents appeared willing to make a significant individual contribution with over half agreeing that a short-term loss in production could be justified by long-term improvements to the environment.
- Survey findings highlighted an opportunity to improve the management of Aboriginal cultural heritage sites on private property with just under half of all respondents agreeing the landholders and Aboriginal communities should work together to manage these sites.

Preferred funding arrangement for natural resource management

- Reduction in rates levied by local government and tax rebates were the only funding arrangements included in the survey where more than half of all respondents reported a strong interest.
- Over a third of respondents also had a strong interest in annual payments for environmental services.
- Less than a third of respondents reported a strong interest in being involved in grant schemes administered by Burnett Mary Regional Group for Natural Resource Management (BMRGNRM) or a government department, coordinated labour to undertake on-ground works, tenders in response to government advertisements, or annual lease payments for land managed by others.

Sources of information about natural resource management

- Newspapers were the most common source of information about natural resource management in the Burnett Mary region. Television was the only other source of information used by at least half of all respondents.
- The least used sources of information about natural resource management were universities, BMRGNRM and training courses.
- When asked about the utility of information over half of all respondents who used government departments and the internet said these sources of information were one of the most useful they had used.
- In comparison, less than one third of respondents who had used the BMRGNRM, environmental organisations or radio said these were one of the three most useful sources of information they had utilised.

Long term plans

- Approximately three quarters of all respondents said it was likely that they would continue to live on their property.
- Over half of all respondents also said that ownership of the property was likely to stay within their family.
- Just under 40% of all respondents said that they were likely to sell or lease out all or most of their property in the long-term.
- In contrast, less than 20% of respondents said that their long-term plans were likely to involve expanding the area of land they managed. These respondents already owned/managed significantly larger properties than other respondents.

Involvement in planning processes

- Just under 40% of respondents were involved in property planning and 11% had a completed or on-going property plan.
- Approximately two thirds of respondents said they had a plan or vision about the improvements they would like to make on their property and just under a quarter of these respondents said they were well advanced in implementing those changes on their property.

- Despite the finding that most landholders said ownership of their property was likely to stay within the family most (72%) had not begun to plan the transfer of their property to the next generation.
- Just under one third of survey respondents said they were involved in local action planning activities with only 5% reporting a high level of involvement.

Involvement in government funded programs

- Only three respondents, or less than 1%, said they were a member of a benchmark or best practice group.
- Six percent of respondents said that they had work undertaken on their property in the past five years that had been at least partially funded by government programs.
- Just under one third of respondents in the Burnett Mary said they had used the services of a government advisor in the past year.
- Thirteen percent of respondents said they were currently a member of a Landcare group.

Constraints to change

- At least three quarters of respondents said that availability of surface or groundwater, suitability of soils and cash flow were, or would be important constraints to changing management practices on their property.
- The existence of long-term markets and stage of life were also among a wide range of other factors considered important by the majority of respondents.
- The only factors that were not considered important in influencing respondents' decision making about changing management practices were: the extent other people were undertaking the new practice in the district, what others see as good farming, availability of labour and the returns available from off-property investments.

Adoption of Current Recommended Practices (CRP)

- Survey data highlighted high levels of adoption of some CRP including using trash blanket practices in cane harvesting (91% adopted), undertaking pest animal and non-crop weed control (89%) and using spell or rotational grazing (76%).
- Findings demonstrated moderate uptake of the CRP cropped using minimum tillage, varied crop rotation based on soil tests, applied lime or gypsum, used a soil testing/monitoring program, reused or recycled effluent, cropped using a rotation with spell pasture, encouraged regrowth of native vegetation, and fenced waterways to control stock access.
- Less than one third of respondents with the appropriate landuse/enterprise had adopted the CRP reduced chemical use, controlled machinery or stock traffic, planted trees or shrubs, sown perennial pasture, used a designated cleaning area to minimise weed infestation, fenced native bush to control stock access, irrigated using a schedule and used low pressure overhead, solid set or drip irrigation.

Confidence in Current Recommended Practices (CRP)

- The majority of survey respondents agreed that fencing waterways was an important part of the work required to revegetate these areas. At the same time, just over half of all respondents also acknowledged that fencing makes these areas more difficult to manage.
- Just under half of all respondents indicated that the time and expense of watering stock off-stream was justified by improvements in bank stability and water quality.
- There was less certainty regarding the benefits and costs of stubble retention, although 43% of respondents thought the benefits of stubble retention outweighed the difficulties/costs.
- In contrast, only 9% of respondents agreed that drip, low pressure overhead or solid set irrigation systems were suitable for all plants/crops and on all soil types.

Differences across sub-catchments

The Burnett Mary region consists of five sub-catchment areas used as the basis for regional planning, asset identification, prioritisation, and integrated works programs. Findings from this research highlighted considerable differences across these sub-catchments and reinforce the need for awareness of these differences to enable effective catchment planning and management. Differences between landholders from the five survey sub-catchments included:

- property size;
- occupation;
- on-property profitability;
- perceived importance of issues;
- values attached to property;
- long-term plans;
- knowledge about natural resource management;
- factors affecting their decision making about changing management practices;
- landcare membership;
- property planning; and
- adoption of CRP.

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1. Introduction

Research context

This report presents a summary of key findings from a mailed survey to 1000 landholders in Queensland's Burnett Mary region in 2004/2005. The survey gathered baseline information regarding the key social and economic factors affecting landholder decision making about the adoption of practices expected to improve the management of natural resources in the Burnett Mary.

It is important to recognise that much of the Burnett Mary region has experienced severe drought conditions in 2004/2005 and that these conditions are likely to affect responses to some of the questions in the mail survey. However, the project partners thought it was important to establish baseline data, and acknowledged that drought had been a reality in much of the area for some time.

This project drew heavily on the methodology of similar projects completed in the Goulburn Broken Dryland in 1999 (Curtis *et al.* 2000), the Ovens Catchment in 2001 (Curtis *et al.* 2002) and the Wimmera region in 2002 (Curtis and Byron 2002). The Burnett Mary Regional Group for Natural Resource Management (BMRGNRM) and the Bureau of Rural Sciences (BRS) were key project partners. Funding for this project was sourced through a mix of national, state and regional programs, including the National Heritage Trust Extension (NHT).

Research objectives

1. To provide baseline data for key social and economic conditions/trends at the sub-catchment scale that is required for effective catchment planning (1:25,000)
2. To gain a better understanding of the limitations/barriers/constraints to the adoption of recommended practices (sustainable agriculture and biodiversity conservation).
3. To evaluate attitudes towards current tools and potential alternative tools for improved land management and predict landholder responses to a limited number of policy options.
4. To provide information that will allow assessment of NHT program outcomes across intermediate objectives (eg. awareness of issues, knowledge, business and succession planning, confidence in recommended practices and adoption of practices for sustainable agriculture and biodiversity conservation).
5. To be used in conjunction with parallel BRS projects to provide a national overview of key trends and NHT program outcomes.

Report structure

The next chapter provides some background to the Burnett Mary region. The subsequent methodology chapter includes a summary of the literature the research team drew upon to identify the variables included in the survey and brief descriptions of the mail out process and the approach to data analysis.

Research findings are presented in Section 5 of this report and are arranged around major topics explored in the mail survey namely:

1. characteristics of landholders and their properties;
2. assessment of issues;
3. values attached to property;
4. knowledge;
5. attitudes towards natural resource management;
6. preferred funding arrangements;
7. sources of information about natural resource management;
8. stage of life and long-term plans;
9. involvement in planning processes;
10. involvement in government funded programs;
11. constraints to change;
12. adoption of current recommended practices; and
13. confidence in current recommended practices.

Based on these findings the concluding chapter highlights key issues and strategies for efforts to improve natural resource management in the Burnett Mary region.

Appendices have been included at the end of the report to explore the differences between farmers and non-farmers across survey topics and sub-regional variation.

2. Background

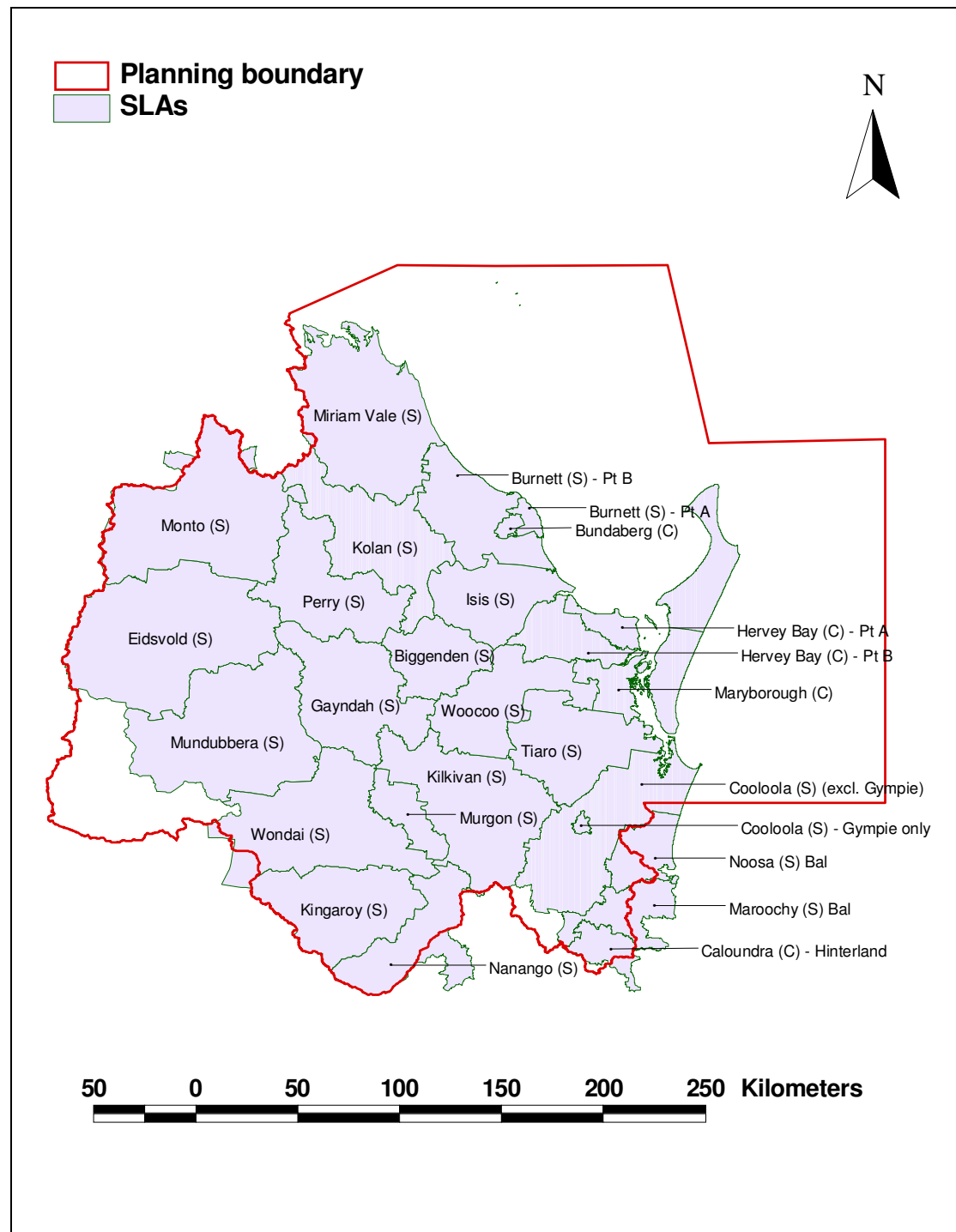
The location and character of the Burnett Mary region

The Queensland Burnett Mary region comprises a land area of approximately 50,000 square kilometres. On the southern part, it extends east towards the Great Dividing Range to the west of the Conondale Range. On the northern extremity, it extends south of the Cania Gorge National Park and east of the Auburn Range, expanding towards the east coast. The region also includes a 40,000 square kilometres of marine area [Map 1].

Major regional centres include Bundaberg, Hervey Bay, Maryborough, and Gympie. The region is home to some 250,000 people and several shires are expected to grow by a further 40% in the next 25 years (BMRGNRM 2005). The region fully encompasses 21 local government authorities and partially includes a further five. For the purposes of this research information was collected across 25 local government areas (with only a very small part of the Chinchilla Shire included in the region this was not included in the data collection).

The region presents a diverse profile of agricultural production: beef cattle, pigs, grains, beans, peanuts, wheat, maize, soy and navy beans, sugar cane, dairying, citrus, and mixed crops comprise the major agricultural products. Forestry, mining, fishing and tourism are also major contributors to the regional economy.

MAP 1: SURVEY AREA

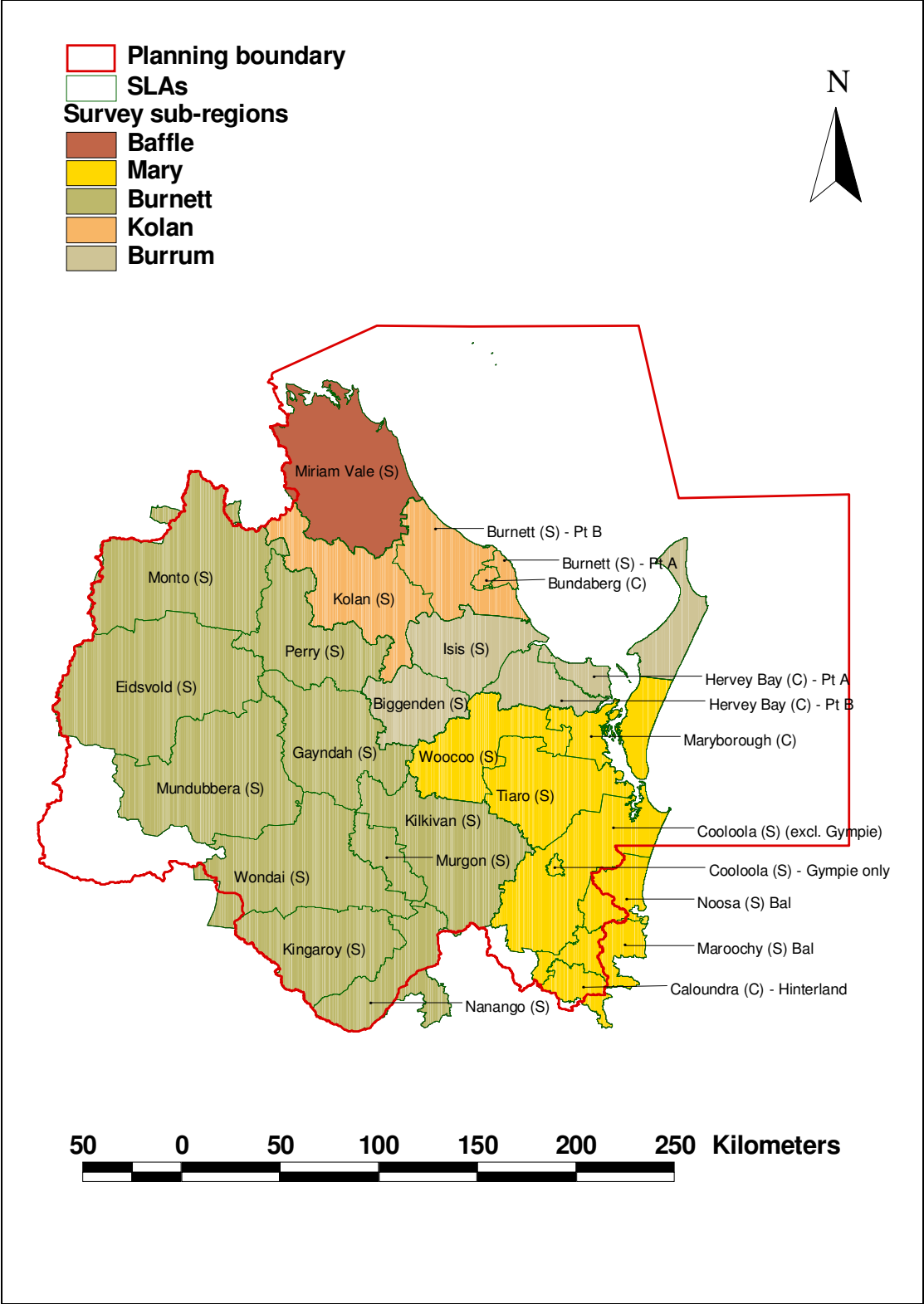


Survey sub-regions in the Burnett Mary

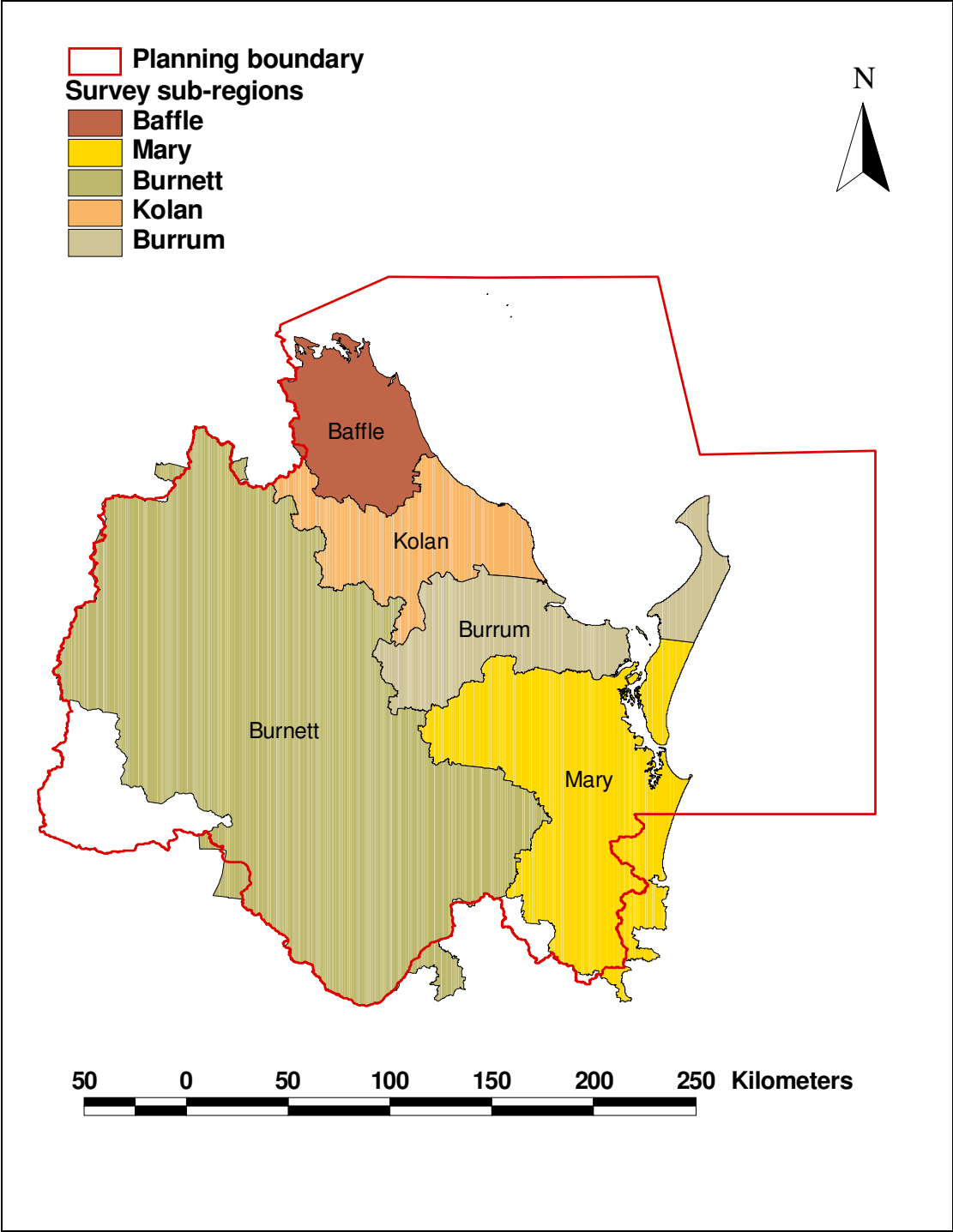
A key aim of this research was to provide baseline information about the social and economic conditions in the Burnett Mary region and to identify the extent of sub-regional variation in these conditions. As the survey used rural ratepayer databases held at the shire or Statistical Local Area (SLA) level, SLA boundaries were used to identify survey sub-regions within the Burnett Mary region. The Burnett Mary region consists of five major river basins: the Baffle;

Burnett; Burrum; Kolan; and Mary. Using these areas as guide the 25 SLAs were combined on a basis of best fit resulting in five survey sub-regions that will be used a basis to explore sub-regional variation in the project [Maps 2 and 3].

MAP 2: SLAs WITHIN THE BURNETT MARY REGION



MAP 3: SURVEY SUB-REGIONS



3. Methodology

Background to this research

Regional Natural Resource Management groups in Australia are required to develop plans that set out how the land, water and biodiversity of the region are to be managed. Each regional plan is to be endorsed by state and Australian government agencies prior to their implementation. While there are state and regional differences, these groups are typically asked to:

- articulate their vision and objectives (Where do we want to go?);
- describe their regional condition and identify the key regional challenges (Where are we now?);
- explain how they will implement their strategy (How do we go forward?); and
- identify targets for the implementation of management actions and for improvements in resource condition that will enable the assessment of progress towards plan objectives (How do we know what we have achieved and learned?).

Clearly, there are opportunities for social research to play an important role at each stage of the planning phase identified above. Cavaye (2003) has recently prepared a practical guide outlining how regional groups in the state of Queensland might integrate social and economic issues into their regional plans. Potential roles for social research could include:

- contributing to processes that capture the range of stakeholder perspectives about possible futures for regions;
- drawing on secondary and primary data sources to describe the social structure and change over time in that structure in a region;
- employing processes that enable stakeholders to explore the trade-offs inherent in many resource allocation decisions across different issues and parts of a region;
- drawing on a range of theoretical and empirical research that would enhance the communication activities of regional groups, the uptake of recommended practices for managing land and water degradation, and the efficacy of investment through community education;
- assisting groups to develop measures of social progress that can be attributed to investments and actions undertaken through their regional plans; and
- employing social impact assessment tools to predict and ameliorate the negative social impacts of proposed interventions, including changes to land use or resource access.

It is increasingly obvious that there are limits to the capacity of landholders to voluntarily effect required change at the landscape scale (Curtis 2000). Effecting behavioural change in private landholders is a complex task and experience suggests that no single instrument will address the underlying reasons for non-adoption (Vanclay 1997; Lockwood *et al.* 2002). As Dovers (1995) and Dovers and Mobbs (1997) emphasised, the challenge is to develop integrated packages that may include:

- legislation or regulations to create the institutional framework for management, set aside areas of land, and enforce standards and prohibitions;

- self regulation;
- research to clarify problems, develop solutions, and monitor environmental conditions;
- education to facilitate improved practices, gain support for policies, and ensure the ability to apply policy instruments; and
- economic measures such as charges, subsidies, penalties, and tradeable permits to assist efficient allocation of resources and equitable distribution of costs and benefits.

This research also recognised that regional areas are, increasingly, the scale at which natural resource management occurs in Australia. As recent research in the Goulburn Broken Dryland (Curtis *et al.* 2000), Ovens Catchment (Curtis *et al.* 2002), and Wimmera region (Curtis and Byron 2002) illustrated, there are also considerable differences at the sub-regional scale. To the extent that there are significant differences at the sub-regional scale, there will also need to be sub-regional differences in the policy mix implemented by the regional groups and other organisations (Curtis *et al.* 2001).

Governments have assumed that, at least in part, poor adoption rates for recommended practices arose because landholders were unaware of important land degradation issues; lacked sufficient knowledge and skills; or had attitudes that emphasised short-term economic returns over maintaining the long-term health of the land (MDBC 1990; ASCC 1991). There has been a large investment of resources over the past decade in awareness raising and education programs, including those carried out by Landcare groups. There is credible evidence that these activities do contribute to increased awareness and understanding and that these changes enhance landholder capacity to adopt recommended practices (Vancly 1992; Curtis and De Lacy 1996; Curtis *et al.* 2001). However, though most landholders already have a strong stewardship ethic, such attitudes have not been linked to increased adoption of recommended practices (Curtis and De Lacy 1996).

Some landholders have lifestyles and values that limit their response to approaches that focus on increasing agricultural production and profit maximisation (Barr *et al.* 2000; Curtis and Robertson 2003). Non-farmers and retirees may respond less quickly to economic signals; be more averse to risking off-property income in on-property enterprises; and will probably have less time for property management (Barr *et al.* 2000). On the other hand, non-farmers may bring new ideas, skills and financial resources that contribute to the renewal of local communities and they may be more likely to respond to appeals for biodiversity conservation (Curtis and De Lacy 1996).

There is now abundant evidence that part of the explanation of low adoption is that many of the current recommended practices or enterprises are either unprofitable and/or unsustainable. Amongst other things, some of the recommended plant-based management systems “leak” water and contribute to ground water flows that mobilise salt (Stirzacker *et al.* 2000; Walker *et al.* 1999). Lack of confidence in recommended practices has been identified as an important constraint affecting adoption (Curtis and Robertson 2003).

Low on-property income will constrain the capacity of landholders to respond to new opportunities. Over the past decade, many broadacre farming enterprises have been unprofitable using the FM 500 project benchmark of financial sustainability (Barr *et al.* 2000). The FM 500 benchmark assumed that a disposable family income exceeding \$50,000 per year was required to sustain a household and fund investment in a farm’s natural and capital resources (Rendell *et al.* 1996). It is important to note that this threshold is now nearly ten years old and may have changed considerably since publication. Nevertheless, the figure of \$50,000 is one of the most commonly used benchmarks and provides a useful reference point for exploring farm incomes. There is increasing evidence that many rural landholders

have limited on-property incomes and that this is a critical constraint to the adoption of new practices (Barr *et al.* 2000; Curtis *et al.* 2001). Poor returns from many farming enterprises have meant that landholders simply may not be able to afford remedial actions such as incorporating legumes into pasture, fencing riparian areas and the maintenance of fertiliser regimes.

It is also unlikely that many dryland landholders will generate substantial income from new enterprises such as olives, wine grapes and farm forestry (Stirzacker *et al.* 2000; Curtis *et al.* 2000). Landholders are very reluctant to take on new enterprises that will involve them entering long-term agreements with powerful industry partners (Race and Curtis 1998). Problems also arise if recommended practices or new enterprises are complex, are perceived as being risky, do not fit with existing enterprises or conflict with existing social norms (Vanclay 1992; Race and Curtis 1998; Barr and Cary 2000).

Landholders are also increasingly aware that they are being asked to implement work that has community benefits in terms of biodiversity conservation, improved public health and protecting export income (agriculture and tourism) and infrastructure. They also understand that many of the problems that they are being asked to address have resulted from previous government policies. Establishment of the NHT, with the federal government sharing the costs of large-scale on-ground work on private land, was an acknowledgment of the legitimacy of these arguments (Curtis and Lockwood 2000).

Discontinuity between the source and impact of issues, particularly those related to water degradation, adds a further complication. In some instances landholders in the upper reaches of catchments are either not experiencing these problems, believe they can live with them or are unaware or unconcerned about contributing to downstream impacts (Curtis *et al.* 2001).

Australia has an ageing rural population with life expectancy increasing and younger people drifting from rural areas to the more prosperous and attractive lifestyles in urban centres (Haberkorn *et al.* 1999). We can no longer assume that a substantial proportion of the inter-generational transfer of properties will occur within families. Where family succession is unlikely, property owners may be less willing to invest in recommended practices or new enterprises. In an era of reduced farm profitability and especially in areas where demand for rural subdivisions is not high, some landholders may feel they are locked into living on their properties in retirement. With increasing life expectancy, this trend could delay inter-generational property transfer. These elderly property owners may also be less willing to invest in recommended practices or new enterprises. Guerin (1999) and Curtis *et al.* (2001) found that there was no clear correlation between landholder age and adoption, and suggested this was an important area for future investigation.

Such pressures were expected to lead to the amalgamation of some smaller grazing properties into larger units. While some amalgamation has occurred, there has not been large-scale consolidation of properties, and the trend has not been uniform (Barr *et al.* 2000). Within commuting distance of larger regional centres, there has been considerable conversion and subdivision of existing holdings into lifestyle farming enterprises for retirees and people with off-farm work. Land prices based on rural residential use will militate against the aggregation of smaller and less viable holdings and closer settlement may impose environmental controls on broad acre farming.

Need to conduct the survey

Profiles of regional communities have usually relied on readily available census data to measure general aspects of the four capitals: human capital, produced-economic capital,

social capital, and natural capital (Webb and Curtis, 2002; Cavaye, 2003). Barr *et al.* (2000) used census and other national databases to combine social and economic data to explore the structure of agriculture over time in the watersheds of the Murray Darling Basin. Using local government areas as the unit of analysis, this seminal study examined attributes such as farm size, farm family income, farmer age, entry and exit from farming, and changes in farming family numbers, and clearly demonstrated that these attributes had changed over time.

The analysis of data collected through farm and household censuses can provide useful information, but as Schultz *et al.* (1999) and Curtis *et al.* (2001) demonstrated, these data are unlikely to satisfy regional groups who need to understand the behaviour of the private landholders who control most of the land in their regions. In the first instance, these national data collection processes are unlikely to address most of the topics for which data is needed. Furthermore, data is only available to the public in aggregated form, the smallest scale being census collector districts that combine data for about 200 households. Aggregation reduces the usefulness of data, particularly when sub-regional contexts are important, as for the Burnett Mary region.

Topics and questions included in the mail survey

Drawing on the above literature and given the constraints of a mailed survey (mainly space and the type of questions that can be effectively posed), the authors, in collaboration with our industry partners, identified the topics listed below for inclusion in the survey. Response options and additional background information are provided in the relevant section of the report.

- Assessment of issues affecting property and district.
- Values attached to property.
- Self-assessment of knowledge for different topics.
- Awareness of on-property salinity.
- Views about balancing production and resource conservation.
- Views about the importance of factors affecting decision making about changing management systems.
- Involvement in planning related to family succession, property and business.
- Long-term plans for the property.
- Interest in funding schemes for natural resource management.
- Sources of information about natural resource management.
- Adoption of recommended practices.
- Confidence in current recommended practices.
- Other property data, including: property size, broad enterprise mix, remnant bush, and area under specific enterprises.
- Background socio-economic data, including: age, gender, education, occupation, on and off-property workload, on and off-property household income, Landcare membership/participation, funding through government programs, time lived in district, level of equity in property.

Current recommended practices (CRP)

A key purpose of collecting survey data in the Burnett Mary region was to explore the impact of factors linked to the adoption of current recommended practices (CRP).

Considerable energy was expended in identifying and operationalising (establishing the format of statements to be asked in the survey) the CRP to be included in the survey. This process took into account the:

- the results of pre-testing the survey with peers, agency partners and landholders;
- key natural resource management issues identified by the BMRGNRM draft regional natural resource management plan;
- views of our industry partners; and
- practicalities of a mail survey.

There were 19 CRP included in the survey.

1. Spell or rotational grazing.
2. Used a soil testing/monitoring program.
3. Applied lime or gypsum.
4. Varying crop rotation according to soil test results.
5. Cropping using a rotation with spell pasture.
6. Controlled machinery or stock traffic to reduce soil compaction.
7. Cropping with reduced chemical usage as a result of applying integrated pest management, GPS technology or other pest reduction strategies.
8. Using low pressure overhead, solid set, or drip irrigation systems.
9. Irrigated using a schedule to determine the timing and volume of water applied.
10. Fencing waterways to control stock access.
11. Fencing native bush to control stock access.
12. Encouraging regrowth of native vegetation.
13. Cropping using minimum tillage practices.
14. Sowing introduced perennial pasture.
15. Planting trees and shrubs.
16. Time spent to control non-crop weeds and pest animals.
17. Reusing or recycling effluent.
18. Using a designated machinery and vehicle cleaning area to minimise weed infestations from visiting contractors.
19. Using trash blanket practices when cane harvesting.

The mail survey process

The following points briefly outline the sampling method used in the mail survey to landholders in the Burnett Mary region.

- BMRGNRM approached 25 municipalities to cooperate and provide landholder details within the survey region using their local government rural property lists.
- Local government property data was provided to BMRGNRM and BRS on the provision that it be used for this survey only and that the lists be destroyed at the conclusion of the survey process.
- These names and addresses were forwarded on to BRS, where duplicate names were identified and removed from the sample.
- All properties less than 10 ha were excluded from the potential survey sample.
- A random sample (spread evenly across the region) of 1,000 landholders was obtained from the remaining names and addresses.

The survey design and mail out processes were undertaken using a modified version of Dillman's (1979) *Total Design Method*. The survey was pre-tested by peers and a project steering committee comprised of community representatives and board members from the BMRGNRM. A draft version of the survey was pre-tested with five focus groups comprised of representatives from a cross section of Landholders in the Burnett Mary region. Feedback from the workshop sessions resulted in some important refinements to the survey instrument.

The modified total design method used for this survey involved using a series of survey mail outs and reminder cards over a period of almost two months. The first mail out of surveys was followed by a reminder card sent out one week later, with a second and third reminder card mailed out each consecutive week. Four weeks after the initial survey mail out, another copy of the survey and a brief letter were sent to landholders that had not responded. The second mail out was followed by another reminder card one week later.

Surveys were addressed to property owners identified on the local government rural property owner lists. In the majority of cases only a surname and an initial were provided. It was therefore impossible to tell the gender balance in the survey sample.

An overall response rate of 60% was achieved. Surveys that were returned to sender or sent back due to the landholder no longer residing at the property were taken off the original sample along with those where the landholder was too old, ill or deceased or where the property had been sold (282). This left a final sample of 718, with 428 completed surveys returned.

Data analysis

Findings in this report have been presented so they can be interpreted without understanding the statistical methods used.

Statistical analysis included in this report consists of descriptive statistics, Spearman rank order correlations, Gamma correlations, non-parametric chi-square tests, and binary logistic regression. All statistical analyses used the SPSS software package.

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 there is more than a 95 per cent chance that an observed relationship or difference has not occurred purely by chance.

Please refer to Appendix 1 for more detail about the statistical methods used to analyse survey data.

Limitations of this research

No single instrument is able to collect data on all possible variables and therefore, some variables were not addressed in this research. Ultimately, professional judgement and consultation with the regional steering committee was used to determine the variables included in the survey.

Every research instrument has its strengths and weaknesses. A mail survey allows researchers to collect information across a large number of respondents and at a much lower cost than would be possible with face-to-face interviews. However, the mail survey does not allow for researchers to use follow-up questions to explore respondents' deeper motivations.

This research provides an important baseline from which changes over time can be monitored. The 2004/2005 Burnett Mary survey should be followed by another, say in three to five years time. It would then be possible to identify trends over time. This is particularly important given the results of Barr *et al.* (2000) that identified important temporal trends.

5. Findings by survey topic

Characteristics of landholders and their properties

The mail survey included a range of questions to provide basic information about landholders in the Burnett Mary region and their properties. It is important to note that the survey was sent to a random selection of all landholders with properties in excess of 10 ha. Consequently, this information provides basic socio-demographic information about landholders in the Burnett Mary, and is not restricted to farmers and farm managers or any other single group of landholders. As a result, comparisons of these findings with other data sets based around a more restricted sample may be problematic. To help facilitate comparisons with other data sets and better understand the different types of landholders in the Burnett Mary, Appendix 2 presents a summary of the differences in responses to survey questions between respondents who said farming was their primary occupation and all other respondents.

Age

Respondents to the mail survey were asked to indicate their age at the time of the survey. Most of rural Australia has an aging population and this trend is expected to have important implications for efforts to improve natural resource management.

The median age of property owners surveyed in the Burnett Mary was 54 years. Thirteen percent of respondents were under the age of 40, while 19% were over the age 65. The over 65 years of age group managed just over 31% of all land surveyed.

There were no significant differences in the age of respondents by either survey sub-regions or primary occupation.

Gender

According to a recent estimate by Elix and Lambert (2000) about 30% of the Australian farm workforce is female and slightly less than 20% of agricultural decision-makers are women. As the survey sample from this project was drawn from rural ratepayer databases, it was not possible to identify the gender of individuals included in the sample and there was no attempt to target a specific mix of respondents. Of the 407 respondents who indicated their gender 97 or just under 24% were women. This figure is consistent with findings of Elix and Lambert (2000).

Respondents who said farming was their primary occupation were significantly more likely to be male [Appendix 2].

There were significant differences in the gender balance of respondents across survey sub-regions with the proportion of male respondents ranging from 87% in the Burrum survey sub-region to 68% in the Kolan survey sub-region [Appendix 3].

Property size

Survey respondents were asked to indicate the total area of land that was owned or managed by them or their immediate family in their local district. This area varied widely, ranging from the lower limit of 10 ha up to properties in excess of 100,000 ha.

The mean property size for respondents to the survey was 408 ha [Table 1]. Survey data suggested that a small number of large property owners manage the vast majority of land in

the Burnett Mary. Only 10% of respondent reported that they owned or managed a property in excess of 1,000 ha. However, these respondents managed 77% of the total area surveyed.

Property size is often considered to be an important factor in determining the financial viability of cropping and grazing enterprises. Findings from this research highlighted that larger properties were significantly more likely to report an on-property profit ($\chi^2 = 100.136$, $df = 1$, $p < 0.001$) and a higher level of on-property profit ($\chi^2 = 28.814$, $df = 7$, $p < 0.001$). The mean size of properties that reported an on-property profit was 946 ha compared to 176 ha for those who did not report an on-property profit.

The survey also asked respondents to indicate the area of their property that they leased, share farmed or agisted from others. Nineteen percent of respondents said that the leased, share farmed or agisted land from other people ranging from an area of less than one ha up to 5,000 ha. The mean area leased, share farmed or agisted from others was 372 ha.

As expected respondents who said farming was their primary occupation owned or managed significantly larger properties than all other respondents [Appendix 2].

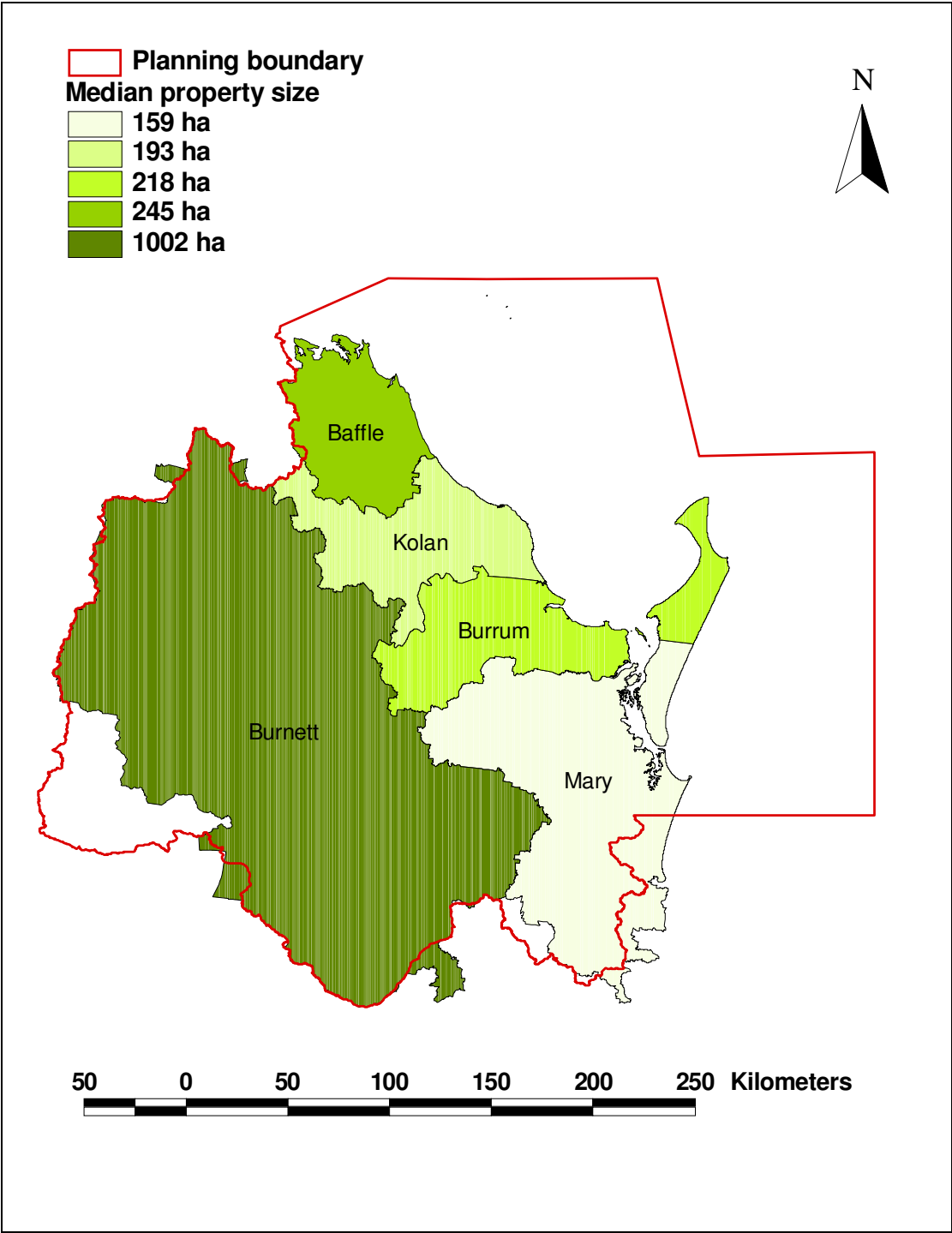
There were significant differences in property size across the survey sub-regions ranging from an average of 159 ha in the Mary to 1002 ha in the Burnett ($\chi^2 = 57.799$, $df = 4$, $p < 0.001$) [Map 4] [Appendix 3]. These data highlight a trend towards much larger properties in the inland section of the region.

Table 1
Proportion of respondents by property size for each sub-region

Survey sub-region	n	% respondents in each property size category						Mean (ha)
		10 – 250	251 - 500	501 - 750	751 - 1000	1001 - 2000	> 2000	
Baffle	42	83%	7%	2%	5%	0%	3%	245 ha
Mary	132	91%	3%	2%	1%	1%	2%	159 ha
Burnett	109	58%	13%	2%	1%	6%	20%	1002 ha
Kolan	76	89%	3%	1%	1%	3%	3%	193 ha
Burrum	39	74%	18%	0%	0%	8%	0%	218 ha
Total*	402*	79%*	8%*	2%*	1%*	3%*	7%*	408 ha*

** Totals calculated by adding sub-region data may differ slightly from these figures. There were a small number of respondents who removed the identification number from the survey and could not be allocated to a sub-region.*

MAP 4: PROPERTY SIZE ACROSS SURVEY SUB-REGIONS



Occupation

Respondents were asked to list the occupational grouping that they thought best described their main area of paid/unpaid work in terms of the time and energy they put into that activity. Examples provided in the questionnaire included farmer, teacher, investor or retiree.

Responses to this open-ended question were grouped into five occupational categories: farmer, professional, trades, retired and other. Farmers were the largest occupational grouping and comprised just under half of all respondents (42%). Over half of all respondents were not farmers, however, these respondents managed only 12% of all land surveyed [Table 2].

On average respondents said they spent 36 hours per week on on-property work and had 171 days of off-property work over the past 12 months. As expected farmers worked longer hours on property with an average of 57 hours a week and spent less time working off property with an average of 100 days over the past 12 months [Appendix 2].

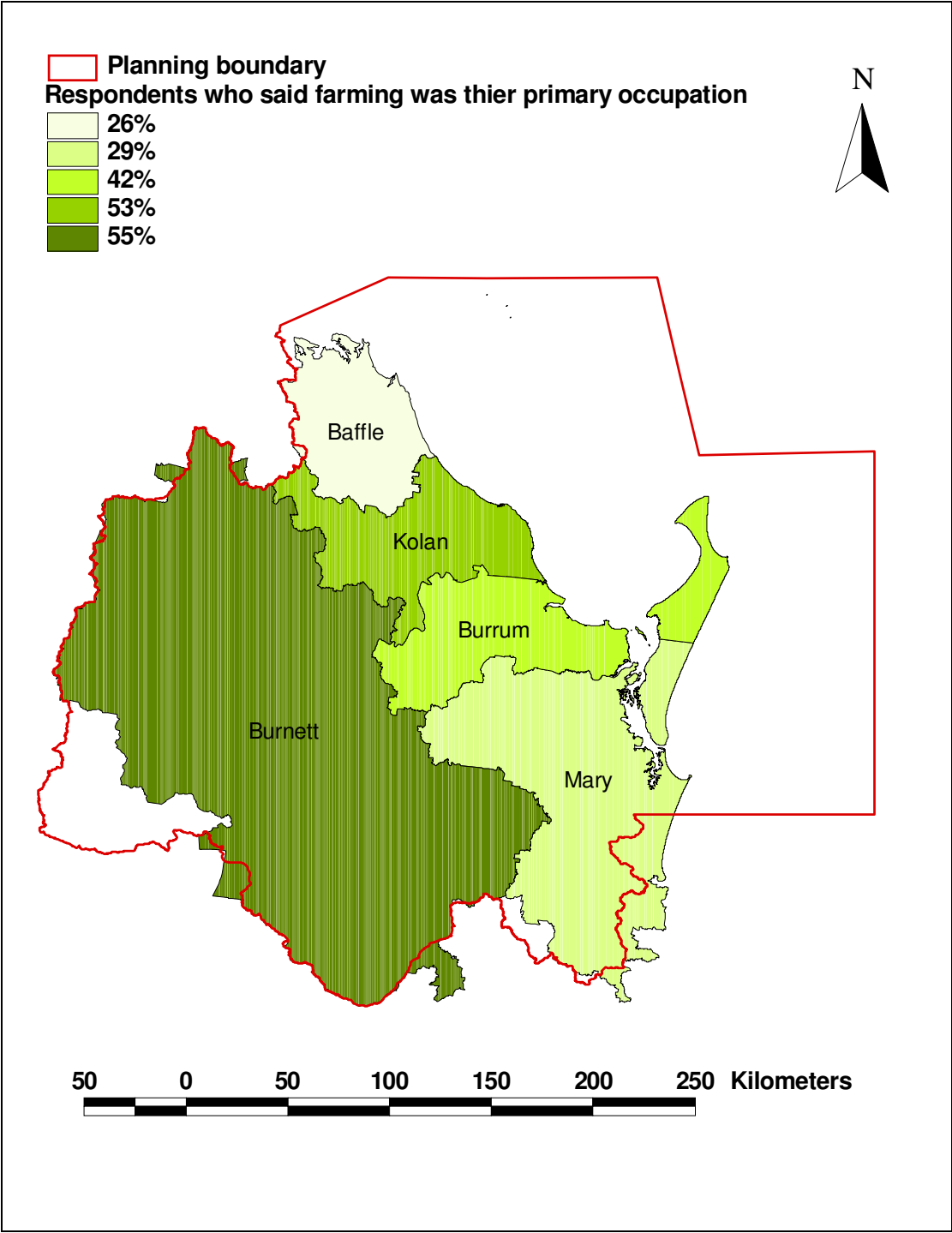
Farming as an occupation varied significantly across survey sub-regions ranging from 55% in Burnett to 26% in the Baffle sub-region ($\chi^2 =$, $df = 4$, $p < 0.001$) [Map 5] [Appendix 3]. However, with the exception of the Baffle sub-region farmers managed the vast majority of land area surveyed across all survey sub-regions [Map 6].

Table 2
Landholder occupations

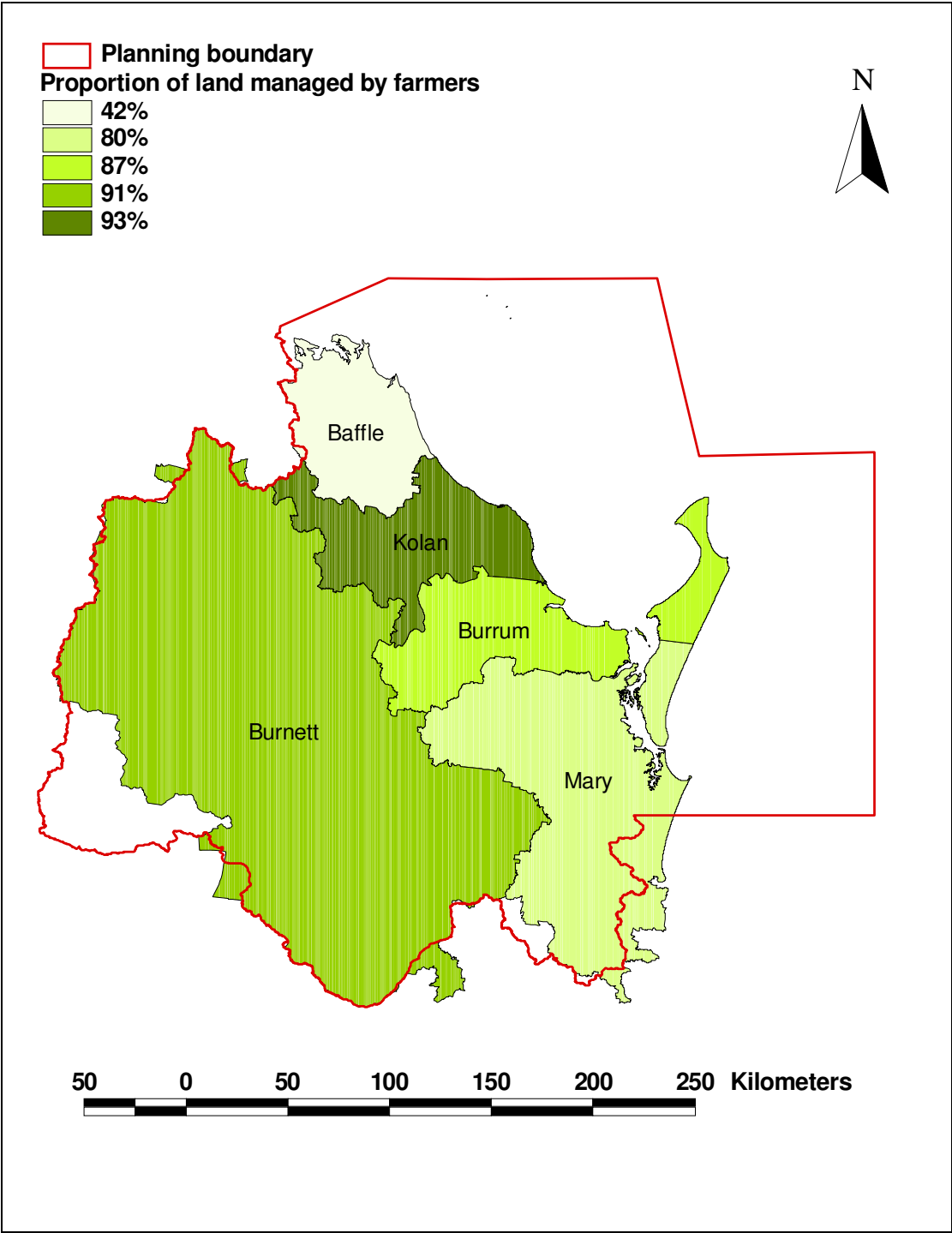
Sub-region	n	Farmer	Professional	Trades	Retired	Other: clerical, admin, retail, home duties
Baffle	38	26%	3%	18%	29%	24%
Mary	138	29%	27%	9%	20%	15%
Burnett	112	55%	15%	10%	6%	14%
Kolan	74	53%	7%	7%	17%	16%
Burrum	36	42%	5%	8%	17%	28%
Total*	401*	42%*	16%*	10%*	16%*	16%*

** Totals calculated by adding sub-region data may differ slightly from these figures. There were a small number of respondents who removed the identification number from the survey and could not be allocated to a sub-region.*

MAP 5: OCCUPATION ACROSS SURVEY SUB-REGIONS



MAP 6: LAND OWNED/MANAGER BY FARMER ACROSS SURVEY SUB-REGIONS



On property income

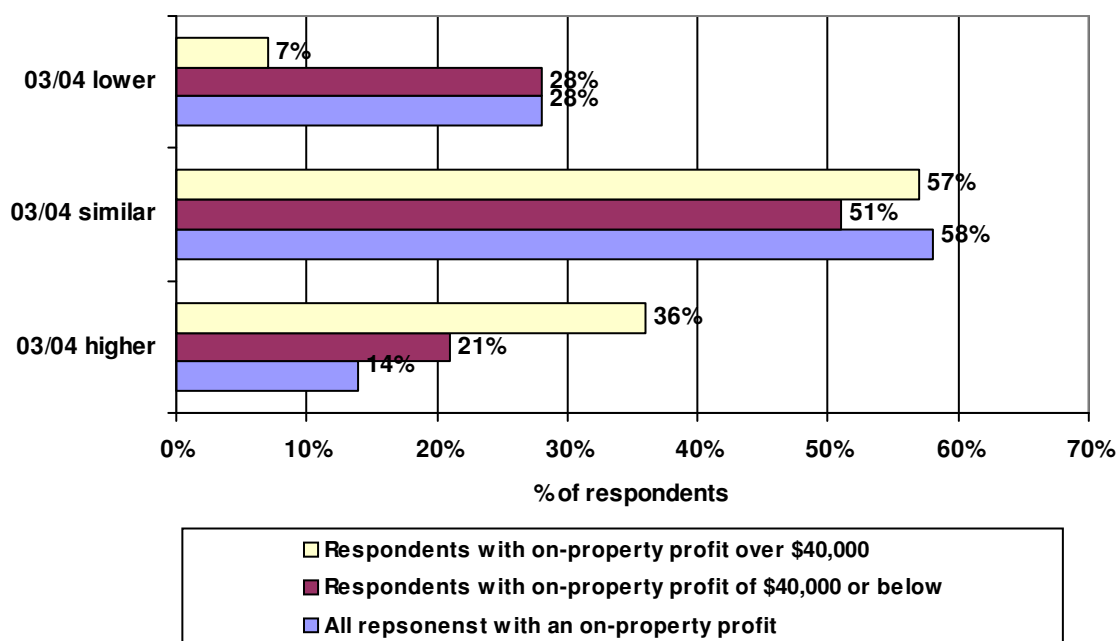
Survey data indicated that over half of all respondents (68%) did not make a net pre-tax on-property profit for the 2003/2004 financial year. The average on-property profit for all respondents was just under \$10,000. Only 6% of all respondents exceeded the \$50,000 profit threshold discussed earlier in this report (Rendell *et al.* 1996). Sixty percent of respondents who said their primary occupation was farming said they returned an on-profit with a mean of just under \$23,000. Respondents who said farming was their primary occupation were significantly more likely to report an on-property profit for the 2003/2004 financial year than all other respondents [Appendix 2].

The proportion of respondents who reported an on-property profit for 2003/2004 varied significantly across survey sub-regions ranging from 50% in the Burnett to 13% in the Baffle [Appendix 3].

It is important to note that in many cases on-property incomes for the year 2003/2004 will have been impacted by drought conditions. As a consequence the figures outlined above may not be an accurate reflection of the longer term profitability of on-property enterprises in the Burnett Mary.

In an attempt to better understand the variability in on-property income over time, survey respondents were asked how their indicated on-property return compared with the average returns over the past five years. This question highlighted considerable variability in on-property returns with only 58% of respondents indicating their on-property income in 2003/2004 was similar to the average over the past 5 years, with 14% indicating higher returns in 2003/2004 and 28% lower [Figure 1]. Furthermore, when compared against the actual level of on-property income, data suggests that those with high returns in 2003/2004 were more likely to indicate that this year was better than the average over the past 5 years [Figure 1].

FIGURE X – ON-PROPERTY INCOME IN 03/04 COMPARED TO AVERAGE OVER PAST 5 YEARS



Off-property income

Over two thirds of respondents (67%) reported a net off-property profit (after expenses and before tax) for the 2003/2004 financial year. The average off-property income for all respondents for this period was approximately \$26,000 (before tax excluding subsidies or government allowances). Over half of all respondents who said farming was their primary occupation also reported an off-property income with a mean of just under \$14,000. At the same time, respondents who said farming was their primary occupation were significantly less likely to report an off-property income for 2003/2004 [Appendix 2].

There were no significant differences in the proportion of respondents who reported an off property income across survey sub-regions.

Total household income

The average total household income for all respondents (calculated by combining on-property and off-property income) was approximately \$36,000. Only 32% of respondents had a total household income above the \$50,000 threshold considered necessary to maintain a household and to fund improvements in a farm's natural and capital resources (Rendell *et al.* 1996). The combined total household income for all respondents was over \$13 million. Of this, on-property income accounted for just under \$4 million or 29% of all income. The combined off-property income was just over \$9 million or 61% of the total income for the 2003/2004 financial year. For respondents who said their primary occupation was farming the majority of household income was from on-property sources, nevertheless off property income accounted for 38% of the combined household incomes for these respondents. To the extent that on-property profitability increases when the drought breaks the balance of on-property and off-property income may shift. Nevertheless, information presented later in this report suggests that the proportion of people seeking off-property income is likely to remain constant and therefore off-property income can be expected to remain as a very important contributor to household incomes for all landholders in the Burnett Mary region.

The survey also asked respondents to indicate the ideal balance between on and off-property income that they would like to achieve using five options: all income from on-property; majority of income from on-property; even mix; majority of income from off-property; and all income from off-property.

Responses to this question showed a fairly even spread although the most preferred mix of income was for all income to come from on-property. In contrast, the actual mix of incomes reported by respondents showed that on-property incomes were generally much lower than needed to meet respondents' ideal mix of on and off-property income [Table 3].

Table 3
Preferred and actual mix of income

Preferred mix of income	% in category	Actual mix for 03/04*
All income from on-property	24%	17% had all income from on-property
Majority of income from on-property	18%	9% had more than 55% but less than 100% from on-property
Even mix	22%	6% had between 45%-55% of income from on-property
Majority of income from off-property	21%	70% had less than 45% of income from on property
All income from off-property	15%	61% had no on-property income

** Note these figures only included respondents who provided an estimate for both their on-property and off-property incomes and as a result vary from earlier figures.*

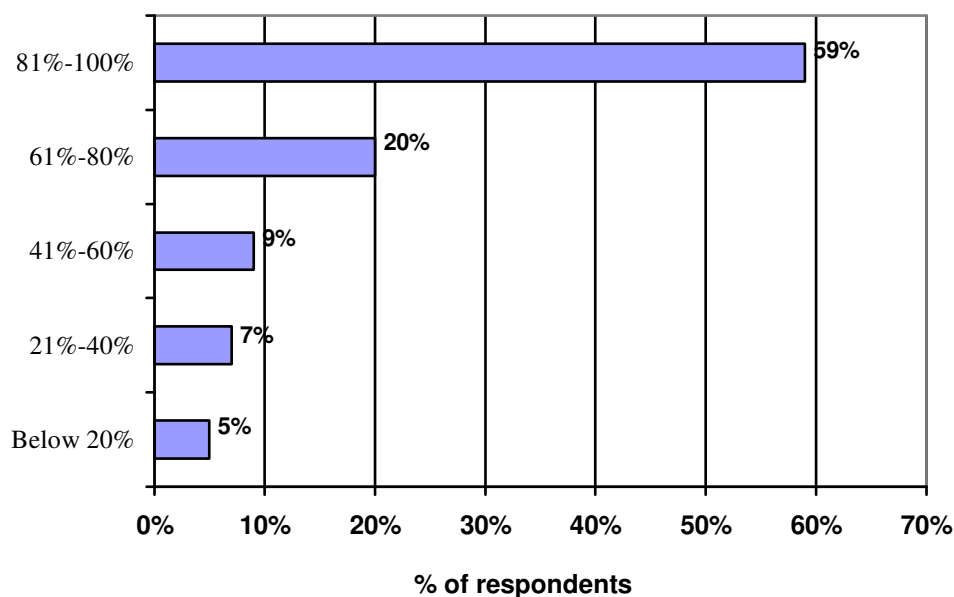
Level of property equity

Respondents were asked to indicate the level of equity in their property (including land, equity and buildings but excluding land they leased or share farmed) using five options, each covering a 20% range.

Most respondents had high levels of equity with over half of all respondents (59%) indicating 81%-100% equity. However, just over a fifth of respondents (21%) had less than 60% equity in their property [Figure 2].

There were no significant differences in level of equity reported by respondents by either survey sub-regions or primary occupation.

FIGURE 2 – LEVEL OF EQUITY



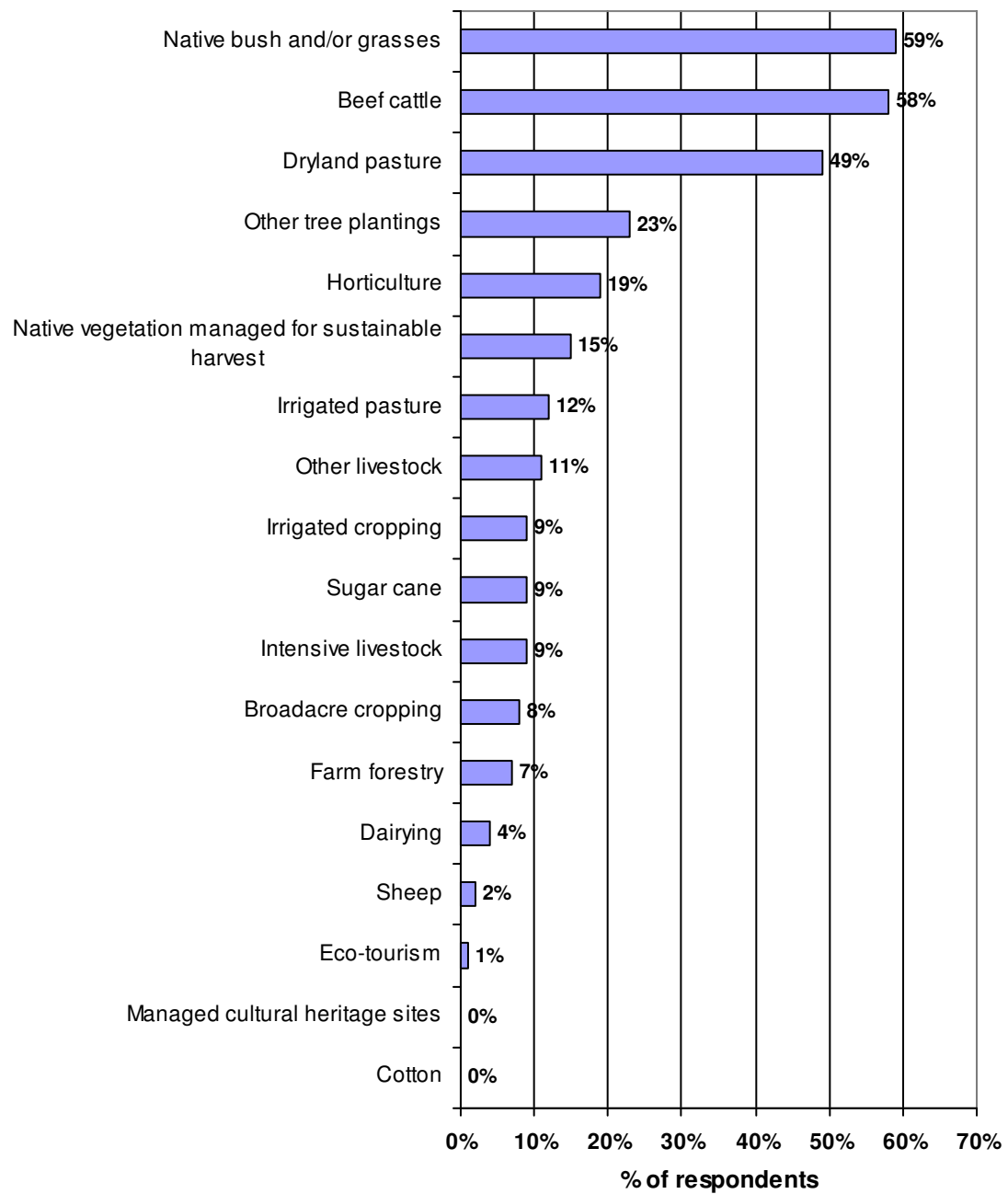
Land uses and enterprise mix

The survey asked respondents to indicate land uses/enterprises undertaken on their property and the approximate area under each enterprise from a list of 18 options. It is important to note that these options were not considered as mutually exclusive and survey respondents could indicate more than one land use or enterprise on the same area of land.

Native bush and grasses and beef cattle were the most common enterprises/land uses with just under 60% of all respondents reporting these enterprises on their property. Dryland pasture, and other tree plantings were the only other enterprises/land uses to be reported by more than 20% of respondents. Other land uses reported by more than 10% of respondents included horticulture, native vegetation managed for sustainable harvest, irrigated pasture and other livestock [Figure 3].

In terms of land area covered beef cattle was the most dominant land use/enterprise covering 164,200 ha or approximately 92% of the property area surveyed, followed by dryland pasture with over 58,000 ha or approximately 36%. Other major land uses or enterprises in terms of land coverage included just under 45,000 ha (27% of combined property area) of native bush and grasses and 35,000 ha (21% of combined property area) of native vegetation managed for sustainable harvest. All other land uses and enterprises accounted for less than 10% of the combined area surveyed.

FIGURE 3 – LANDUSES AND ENTERPRISE MIX



Assessment of issues

Landholders were asked to assess the importance of a range of social, environmental and economic issues in their local district and on their property. The issues covered in the survey were identified through discussions with the project steering committee and at the survey pre-test workshops. Respondents were asked to rate the importance of each issue listed in the survey as either of 'very high importance', 'high importance', 'moderate importance', 'low importance' or 'very low importance'. To simplify the presentation of this data, these five responses have been collapsed into three categories – 'important' (combining very high importance and high importance), 'moderate' (of moderate importance) and 'unimportant' (combining very low importance and low importance).

Issues affecting the local district

Seven of the 17 issues were rated as important issues affecting the local district by more than half of all respondents. The highest rated issue was the lack of long-term opportunities for young people in the district. The next highest rated issue was the availability of surface and groundwater for agriculture [Figure 4].

Findings from the survey indicated that social issues such as lack of long-term opportunities for young people, availability of services, and reduced employment opportunities were rated amongst the most important issues affecting respondent's local district. Indeed, three of the top five issues identified related to social conditions. There is quite clearly considerable community concern about the viability of many rural communities in the Burnett Mary region [Figure 4].

The identification of weeds and pest animals as a key regional issue in the draft natural resource management plan was confirmed by survey data. The cost of managing weeds and pest animals was rated as an important issue affecting the local district by the majority of respondents [Figure 4].

Other issues rated as important by most respondents included regulations limiting land uses, and controls on the management of privately owned or leased land in the district. These findings highlight concern about government intervention undermining landholders' capacity to manage their property [Figure 4].

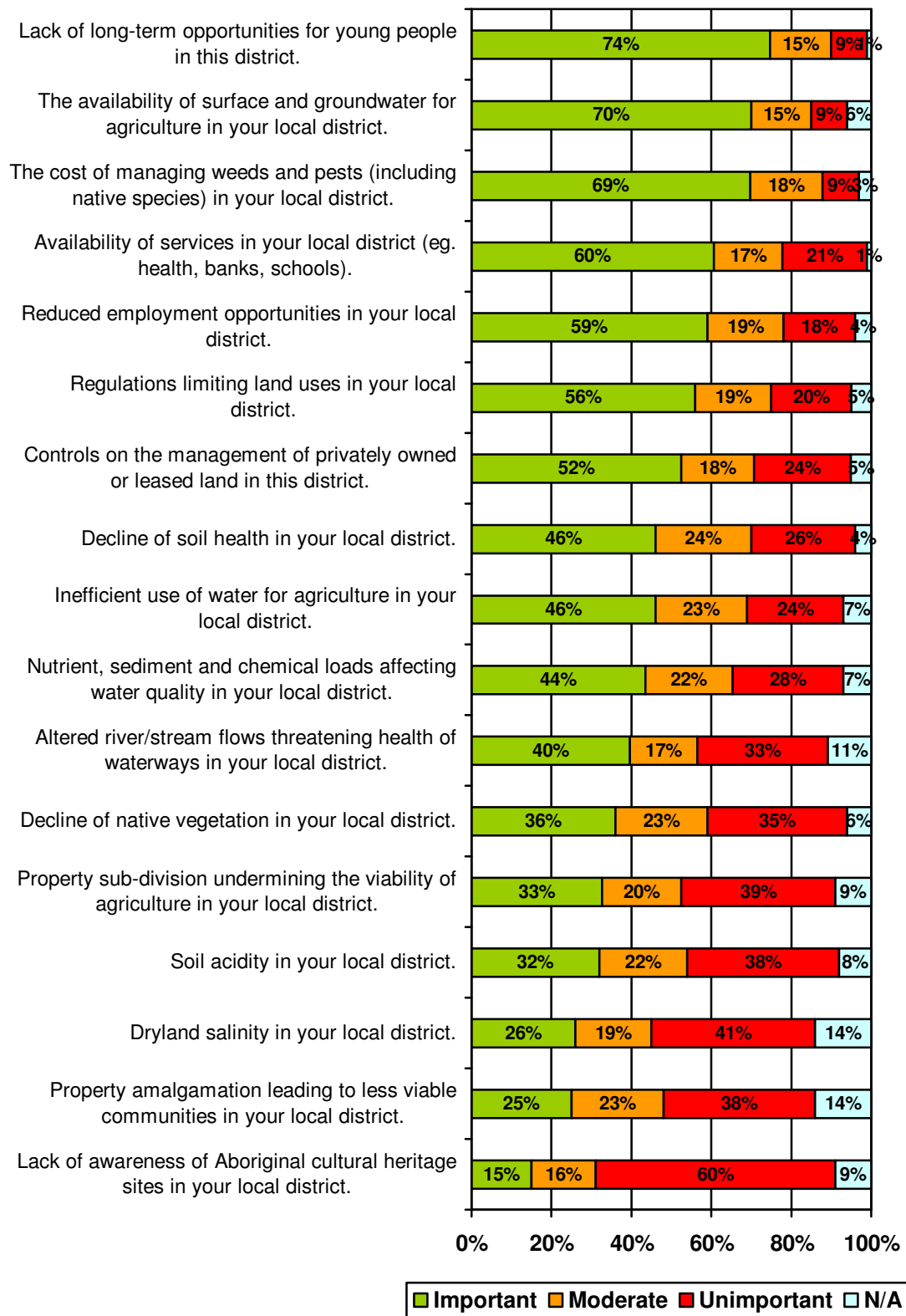
In contrast, dryland salinity, soil acidity, decline of native vegetation, deteriorating water quality and lack of awareness about Aboriginal cultural heritage sites were not rated as highly important issues affecting the local district by most landholders, despite being identified as priorities issues in the draft regional natural resource management plan [Figure 4]. Notwithstanding the potential for large investments in natural resource management through the National Action Plan for Salinity and Water Quality, attempts to engage the community on the basis of addressing salinity and water quality appear likely to achieve only limited success.

Analyses exploring the perception of issues for farmers and non-farmers highlighted a number of important differences. Landholders who said farming was their primary occupation were significantly more concerned about availability of water and controls on the management of private land. At the same time, farmers were less concerned about a range of natural resource management issues including native vegetation decline, soil health and salinity [Appendix 2].

There were also several differences in respondents' perception of issues across the survey sub-regions [Appendix 3].

It is critical to note that many of the priority issues identified in the draft natural resource management plan for the Burnett Mary region are simply not considered amongst the most pressing issues facing rural communities. These findings will have important implications for efforts to engage these communities in natural resource management activities. Further investment in community education to raise awareness about the extent and importance of these priority natural resource management issues may be one option to help reconcile the current disparity. However, to the extent that rural community decline and concern about the erosion of property rights remain important issues, activities aimed at improving natural resource management that do not consider the broader social issues facing many rural communities may be met with limited interest. Efforts to engage the community in natural resource management in the Burnett Mary should draw on innovative approaches that not only outline the environmental and/or economic advantages of new practices and production systems but highlight links to the social well being of rural communities. The BMRGNRM also needs to work closely with landholders to build trust and demonstrate that working with them will not erode their property rights.

FIGURE 4 – ASSESSMENT OF ISSUES AFFECTING THE DISTRICT



Issues affecting respondents' property

When asked about a range of issues affecting their property, government policy and regulations limiting management options on property was rated as the most important issue. This finding provides further evidence of landholders concerns about the erosion of property rights affecting their management options, especially for farmers.

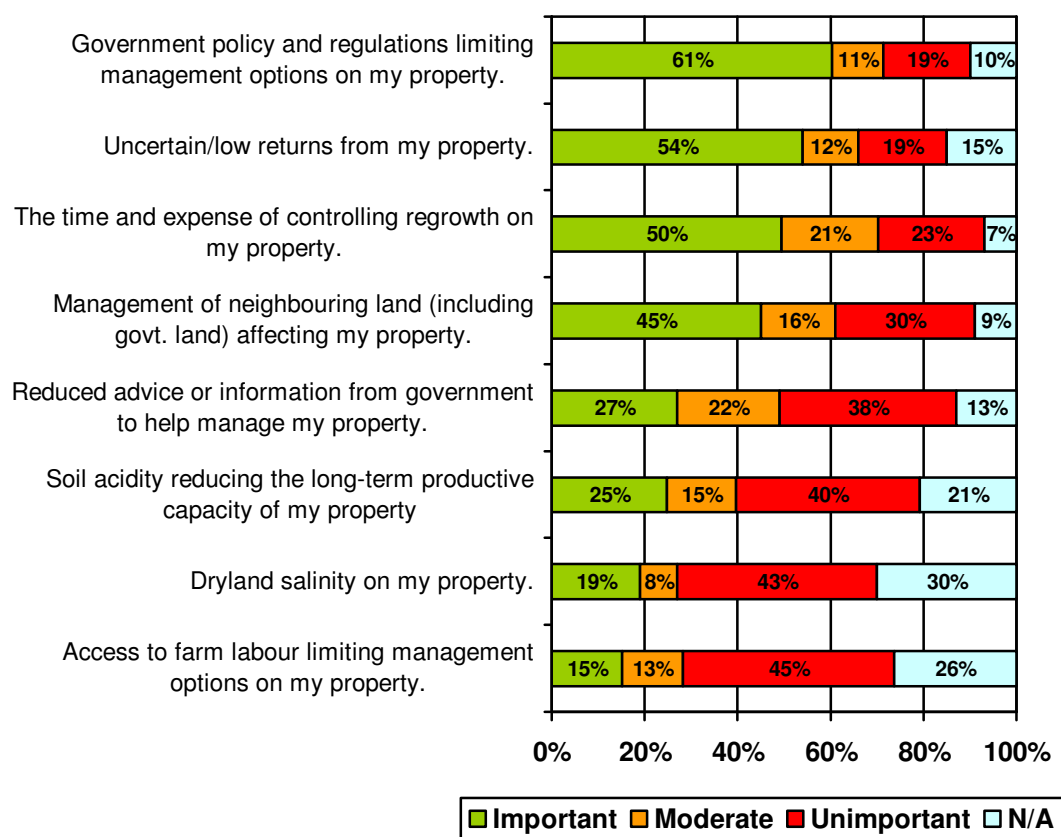
Uncertain or low returns from my property and the time and expense of controlling regrowth were the only other issues where over half of all respondents reported these were important factors affecting their property [Figure 5].

Findings from the mail survey indicated moderate concern about the on-property impacts of how neighbouring land was managed and the availability of technical advice. As was the case with issues affecting the district, there was little concern about the impacts of salinity and soil acidity at the property scale. Few respondents also reported that access to farm labour limiting management options on their property was an important issue [Figure 5].

Respondents who said farming was their primary occupation, were significantly more likely to indicate that uncertain/low returns, reduced advice and information, access to labour and government regulations were important issues on their property [Appendix 3].

There were no significant differences in respondents' assessment of issues on their property across survey sub-regions.

FIGURE 5 – ASSESSMENT OF ISSUES AFFECTING RESPONDENTS' PROPERTY



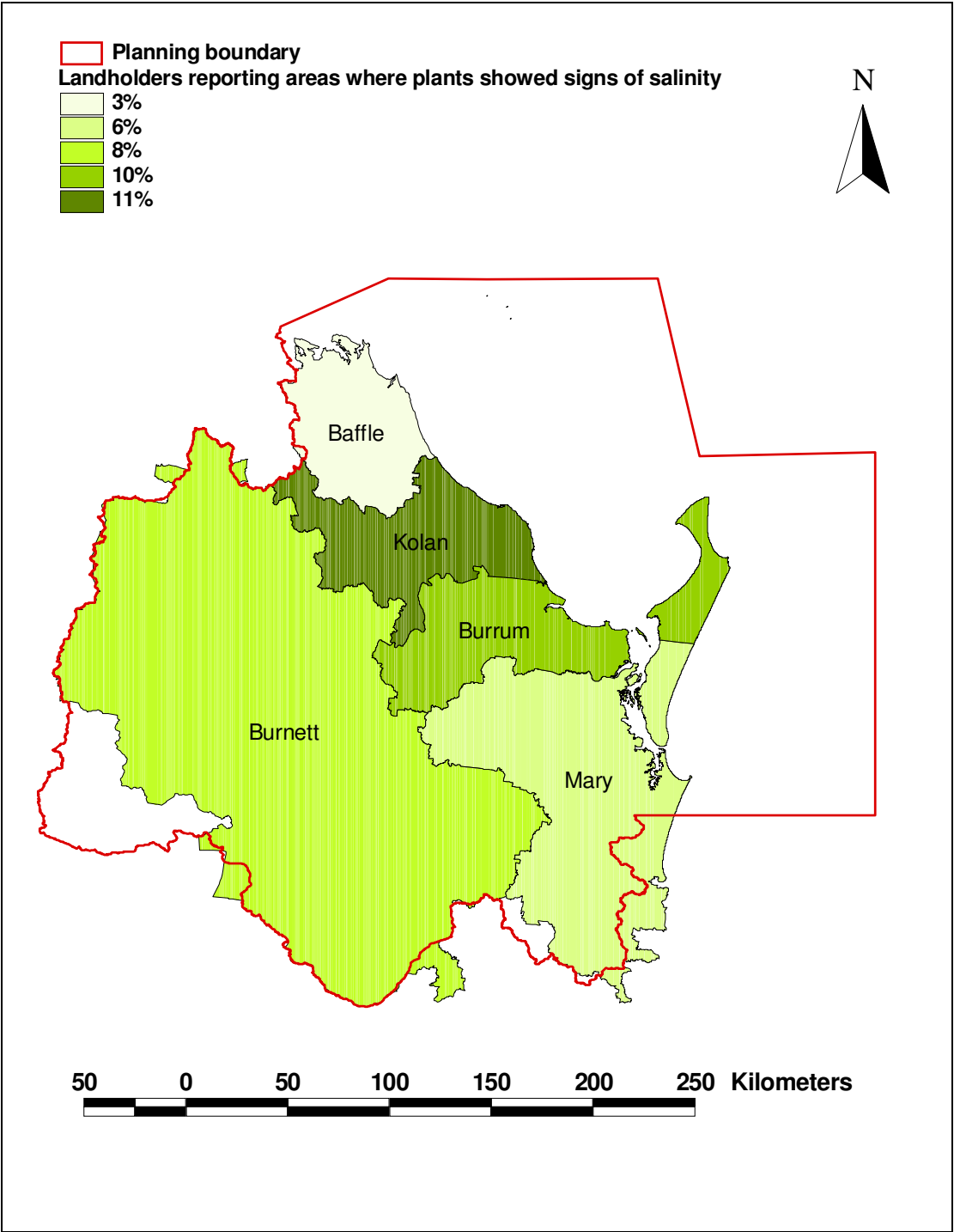
Respondents' assessment of salinity on their property

The mail survey asked each respondent if they thought there were any areas on their property where plants were showing signs of salinity. For those respondents who said there were areas showing signs of salinity, they were then asked to indicate the total area of their property affected.

Only 30 respondents or 8% of those surveyed said there were areas on their property where plants were showing signs of salinity and a further 13% said they were uncertain. The average area affected for respondents who identified salinity was 8 ha and a total of 231 ha or well under 1% of the combined area of properties surveyed.

As highlighted in Map 7 a higher proportion of respondents in the Kolan region (11%) reported areas on their property showing signs of salinity closely followed by the Burrum region. In contrast only 3% of respondents in the Baffle region reported signs of salinity on their property.

MAP 7 – LANDHOLDERS PERCEPTION OF SALINITY



Values attached to property

The mail survey included a range of statements exploring the values landholders in the Burnett Mary region attached to their property. Respondents were asked to indicate the importance of a range of potential values using a five-point scale. The response options were 'very important', 'important', 'of some importance', 'minimal importance' and 'not important'. As in the previous section these options have been collapsed into three categories to simplify presentation – 'important' (combining very important and important), 'moderate' (of some importance) and 'unimportant' (combining not important and minimal importance).

Survey findings highlighted a diverse range of values attached to respondents' properties. Ten of the 19 topics included in the survey were rated as important by more than half of all respondents. The single most important value reported was that the property provided respondents with the lifestyle they wanted. Over three quarters of respondents also said being an attractive place to live and being able to sell or pass the property on to others in improved condition were important values of their property. This finding suggests that most respondents in the Burnett Mary had a land stewardship ethic [Figure 6].

Respondents also highlighted a range of other important social values associated with their property including being a great place to raise a family, providing the freedom of working for themselves, and being part of a rural community. Over half of all respondents indicated that these aspects represented important values of their property [Figure 6].

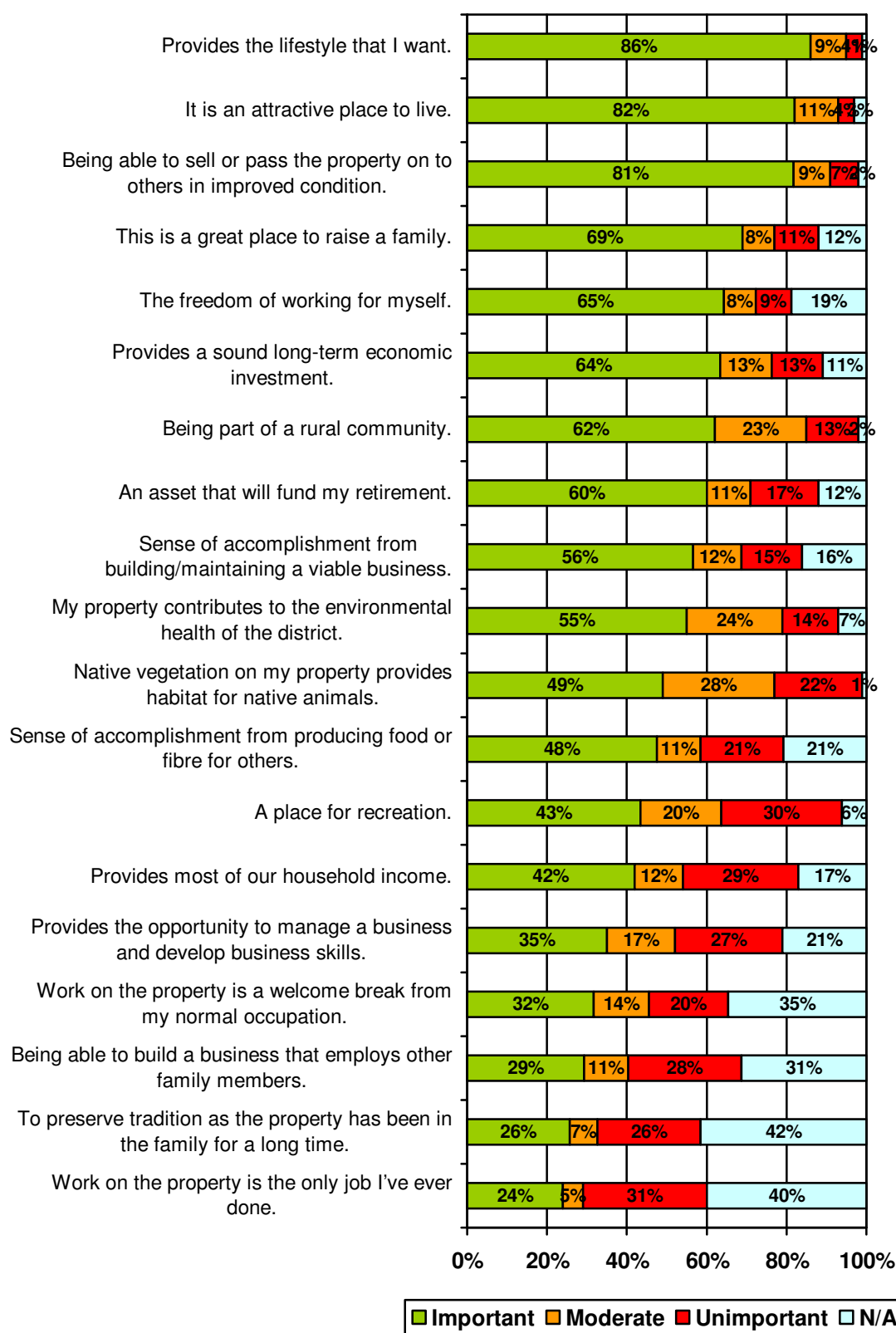
Whilst generally not quite as highly rated as some of the social values a number of economic and environmental values were also widely attributed to respondents' properties. Economic values such as providing a sound long-term economic investment, being an asset that will fund retirement, and providing a sense of accomplishment from building/maintaining a viable business, were rated as important by the majority of respondents. The property contributing to the environmental health of the district was also considered important by approximately half of all survey respondents. Just under half of all respondents reported that providing habitat for native plants and animals and providing the majority of their household income were important values of their property [Figure 6]. Work on the property providing the only job they had ever done and to preserve family tradition were the lowest rated values [Figure 6].

Survey data suggested most respondents had a land stewardship in that almost all respondents said that it was very important for them to be able to pass their property on in better condition. While a range of other environmental and economic values were attached to respondents' properties, the most highly valued function of landholders' property was providing the type of lifestyle they desired. An important implication of this finding is that even where actions can be demonstrated to be economically rational and/or environmentally friendly they are less likely to be implemented if they are perceived as threatening a landowner's desired lifestyle. Indeed, recent work by Webb *et al.* (2002) exploring landholders' decisions to leave farming highlighted that the attachment to place and the lifestyle provided by living on a rural property were key benefits that landholders were reluctant to give up despite financial difficulties. Attempts to engage landholders in the Burnett Mary in natural resource management activities need to consider the broad range of social, economic and environmental values attached to property. There needs to be careful consideration about the potential impacts to landholders' lifestyle when promoting or developing natural resource management practices and strategies. Where practices or strategies are not perceived as adversely affecting landholders' lifestyle, or in fact may actually improve it, as well as providing environmental or economic benefits, the chance of generating support for that strategy or practice are likely to be increased.

Respondents who said farming was their primary occupation tended to attach a wider range of values to their property. In particular, farmers were more likely to say their property was important for economic or business purposes and in maintaining family tradition. In contrast non-farmers were more likely to indicate that their property was important for habitat and recreation [Appendix 2].

Survey data also highlighted numerous differences in the values attached to property across the survey sub-regions [Appendix 3].

FIGURE 6 – VALUES ATTACHED TO PROPERTY



Knowledge

Self-assessment is a widely accepted approach for gathering information about people's knowledge of natural resource management (Shindler and Wright 2000). In this study, respondents were asked to rate their knowledge about 12 topics relating to major natural resource management issues in the Burnett Mary region. For each statement included in the survey respondents were asked to select the best response option from 'no knowledge', 'very little knowledge', 'some knowledge', 'sound knowledge' and 'very sound knowledge (could give a detailed description to others)'. For presentation purposes, these five options have been assigned into three categories 'limited knowledge' (combining no knowledge and very little knowledge), 'some knowledge', and 'sound knowledge' (combining sound knowledge and very sound knowledge). A not applicable option was included for instances where knowledge about a specific topic was not relevant to respondents (for example where topics related to specific landuses or enterprises).

Of the 12 statements exploring respondents' knowledge about natural resource management there was only one topic where the majority of respondents indicated that they had sound knowledge. That topic was the benefits of spell pasture and crop rotation in maintaining soil health and productivity [Figure 7].

Just under half of all respondents said they had sound knowledge about the benefits of ground cover on cropping and grazing paddocks to maintain or improve soil health. Respondents reported moderate knowledge about the ability of vegetation (including grasses) around waterways to improve water quality, the effects of uncontrolled stock access on waterways, how to recognise the signs of salinity, the extent of water savings from techniques such as drip irrigation and irrigation scheduling, and how to use results from soil test to help inform property management [Figure 7].

The survey highlighted particularly low levels of knowledge about:

- the processes leading to soil acidification (47% little or no knowledge);
- the processes leading to herbicide resistance in broad acre cropping situations (45% little or no knowledge);
- the extent and quality of groundwater resources in the district (38% little or no knowledge); and
- the processes leading to soil salinity (34% little or no knowledge) [Figure 6].

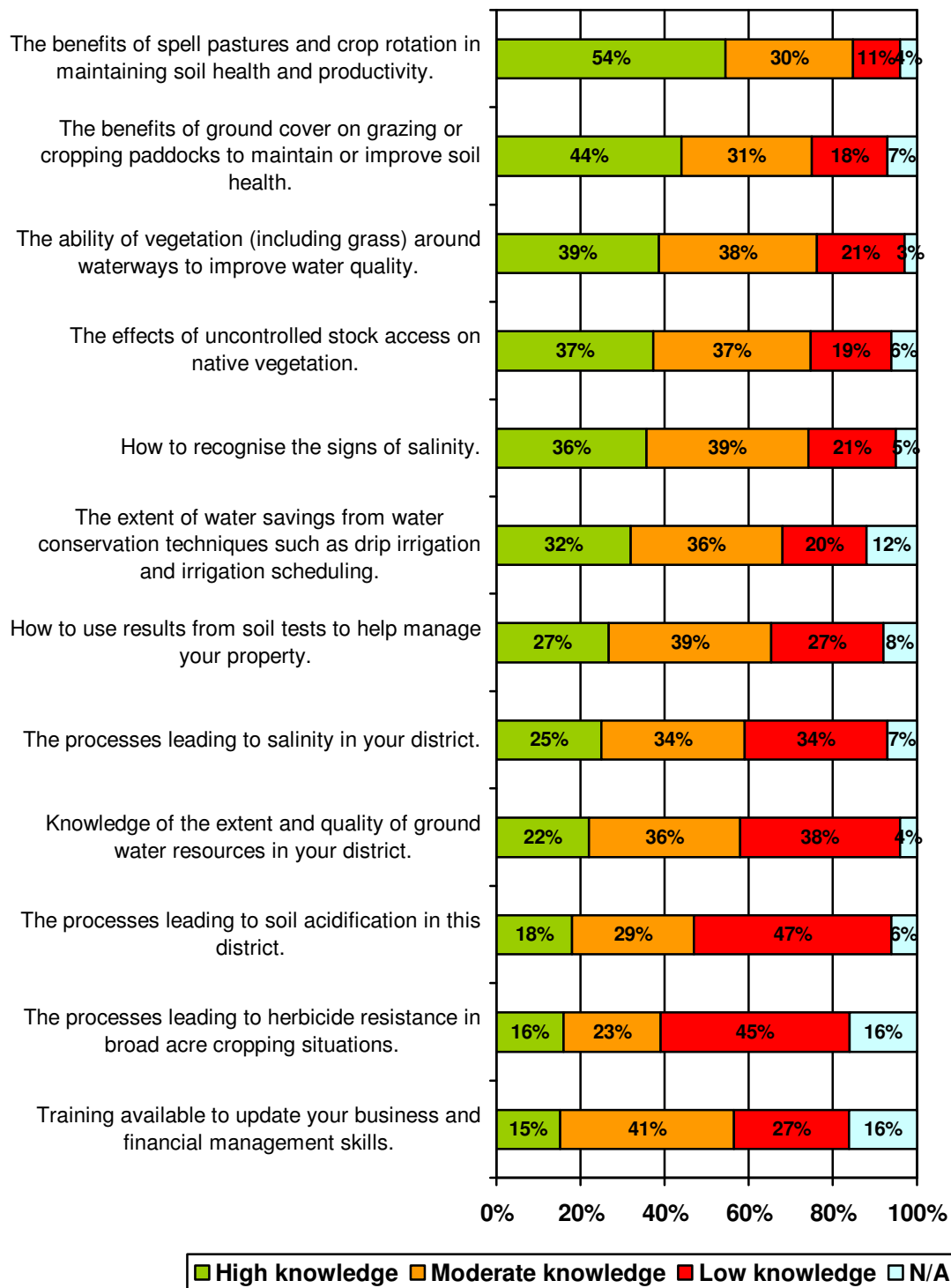
Respondents who said farming was their primary occupation reported significantly higher knowledge across most of the topics covered in the survey. However, it is important to note that even for farmers, there were only a small number of topics where the majority of these respondents reported sound knowledge [Appendix 2].

There were only two topics where respondents level of knowledge differed significantly across the survey sub-regions [Appendix 3].

The relatively low levels of knowledge across some natural resource management issues, including salinity and soil acidity, is likely to reflect the earlier finding that most landholders did not consider these important issues in their region or on their property. These findings suggest a need for increased investment in targeted education and awareness raising activities. These activities should aim to provide more convincing evidence of the current and potential risk of these issues and the need to undertake mitigating action before a crisis point is

reached. Education and awareness raising activities should also attempt to make more explicit links between understanding and action and the key values of landholders.

FIGURE 7 – KNOWLEDGE ABOUT NATURAL RESOURCE MANAGEMENT



Attitudes and beliefs towards natural resource management

A series of nine statements explored landholders' attitudes to the management of natural resources in the Burnett Mary region. For each statement respondents were asked to choose a response option from 'strongly agree', 'agree', 'not sure', 'disagree' and 'strongly disagree'. These response options have been collapsed into three groups for presentation of data in Figure 8.

The most strongly reflected belief was that grasses could stabilise river banks as well as trees with over three quarters of respondents agreeing with this statement. Over three quarters of respondents also agreed that clearing regrowth plays an important part in maintaining a viable business, diverting water flows could lead to problems for downstream landholders and the environment and that action at the property level can improve the environmental health of the district [Figure 8].

Most respondents to the survey also thought that landholders should be fully paid for providing environmental services that benefit the wider community. At the same time, many respondents were also willing to forego on-property income in the interest of improved resource conditions with well over half of all respondents reporting that a short-term loss in productive capacity could be justified by long-term benefits to natural resources [Figure 8]. This finding further highlights the land stewardship ethic that exists amongst most landholders in the Burnett Mary region and reinforces the point that financial considerations are not the only factor shaping landholder decision making about natural resource management.

Responses to the survey also indicated concern about the transfer of water between river systems with over half of all respondents agreeing that water allocations should not be transferred from one river system to another. It is interesting to note that while there was considerable concern amongst landholder about the need to clear regrowth to maintain agricultural viability, there was also widespread acknowledgement that clearing had substantially reduced the existence and diversity of native plants and animals in the district [Figure 8]. At the same time, only a small proportion of respondents were confident in the accuracy of vegetation maps for their district.

Despite the earlier finding suggesting limited concern about lack of awareness of culturally significant sites, just under half of all respondents said that they thought Aboriginal communities and landholders should work together to manage culturally significant sites on private property [Figure 8]. These findings suggest an opportunity exists to improve the management of Aboriginal cultural heritage sites through collaborative management arrangements.

The survey also highlighted some concerns regarding access to reliable expert advice or assistance for natural resource management. Indeed, almost half of the landholders surveyed said that it was difficult to obtain reliable expert advice or assistance [Figure 8].

Analysis of survey data highlighted a number of differences in respondents attitudes towards natural resource management based on their primary occupation [Appendix 2] and the survey sub-region their property was located in [Appendix 3].

FIGURE 8 – ATTITUDES AND BELIEFS TOWARDS NATURAL RESOURCE MANAGEMENT



Preferred funding arrangements for natural resource management

Through its regional natural resource management plan, the BMRGNRM is largely responsible for managing government investment in natural resource management throughout the region. The survey asked respondents to indicate their level of interest in a number of arrangements for involving landholders in natural resource management activities. For each suggested arrangement respondents were asked to choose a response option from 'not interested', 'some interest', 'interested', 'strong interest' and 'definitely interested'. These response options have been collapsed into three groups; 'limited interest' (combining not interested and some interest), moderate interest (interested), and 'strong interest' (combining strong interest and definitely interested) [Figure 9].

The most preferred option for involving landholders in natural resource management activities was through reduction in rates levied by local government with just under two thirds of respondents reporting they would be interested in this form of incentive. Tax rebates administered by the Australian Government was the only other funding arrangement that the majority of respondents reported a strong interest in [Figure 9].

Just under half of all respondents (41%) were also strongly interested in annual payments for environmental services [Figure 9].

Survey findings highlighted more limited levels of interest in coordinated paid labour to undertake conservation work or grant schemes administered by the BMRGNRM or a government department [Figure 9].

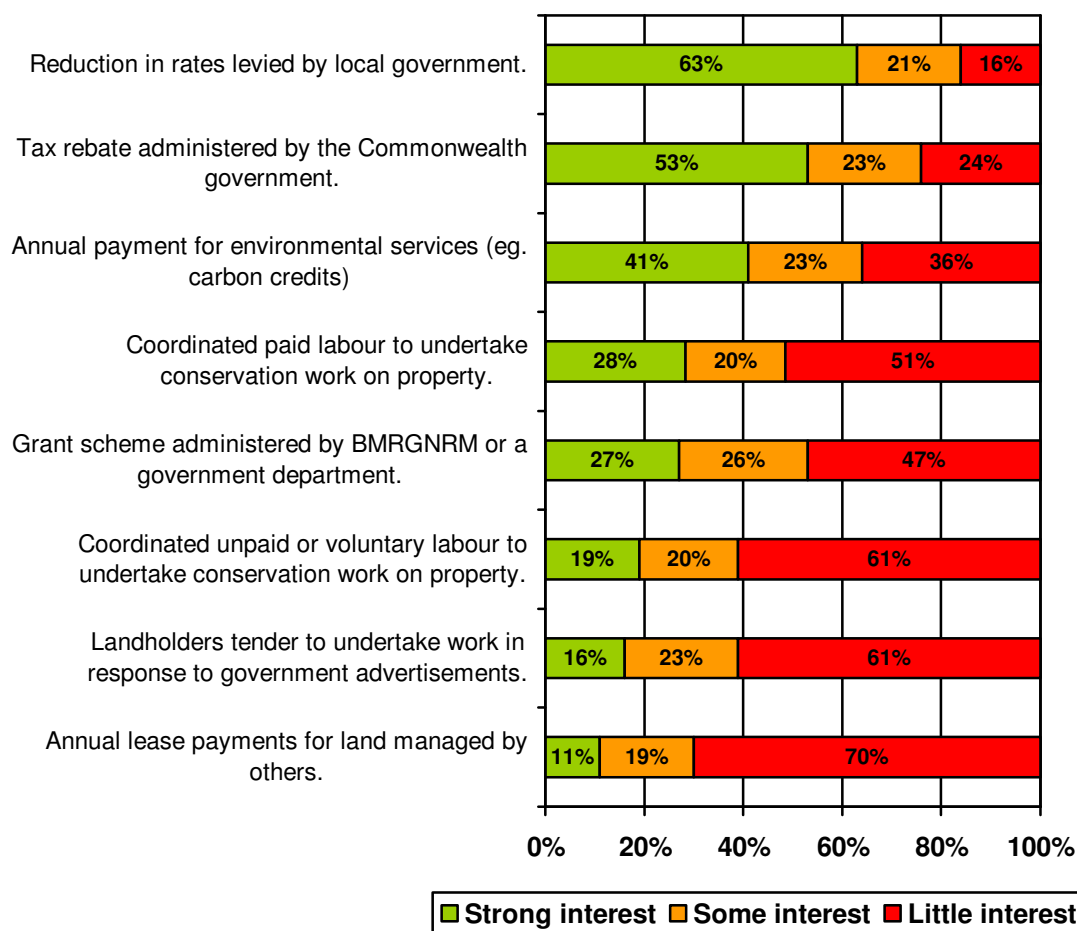
Less than 20% of respondents reported strong interest in coordinated unpaid or voluntary labour to undertake conservation work, landholders to tender in response to an advertised call or annual lease payments for land managed by others [Figure 9].

Respondents who said farming was their primary occupation reported significantly higher levels of interest in grant schemes and tax rebates than when compared to all other respondents [Appendix 2].

There were no significant differences across survey sub-regions in respondents reported interest in funding arrangements.

Despite the earlier finding that the majority of respondents thought landholders should be paid for environmental services, it seems that no single mechanism is likely to engage all landholders, and a mix of policy options will be required. Part of the explanation for limited interest in some funding arrangements may be the perceived complexity of paperwork and the application processes. Indeed, as highlighted earlier over half of all respondents said that government "red tape" limited their interest in applying for assistance to undertake works with environmental benefits. The extent to which any paperwork or application process is kept simple and streamlined appears likely to be an important factor affecting landholder interest in funding arrangements for natural resource management.

FIGURE 9 – INTEREST IN FUNDING ARRANGEMENTS FOR NATURAL RESOURCE MANAGEMENT



Sources of information about natural resource management

The mail survey included a question that asked respondents to indicate where they sourced information about natural resource management issues in the Burnett Mary region. Respondents were then asked to nominate the three sources of information they had used that were most useful in providing the sort of information they required.

Figure 10 shows that newspapers were the most commonly used source of information about natural resource management used by over two-thirds of landholders in the Burnett Mary, followed by television (50%), Mailed brochure/leaflets (45%), radio (41%), and books/magazines (40%). Field days (34%), friends and relatives (33%), and Government departments (30%) were also used as a source of information about natural resource management by around a third of all respondents. Universities, the Burnett Mary Region Group, Training Courses, workshops/seminars, environmental organisations and the internet were not widely used sources of information by landholders.

Findings from the survey showed that respondents who said that farming was their primary occupation tended to access a wider range of information about natural resource management.

This is consistent with the earlier findings suggesting that farmers had higher knowledge across a range of natural resource management topics [Appendix 2].

Survey data also highlighted some variation in the sources of information about natural resource management across survey sub-regions [Appendix 3].

To assess the utility of various sources of information Figure 11 shows how many people who had used a particular source of information said it was one of the three most useful they had used. Government departments and the internet were the only two sources of information about natural resource management where over half of all respondents who used them said they were amongst the most useful sources. Just under half of all respondents who had used newspapers, field days, industry groups and mailed brochures also thought these were amongst the most useful source of information about natural resource management [Figure 11].

FIGURE 10 – SOURCES OF INFORMATION ABOUT NATURAL RESOURCE MANAGEMENT

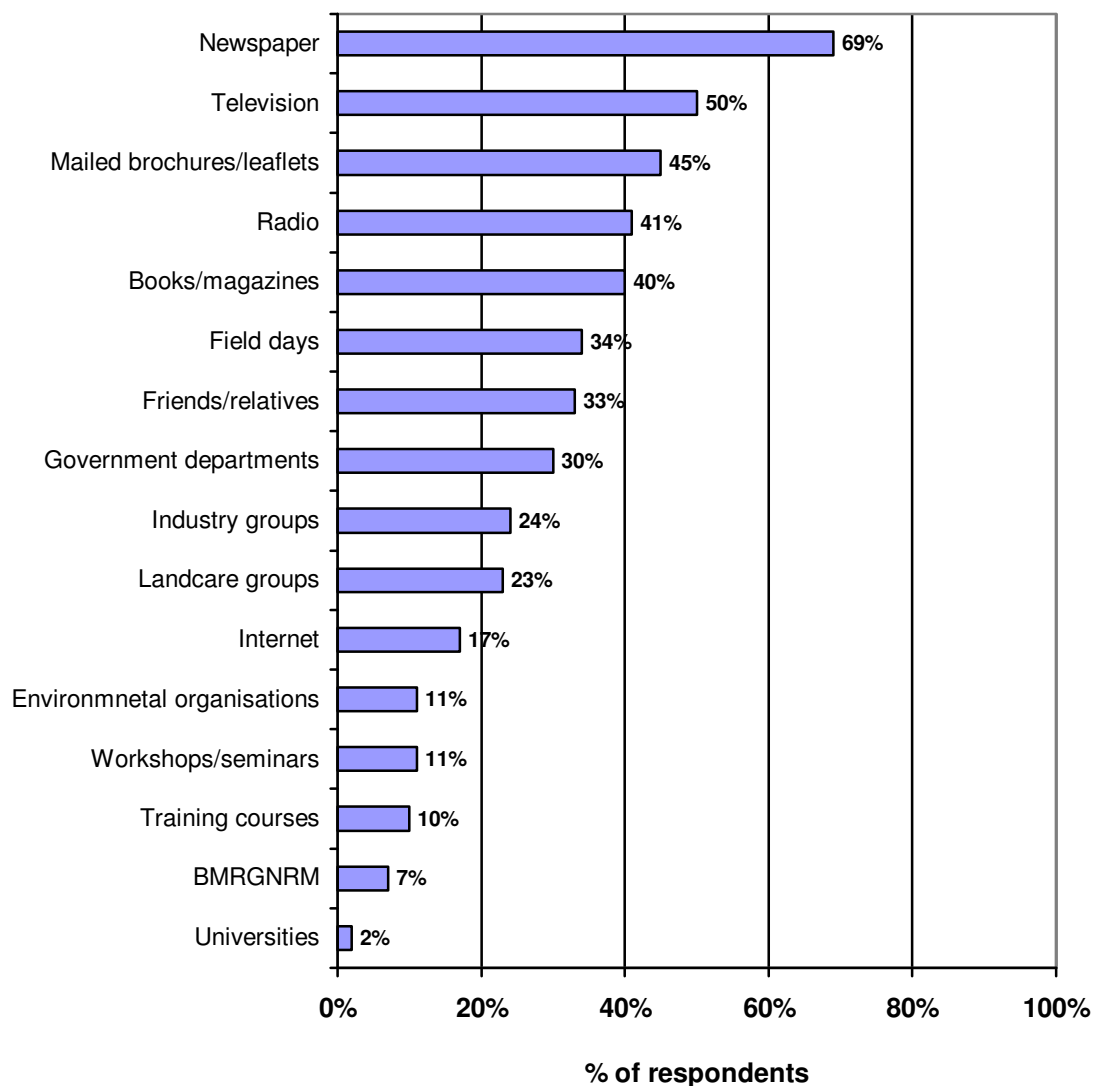
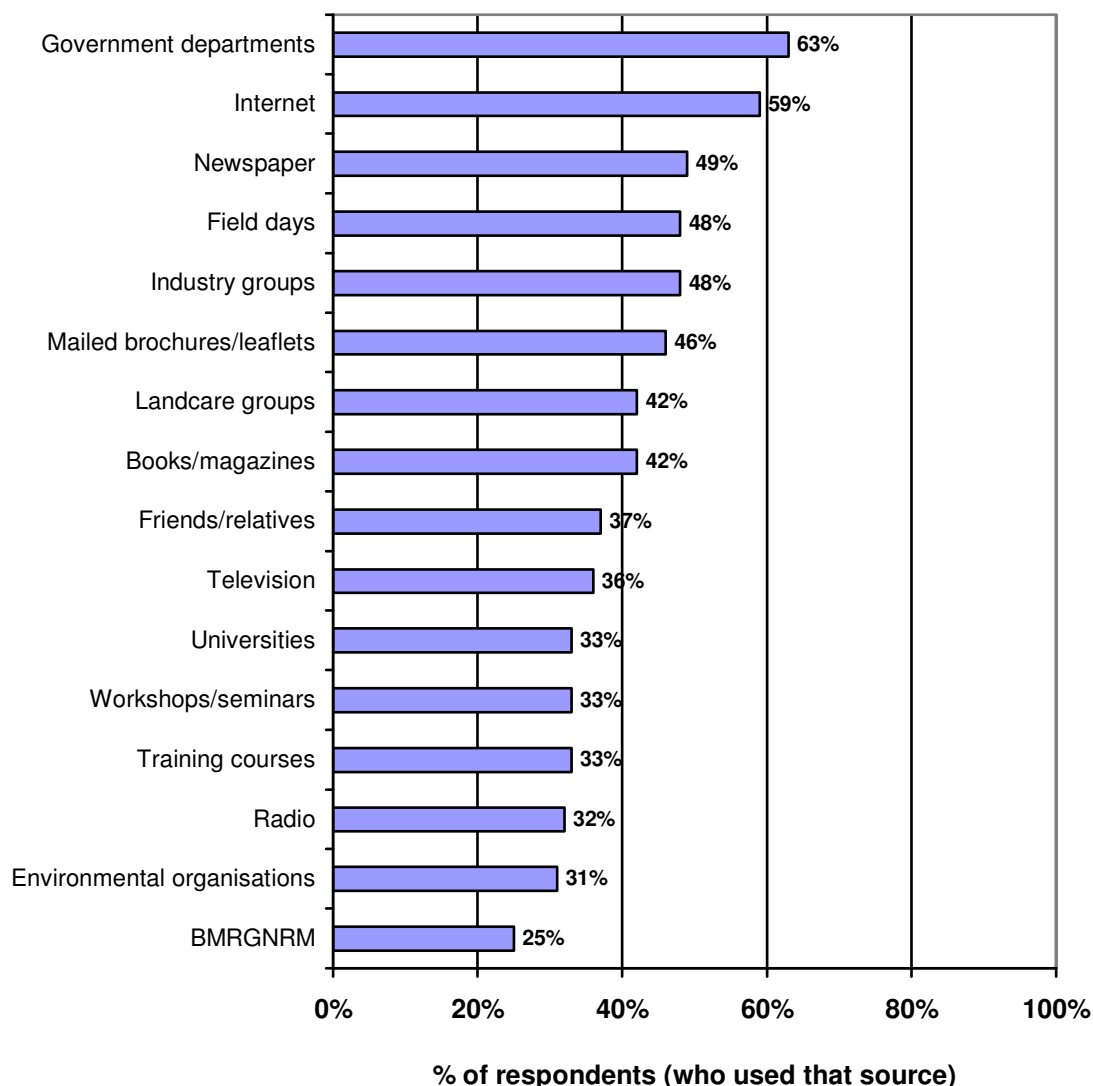


FIGURE 11 – UTILITY OF INFORMATION USED ABOUT NATURAL RESOURCE MANAGEMENT



Long term plans

The survey included twelve statements explored the likelihood that each respondent's long-term plans would involve a range of options [Figure 12]. This data contributes to a better understanding of the potential for change in the management and ownership of land in the Burnett Mary region. The response options for these statements were 'highly likely', 'likely', 'not sure', 'unlikely', and 'highly unlikely'. These choices were not mutually exclusive, that is, any single respondent could indicate that more than one option was likely to occur. For presentation purposes, in Figure 12 these response options have been collapsed into three groups – 'likely' (combining highly likely and likely), 'not sure', and 'unlikely' (combining highly unlikely and unlikely).

Continue to live on property

Responses to the survey question exploring landholders' long-term plans indicated that most land in the Burnett Mary region is likely to be tightly held. Over two thirds of respondents

thought it was either highly likely or likely that they would continue to live on their property in the long-term [Figure 12]. This group of respondents managed 80% of land surveyed.

There were no significant differences in respondents' plans to continue to live on their property based on their occupation or the survey sub-region their property was located in.

Ownership of the property will stay within the family

Fifty-six percent of respondents also indicated that it was highly likely/likely that ownership of their property would stay within the family [Figure 12]. These respondents managed 87% of land surveyed. Just under a third of those who said the property would remain in the family indicated that it was likely someone else in the family would make management decisions. That is, in most instances even where family transfer is thought likely to occur, the current property manager appears likely to maintain their decision making authority for some period of time.

Respondents who said farming was their primary occupation were significantly more likely to indicate that ownership of the property will stay in the family [Appendix 2].

There was a significant difference in the proportion of respondents from each survey sub-region indicating that ownership of the property will stay in the family ranging from 72% in the Burnett to 50% in the Mary [Appendix 3].

Plans for intensification

Just over one third of respondents said it was likely that their long term plans would involve intensifying production on their property [Figure 12]. These respondents managed approximately 64% of the survey area and owned significantly larger properties than all other respondents (median property size of 111 ha compared to 47 ha ($\chi^2=22.214$, $df=1$, $p<0.001$)).

Respondents who said farming was their primary occupation were significantly more likely to report that their long-term plans would involve intensifying production on their property [Appendix 2].

The proportion of respondents who said they planned to intensify production on their property also differed significantly across survey sub-regions ranging from 52% in the Burnett to 27% in the Mary [Appendix 3].

Plans for diversification

Twenty-nine percent of respondents said it was likely that their long term plans would involve diversifying production on their property and these respondents owned 30% of the area surveyed [Figure 12].

Respondents who said their primary occupation was farming were significantly more likely to report that they planned to diversify production on their property [Appendix 2].

There was no significant difference in the proportion of respondents planning to diversify production across survey sub-regions.

Plans for expansion

Less than 20% of respondents said it was likely that their long term plans would involve expanding the area of land they managed by purchasing, leasing or share farming additional land [Figure 12]. This small group of respondents managed 37% of all the land surveyed. Those who said they were likely to expand owned significantly larger properties than all other respondents with a median property size of 134 ha compared to 58 ha for other respondents ($\chi^2=11.290$, $df=1$, $p=0.001$). It may be that larger property owners are more likely to have the

equipment needed to operate a large scale enterprise. They are also more likely to have the capital resources needed to purchase additional land or equipment.

Respondents who said farming was their primary occupation were significantly more likely to indicate that they planned to expand their land holding than all other respondents [Appendix 2].

There was no difference in the proportion of respondents planning to expand across survey-sub-regions.

Plans to sell or lease all or most of the property

When analysing data from across the Burnett Mary it appears that the proportion of respondents likely to expand will be more than matched by the properties likely to become available for lease or sale. Thirty-two percent of respondents said that they were likely to sell the entire property. A further 7% said that they were likely to lease all or most of the property to someone else and 7% though they were likely to subdivide and sell a large part of their property [Figure 12]. Combining these groups, 37% of respondents reported that they were likely to either sell or lease all or most of their property in the long-term. These respondents owned approximately 23% of the land surveyed.

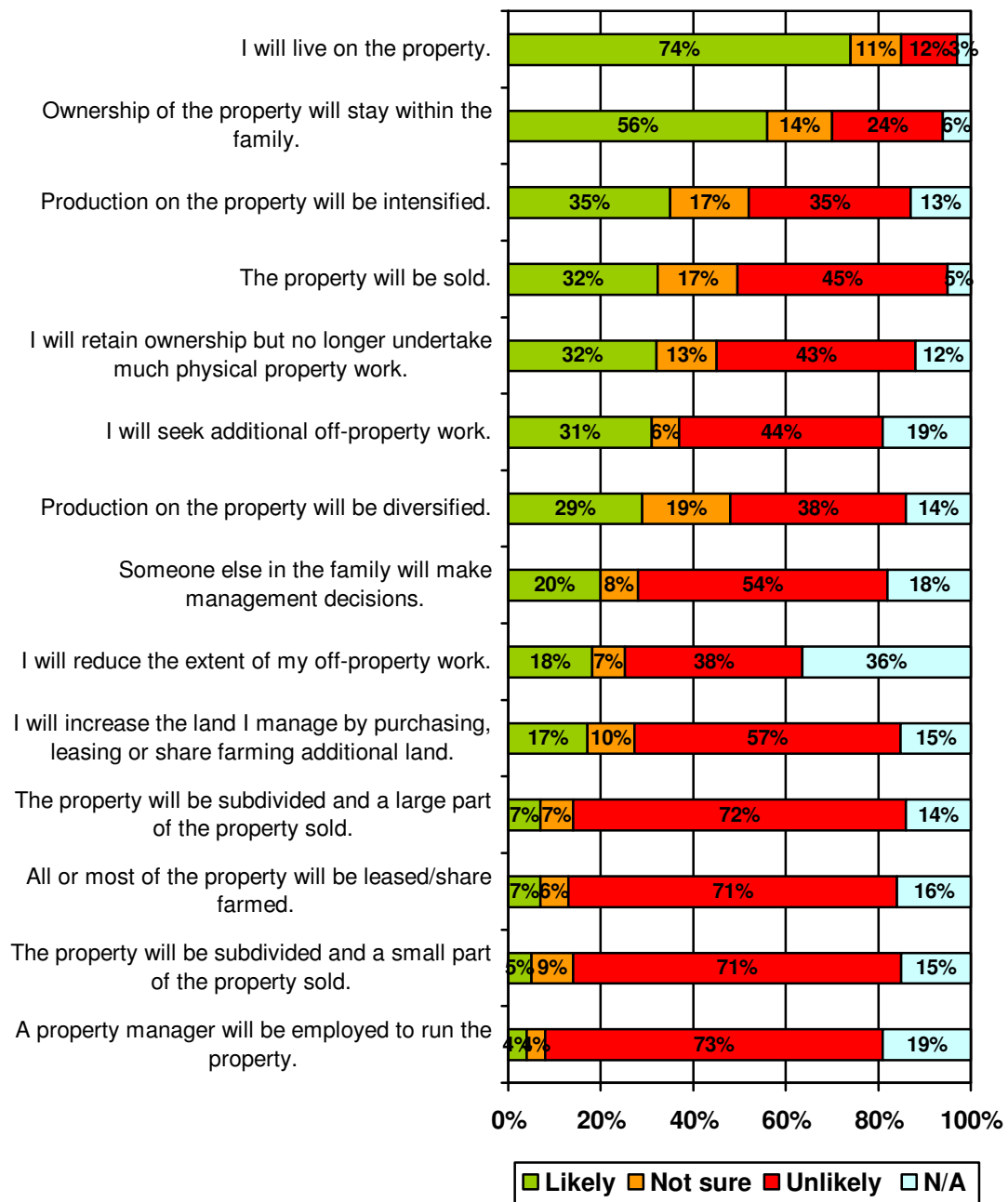
Respondents who said their primary occupation was farming were significantly less likely to indicate that their long-term plans would involve selling their property [Appendix 2].

There were significant differences in the proportion of respondents who said they were likely to sell their property or subdivide and sell a large part of their property across survey sub-regions. Forty-four percent of respondents in the Mary said they were likely to sell their property compared to 23% in the Baffle, and 12% of respondents in the Mary and Burrum said they were likely to subdivide and sell a large part of their property compared to 2% in Kolan [Appendix 3].

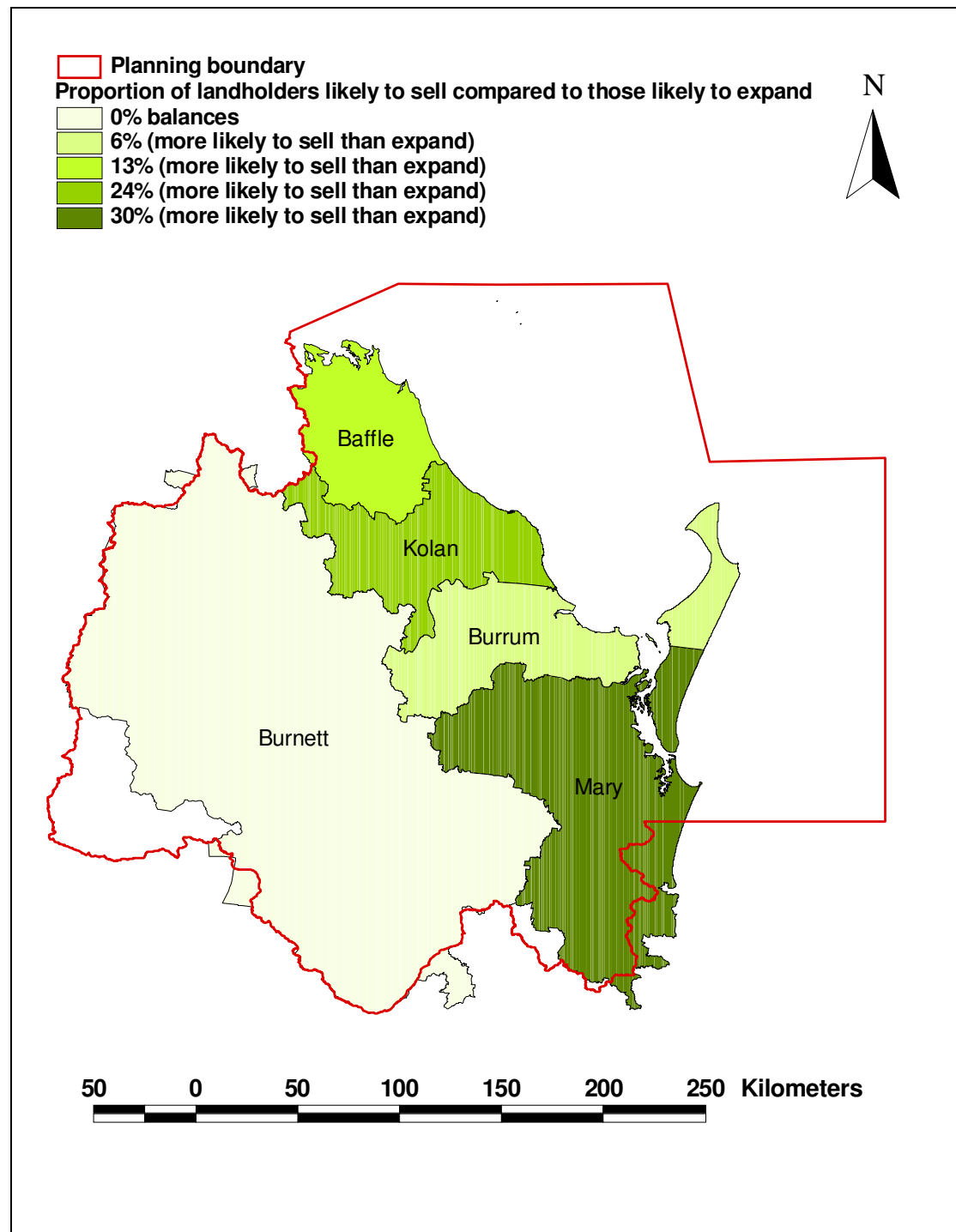
In comparing the likelihood of respondents selling or leasing most of their property and those looking to expand it appears that the demand for land will be more than met by properties likely to become available. To explore the likely demand and availability of land in greater detail Map 8 represents a break down of the difference in properties likely to be sold or leased and landholders looking to expand their holding. This comparison was made by subtracting the proportion of respondents in each survey sub-region planning to expand their holding from the proportion likely to sell or lease their property. Adopting this approach a negative figure indicates the proportion of respondents looking to expand is greater than the proportion of respondents likely to sell or lease their property. Conversely, a positive number indicates that the proportion looking to sell is greater than the proportion looking to expand. A value of zero or close to zero indicates that the proportion of respondents looking to expand is closely matched by the proportion looking to sell or lease their property. As highlighted in Map X this approach indicates that with the exception of the Burnett survey sub-region where the proportion is balanced, that the availability of land is likely to exceed demand for agricultural expansion. Of particular note is the high proportion of respondents likely to sell their property in the Mary and Kolan survey sub-regions.

In considering these findings it is important to note that this approach does not take into account the land area, the suitability or affordability of the land available for those landholders looking to expand their land holding.

FIGURE 12 – LONG-TERM PLANS



MAP 8 – PLANS FOR EXPANSION AND SALE



Involvement in planning processes

For this topic respondents were asked to indicate the extent of their involvement in a number of planning processes including property planning, succession planning and local action planning.

Property planning

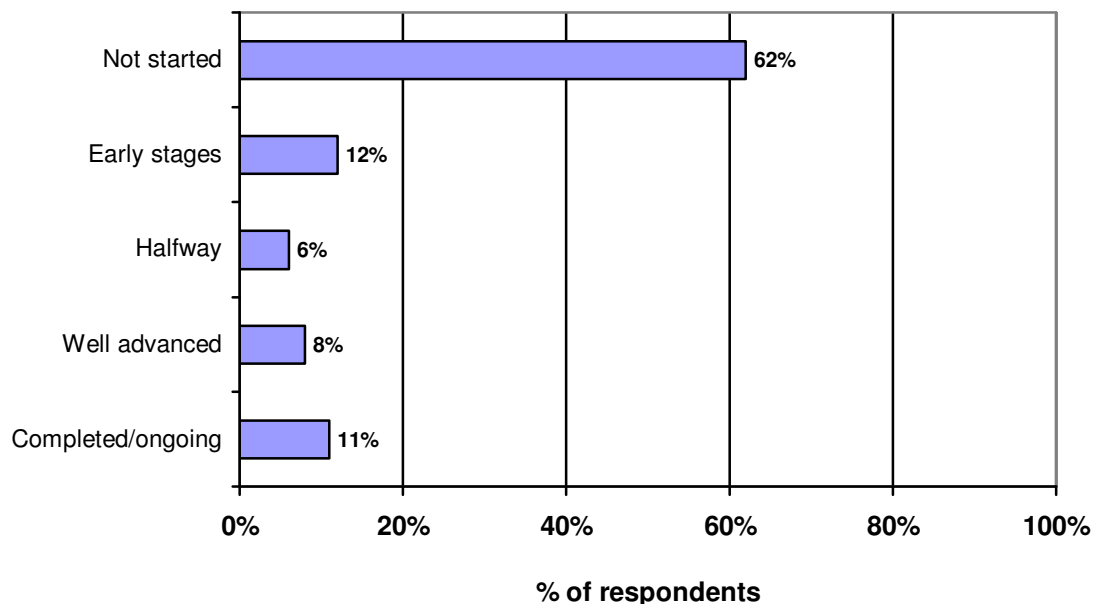
The mail survey asked respondents to indicate if they had developed or were currently developing a written property plan that included a map or other documents that addressed the existing property situation and outlined future management and development plans. The response options were 'completed/ongoing', 'well advanced', 'halfway', 'early stages', and 'not started'.

Thirty-eight percent of all respondents were either currently preparing or had completed a property plan. Just under one third of those involved in property planning had a completed or well advanced plan [Figure 13]. Just under 11,000 ha or approximately 7% of the area surveyed was currently covered by completed property plan. Landholders who said farming was their primary occupation were significantly more likely to be involved in property planning than all other respondents [Appendix 2].

There was no significant difference in the proportion of respondents involved in property planning across survey sub-regions.

While these findings are encouraging, most respondents (57%) said they had not started preparation of a property plan. Ongoing promotion and greater support to assist landholders to implement plans appear likely to facilitate greater uptake of property planning in the future. In particular, there appears to be a need for greater attention in promoting and supporting property planning with landholders who are not primarily farmers by occupation. This will be especially important in sub-catchments where these landholders manage a larger proportion of the land area or key natural resource assets.

FIGURE 13 – INVOLVEMENT IN PROPERTY PLANNING



Long term plan or vision about on-property improvements

In addition to asking about the presence of written property plan, respondents were asked to indicate if they had a long-term plan about the improvements they wanted to make on their property. Those respondents who indicated that they did have such a long-term plan or vision

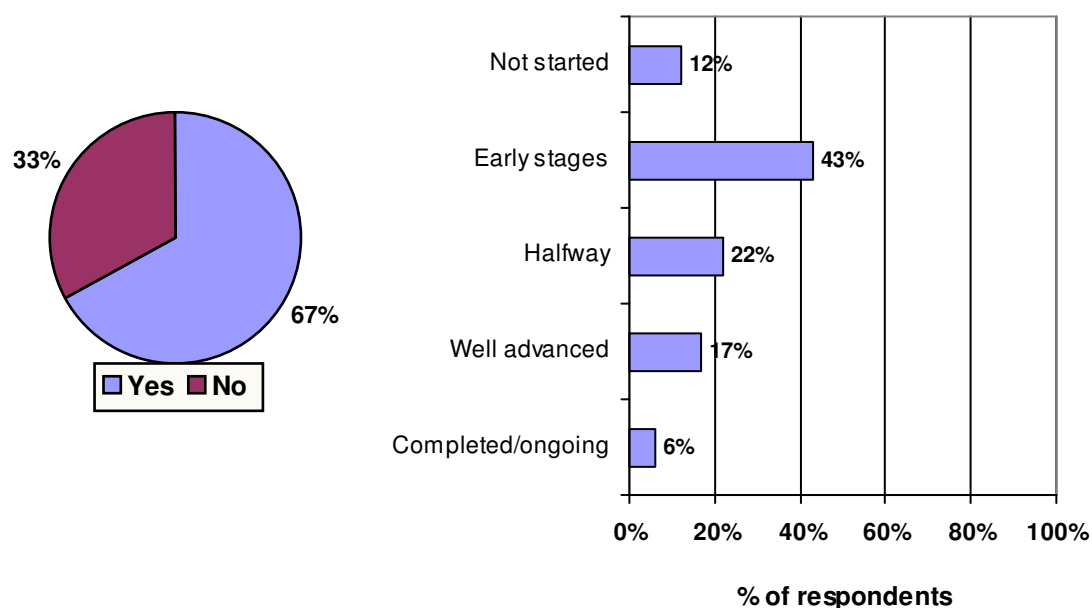
were then asked to indicate to what extent they had accomplished that plan or vision/ The response options were ‘completed/ongoing’, ‘well advanced’, ‘halfway’, ‘early stages’, and ‘not started’.

Over two thirds of respondents to the survey said that they had a plan or vision about the improvements they would like to make on their property. Furthermore, 98% of these respondents said that they had at least started to implement these improvements [Figure 14]. As was the case with the written property plan, respondents who said farming was their primary occupation were significantly more likely to have a long-term plan or vision. Nevertheless, over half of all respondents who were not farmers still said they had a long-term plan or vision, nearly twice as many as the proportion of non-farmers who had a written property plan [Appendix 2].

There was no significant difference between the proportion of respondents who had a plan or vision for their property across the survey sub-regions.

While many respondents had limited involvement in the preparation of a written property plan it is important to note that most respondents had a long-term plan or vision for their property. Less formal and less structured planning processes appear likely to be effective in promoting property planning amongst landholders who do not consider farming as their primary occupation.

FIGURE 14 – LONG TERM PLAN OR VISION ABOUT ON-PROPERTY IMPROVEMENTS



Succession planning

Respondents were asked if their family had agreed on a plan to manage the transfer of their property to the next generation. The possible response options were ‘completed/ongoing’, ‘well advanced’, ‘halfway’, ‘early stages’, and ‘not started’.

Despite the earlier finding that many respondents planned to pass the property on to another family member, most respondents (72%) have not begun to plan the transfer of their property to the next generation. Even when only considering those respondents who indicated their long-term plans were likely to involve family succession, more than half (56%) had not begun to plan for this process. Less than 5% of respondents had agreed on a family succession plan and only a further 5% had well advanced plans [Figure 15].

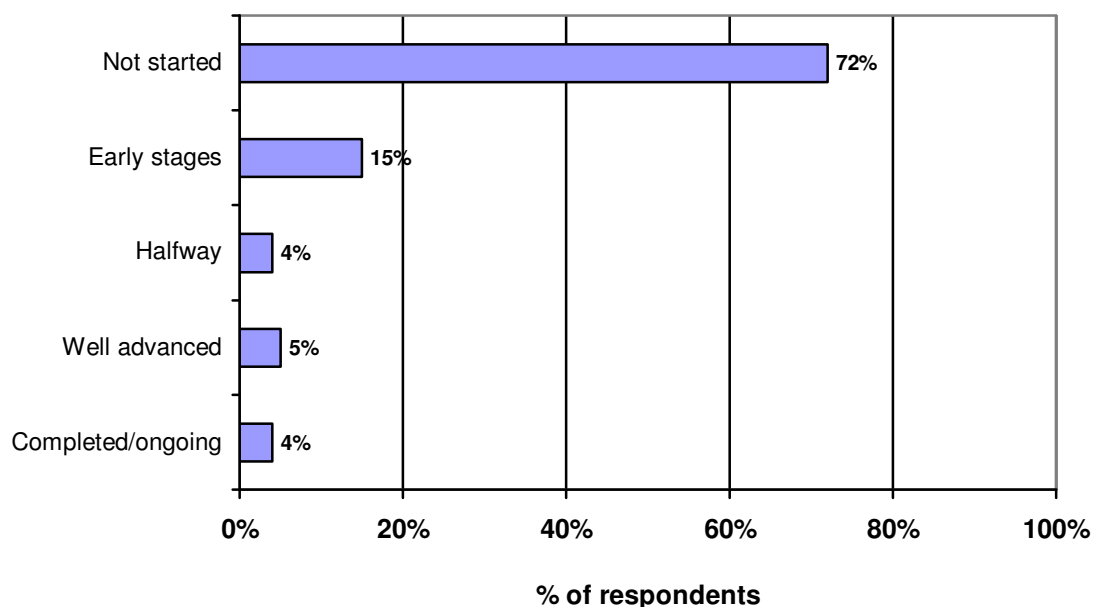
However, older respondents were significantly more likely to be involved in succession planning with an average age of 56 for those involve in succession planning compared to 52 for all other respondents ($\chi^2=7.722$, df = 1, p = 0.005).

Respondents who said farming was their primary occupation were significantly more likely to report that they were involved in succession planning [Appendix 2].

There was no significant difference in respondents' involvement in succession planning across the survey sub-regions.

Family succession planning is often a complex process that requires a large investment of time, energy and money. It is possible that many landholders are uncertain about how to undertake this process. Establishing an information package that outlined the common steps required to undertake a succession plan and a list of people to contact for advice may be an approach that can help facilitate greater uptake of succession planning. At the very least, such an information package could make the planning process easier for those involved.

FIGURE 15 – INVOLVEMENT IN SUCCESSION PLANNING

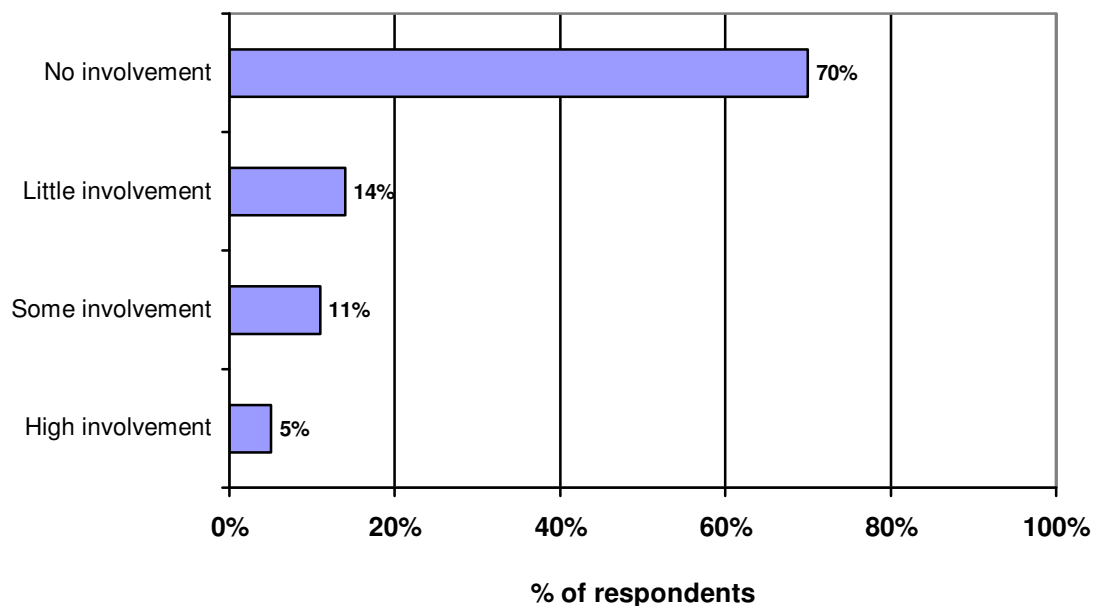


Local action planning

The mail survey asked respondents to indicate their level of involvement in local action planning using examples such as Landcare, community development or industry associations. The possible response options were 'no involvement', 'little involvement', 'some involvement', and 'highly involved'.

Just under half of all respondents (43%) reported being involved in local action planning. Only 5% of respondents were highly involved [Figure 16]. As was the case with property planning, respondents who said farming was their primary occupation were significantly more likely to be involved in local action planning [Appendix 2]. Survey data suggests that the activities of many local action planning groups have a stronger appeal to landholders who are farmers. Again in sub-catchments where non-farmers manage large or critical areas of land, local action planning groups may need to carefully target the interests of these landholders.

FIGURE 16 – INVOLVEMENT IN LOCAL ACTION PLANNING



Involvement in government funded programs

The survey asked respondents to indicate their involvement in government funded programs that amongst other things, aim to assist landholders to implement improved land management practices. Respondents were asked five questions:

- had there been work undertaken on their property in the last five years that was funded by government programs;
- were they currently a member of a Landcare group;
- were they currently a member of a Topcrop group; and
- were they currently a member of some other benchmark or best practice group.
- a benchmark or best practice group.

Work funded by government on their property

Findings from the survey indicated that the vast majority of landholders in the Burnett Mary had not received government funding to undertake work on their property. Only 6% of

respondents said that work had been undertaken on their property in that last five years that had been at least partially funded by state or federal government programs.

There were no significant differences in the proportion of respondents reporting government funded works on their property based on either occupation or survey sub-regions.

Landcare membership

Thirteen percent of respondents to the survey said that they were currently a member of a Landcare group.

Respondents who said farming was their primary occupation were significantly more likely to report being a members of a Landcare group [Appendix 2].

There was no significant difference in Landcare membership across survey sub-regions.

Used the services of a government advisor

Just under one third of all respondents (31%) said they had used the services of a government advisor in the past 12 months.

Respondents who said farming was their primary occupation were significantly more likely to report that they had used the services of a government advisor [Appendix 2].

There was no significant difference in the proportion of respondents who had used the services of a government advisor across survey sub-regions.

Membership of benchmark or best practice groups

Only three respondents or less than 1% of all landholders surveyed said they were a member of a benchmark or best practice group.

There were no significant differences in membership of benchmark of best practice groups based on either occupation or survey sub-regions.

Constraints to change

The survey explored the importance of 22 factors that the literature, our previous research and industry partners thought were likely to influence landholder decision making about taking on new practices. Practices suggested in the pre-amble of the question included increasing the area under lucerne or native trees, using time controlled grazing, fencing to manage stock access to waterways, or adopting minimum tillage. The response options were ‘very important’, ‘important’, ‘not sure’, ‘unimportant’ and ‘very unimportant’. These response options have been collapsed into three categories – ‘important’ (very important and important), ‘not sure’ (not sure) and ‘unimportant’ (unimportant and very unimportant).

Survey findings highlighted a very broad range of economic, environmental and social constraints that are likely to affect the capacity of landholders in the Burnett Mary to change land management practices. Eighteen of the 22 topics listed in the survey were rated as an important constraint by at least half of all respondents and at least one economic, social and environmental issue was rated as one of the top five constraints [Figure 17].

The highest rated constraint to changing land management practices was the availability of surface or groundwater with 85% of respondents indicating this was or would be an important factor. Suitability of soils was also rated very highly as a constraint (80%), reflecting the fact

that the success of many current recommended practices is unknown or unpredictable depending on the resource base. Available cash flow, the existence of long-term markets, stage of life and the extent the practice would increase property value were also considered to be important factors in the decision-making process by more than two thirds of respondents [Figure 17].

The extent that other people in the district are undertaking new practices, what others see as good farming practices, availability of labour, and the returns available from off-property investments were the lowest rated constraints and the only ones where less than half of all respondents said they were important [Figure 17].

In line with the wider range of values farmers attached to their property, survey data also highlighted that farmers reported a greater range of factors influencing decisions about changing management practices on their property [Appendix 2].

The proportion of respondents who reported that the existence of long-term markets was an important constraint also varied significantly across survey sub-regions ranging from 85% in Burnett to 64% in Burrum [Appendix 3].

As mentioned earlier in this report it has been widely assumed that the aging rural population could have important implications for efforts to enhance the adoption of improved management practices. At the same time, there was no evidence in this research that age represented a barrier to the adoption of CRP. While many respondents also considered stage of life to be an important constraint, it is critical to note that this is quite a distinct issue from age. For example, the age group of respondents who were most likely to consider that stage of life was an important constraint was those under 30. Ninety percent of these respondents said that stage of life was an important constraint compared to 79% for the next highest age group which was the 71-80 years age group. Respondents under 30 are those most likely to be in the prime family forming stages of life. Different family commitments, savings, and debt are likely to be important factors affecting the willingness and capacity of landholders in earlier stages of their life from implementing changed management practices.

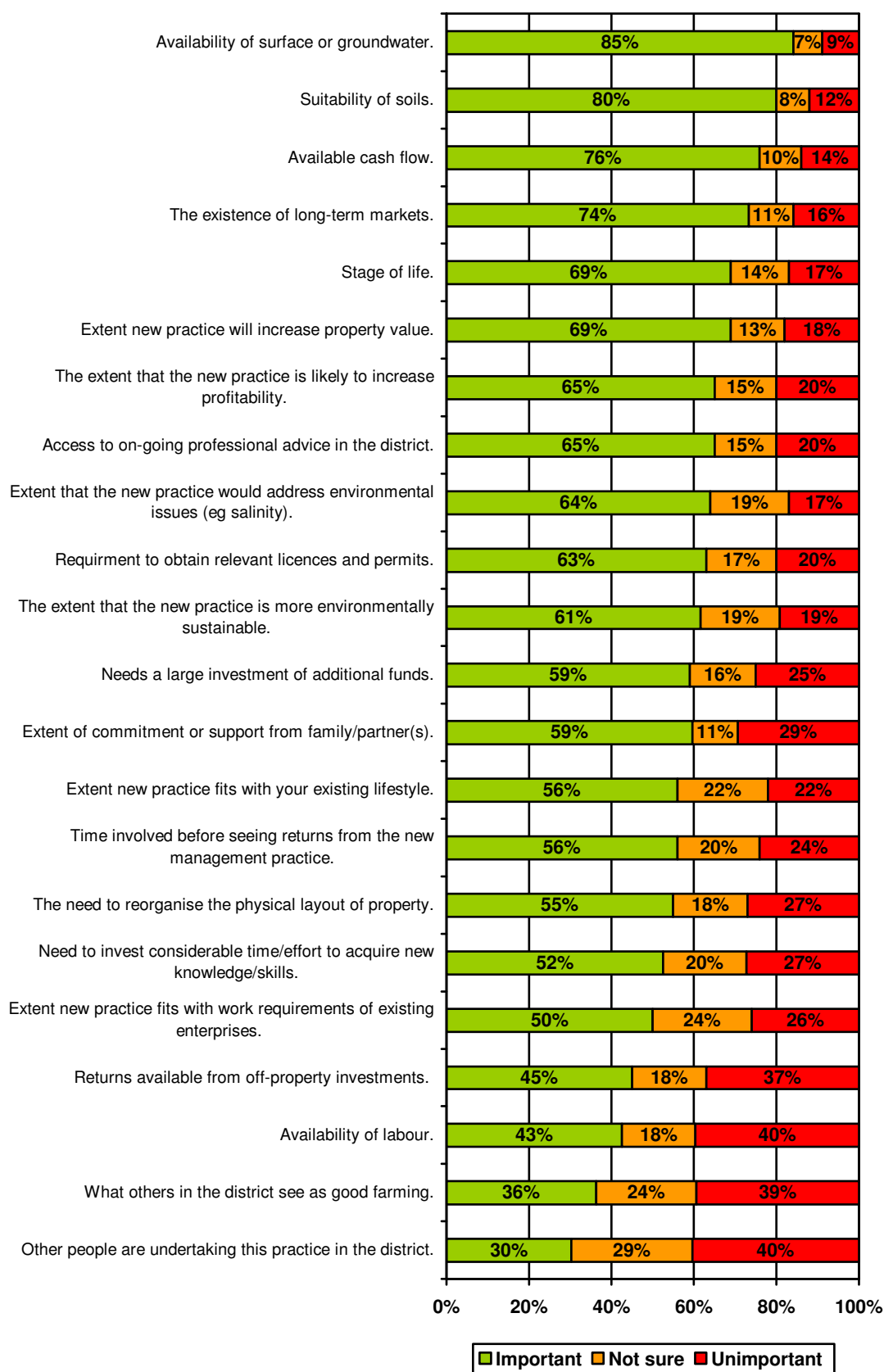
Survey data suggesting that cash flow was an important constraint to changing management practices, and that landholders thought they should be paid for environmental services suggest there is potential for stronger cost sharing arrangements to enhance adoption. Rural landholders are becoming increasingly aware that they are often being asked to implement works with wider community benefit. At the same time, the vast majority of landholders in the Burnett Mary had not received any government funding to undertake works on their property over the last five years.

One of the assumed benefits arising from adjustment towards larger more economically “viable” production units is that larger more profitable enterprises will be better placed to implement improved management practices. However, findings from this survey indicated that respondents who made an on-property profit were actually more likely to report that cash flow was an important constraint. Ninety-one percent of all respondents who made an on-property profit said that cash flow was an important constraint compared to 68% of respondents who did not make an on-property profit.

While at first this finding may seem counter-intuitive, the strong link between property size and profitability appears to provide part of the explanation for this finding. Despite being more profitable, respondents with larger properties were significantly more likely to indicate that cash flow was an important constraint to changing management practices. The average property size for respondents who said cash flow was an important constraint was 578 ha compared to 76 ha for those who said it was not important. The scale of investment required

by a single landholder to implement and manage change across a larger property, and the likelihood of a more entrepreneurial approach to evaluating options for change may be important factors underlying these trends. These findings are likely to have important implications for efforts to adjust agricultural enterprises towards larger production units and warrant more detailed studies of these issues.

FIGURE 17 – CONSTRAINTS TO ADOPTING NEW LAND MANAGEMENT PRACTICES



Adoption of current recommended practices (CRP)

The mail survey included questions relating to the uptake of 19 current recommended practices (CRP) identified as likely to contribute to improved productivity and natural resource management outcomes in the Burnett Mary region. As some CRP relate to specific enterprises only individuals who reported those enterprises on their property were included in those analyses. For example, only respondents who reported that they cropped on their property were included in the analysis exploring the adoption of the CRP minimum tillage. As a result the 19 CRP have been grouped into six categories.

1. Non-specific CRP (including all respondents).
 - a. Planted trees and shrubs.
 - b. Encouraged regrowth of native vegetation.
 - c. Controlled machinery or stock traffic to reduce soil compaction.
 - d. Sown perennial pasture.
 - e. Conducted work to control non-crop weeds and pest animals.
 - f. Used a designated cleaning area to minimise weed infestations.
 - g. Applied lime or gypsum.
 - h. Used a soil testing/monitoring program.
 - i. Reduced chemical use.
2. Cropping CRP (including only those respondents who reported cropping enterprises on their property).
 - a. Cropped using a rotation that was varied based on soil test results.
 - b. Cropped using a rotation with spell pasture.
 - c. Cropped using minimum tillage practices.
3. Stock CRP (including only those respondents who reported stock on their property).
 - a. Fenced waterways to control stock access.
 - b. Used spell or rotational grazing.
 - c. Fenced native bush to control stock access.
4. Irrigation CRP (including only respondents with irrigated enterprises on their property).
 - a. Used low pressure overhead, solid set or drip irrigation systems.
 - b. Irrigated using a schedule to determine the timing and volume of water applied.

5. Dairy or intensive livestock CRP (including only those respondents with dairying or intensive livestock on their property).
 - a. Reused or recycled effluent.
6. Sugar cane CRP (including only those respondents with sugar cane on their property).
 - a. Used trash blanket practices.

Non-specific CRP

Survey data highlighted moderate levels of adoption for most non-specific CRP. The only CRP to be adopted by the majority of respondents (89%) was work to control pest animals and non-crop weeds. Over one third of respondents had applied lime or gypsum, used a soil testing/monitoring program or encouraged regrowth of native vegetation. Despite the fact that almost all respondents said they were involved in weed or pest control, only 14% said they had used a designated cleaning area to minimise weed infestations [Figure 18].

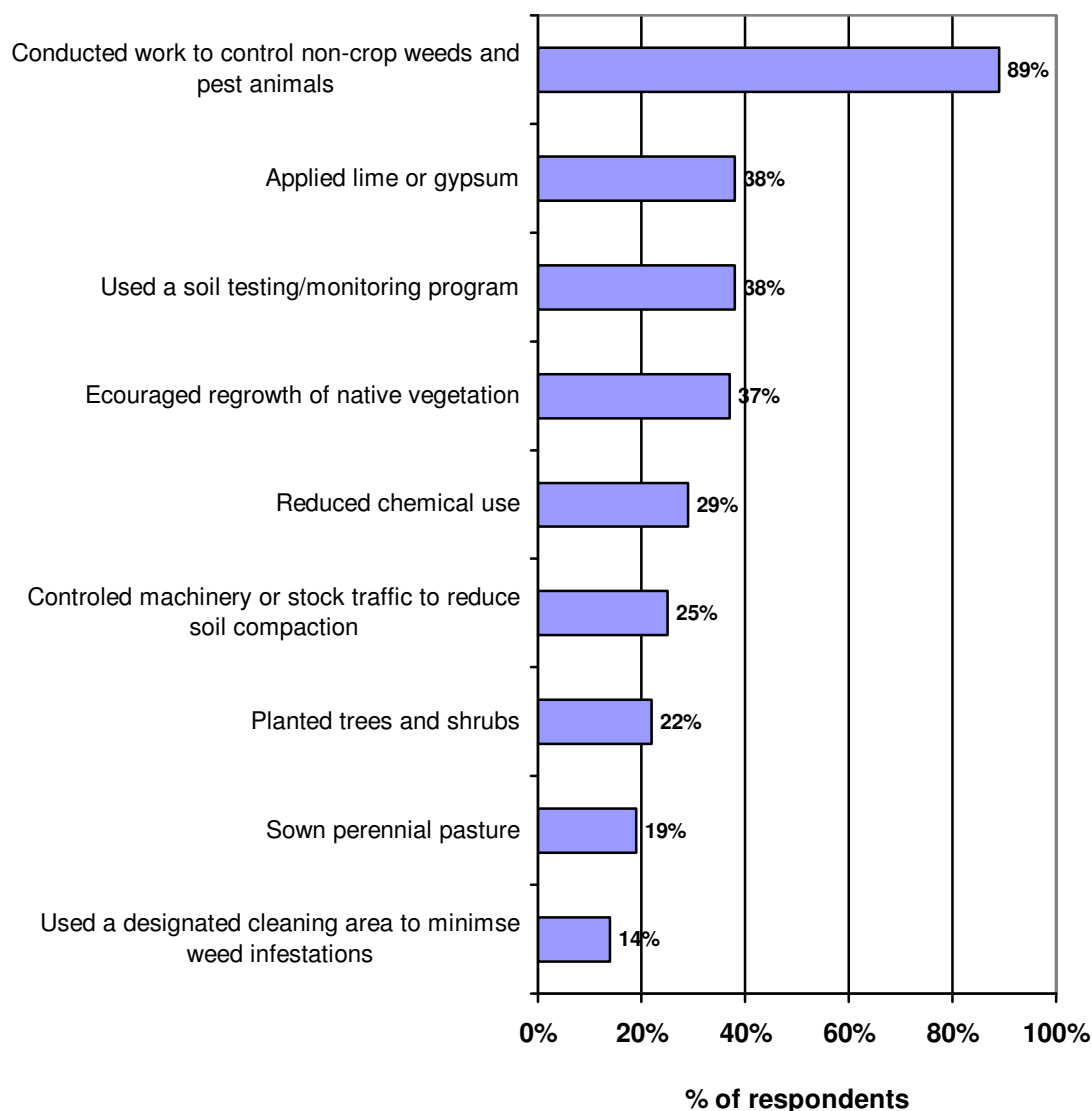
Just under a quarter of respondents said they had planted trees or shrubs over the past five years. On average these respondents had planted 6 ha and a total of almost 500 ha or less than 1% of the combined area of properties surveyed.

Less than 20% of respondents had sown perennial pasture. These respondents were also asked to indicate the area sown to perennial pasture. A total of just over 10,000 ha or 6% of the combined area of properties surveyed was sown with perennial pasture at an average of 145 ha.

The uptake of most non-specific CRP varied significantly between farmers and non-farmers with farmers generally more likely to have adopted production related practices, while less likely to have adopted revegetation related practices [Appendix 2].

The adoption of a number of these practices also varied significantly across survey sub-regions [Appendix 3].

FIGURE 18 – ADOPTION OF CURRENT RECOMMENDED PRACTICES



Cropping CRP

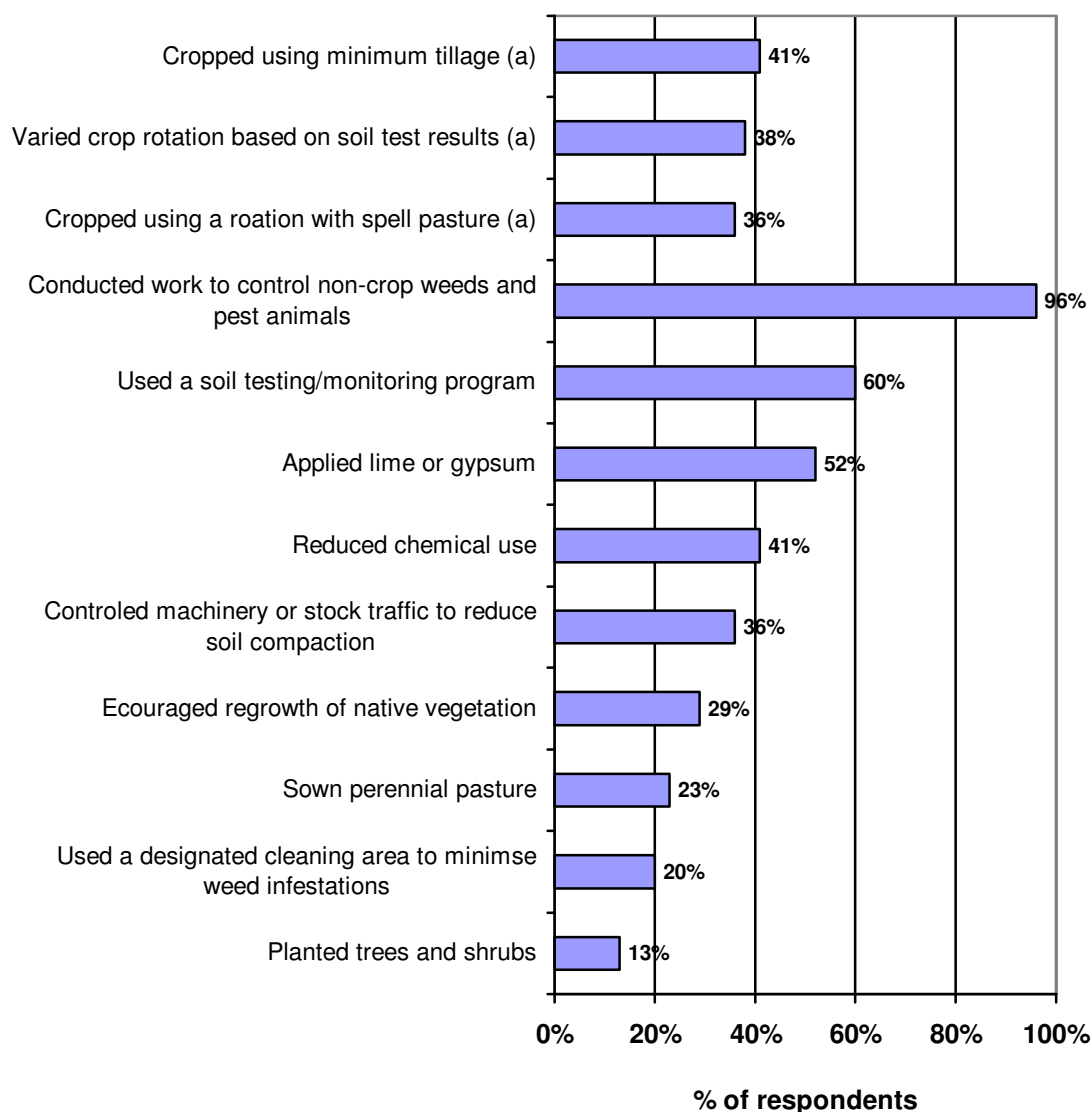
Analysis of survey data highlighted that less than half of all respondents involved in cropping enterprises had adopted cropping related CRP with 41% using minimum tillage practices, 38% varying crop rotations based on soil tests and 36% using a rotation with spell pasture [Figure 19].

One average respondents involved in minimum tillage cropped 125 ha using this practice. A total of 2,600 ha or 50% of the total area used for cropping was cropped using minimum tillage practices.

When looking at the uptake of other CRP by respondents involved in cropping, these respondents had much higher levels of uptake of the CRP used a soil testing/monitoring program (60%), applied lime or gypsum (52%), and reduced chemical use (41%) [Figure 19].

There were no significant differences in the uptake of cropping CRP based on either occupation or survey sub-region.

FIGURE 19 – ADOPTION OF CURRENT RECOMMENDED PRACTICES FOR LANDHOLDERS WITH CROPPING ENTERPRISES



(a) = only respondents with cropping on their property

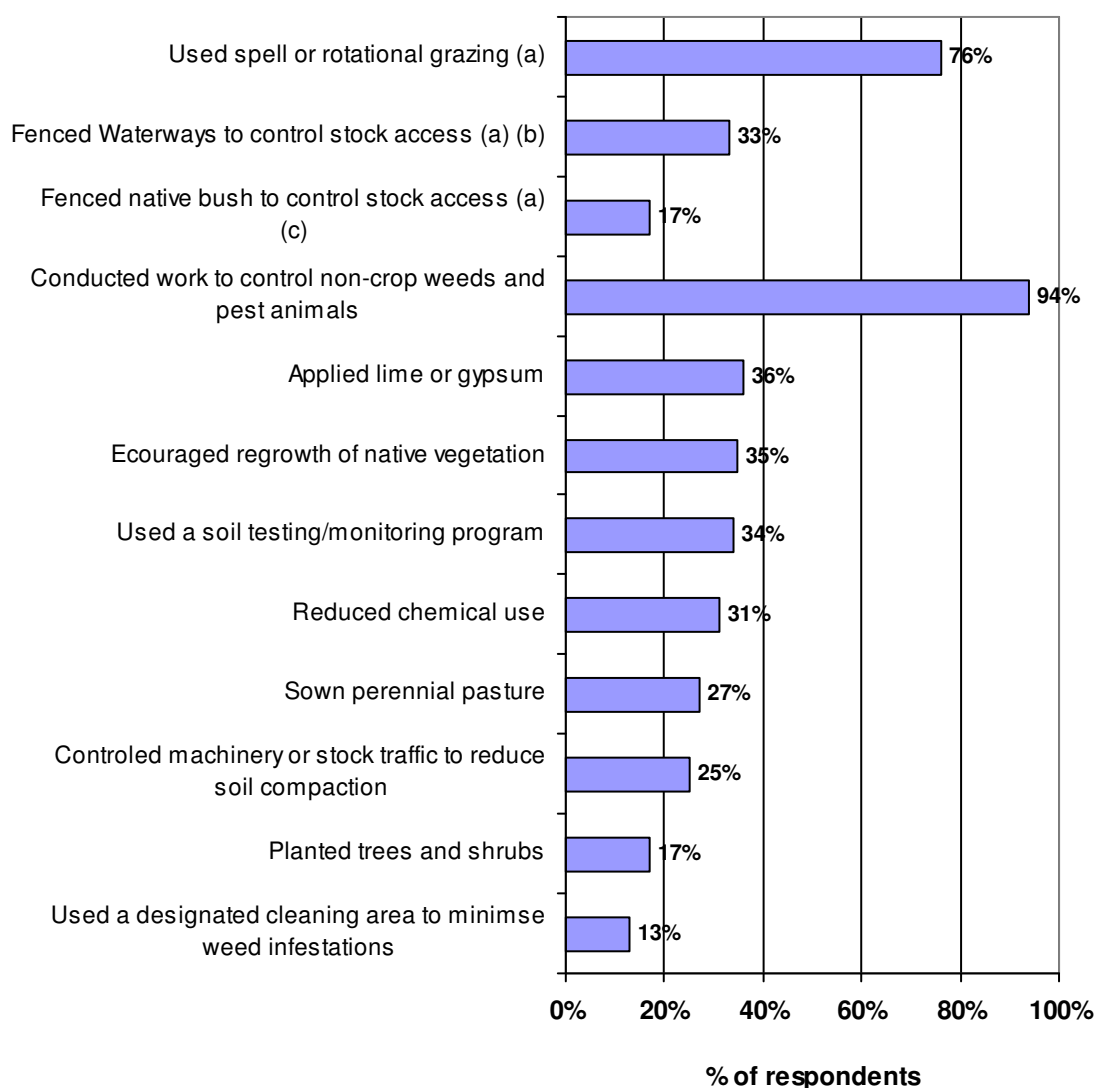
Stock CRP

Over two thirds of all respondents with stock had adopted the CRP used spell or rotational grazing. Adoption of the CRP fenced waterways to control stock access and fenced native bush to control stock access were adopted by a much smaller proportion of respondents with 33% and 17% of respondents respectively adopting these CRP. The uptake of non-specific CRP was comparable with those of all respondents [Figure 20].

Respondents who said farming was their primary occupation were significantly less likely to have adopted the CRP used spell or rotational grazing [Appendix 2].

There were no significant differences in the uptake of stock CRP across survey sub-regions.

FIGURE 20 – ADOPTION OF CURRENT RECOMMENDED PRACTICES FOR LANDHOLDERS WITH STOCK RELATED ENTERPRISES



(a) = only respondents with stock on their property

(b) = only respondents with stock and a waterway on their property

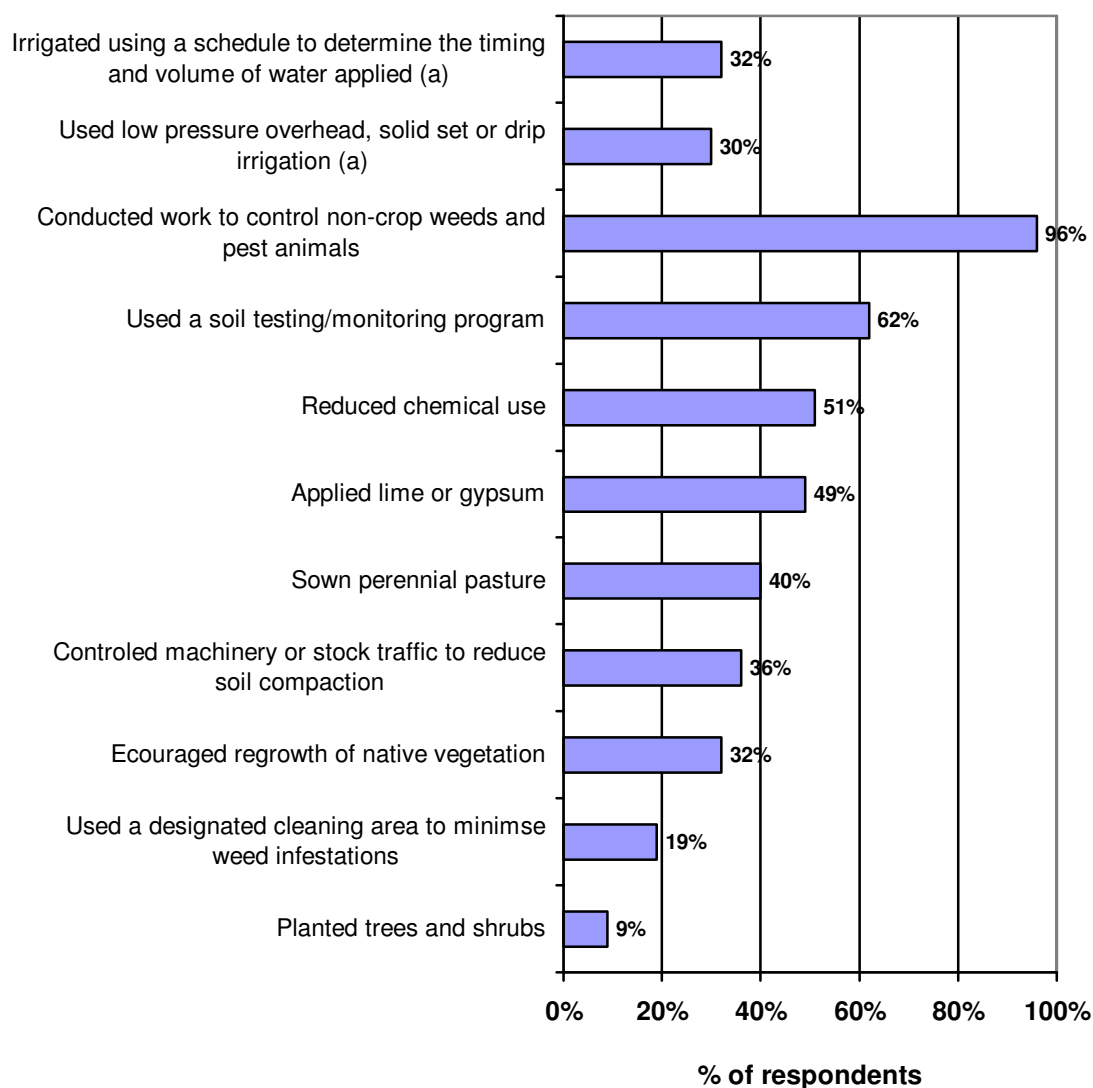
(c) = only respondents with stock and native bush on their property

Irrigation CRP

Just under one third of respondents with irrigated enterprises had adopted the CRP irrigated with a schedule to determine the timing and volume of water applied and used low pressure overhead, solid set or drip irrigation systems. Compared to all other respondents those with irrigated enterprises were more likely to have used a soil testing program, reduced chemical use, applied lime or gypsum and sown perennial pasture [Figure 21].

There were no significant differences in the uptake of irrigation CRP based on either occupation or survey sub-region.

FIGURE 21 – ADOPTION OF CURRENT RECOMMENDED PRACTICES FOR LANDHOLDERS WITH IRRIGATED ENTERPRISES



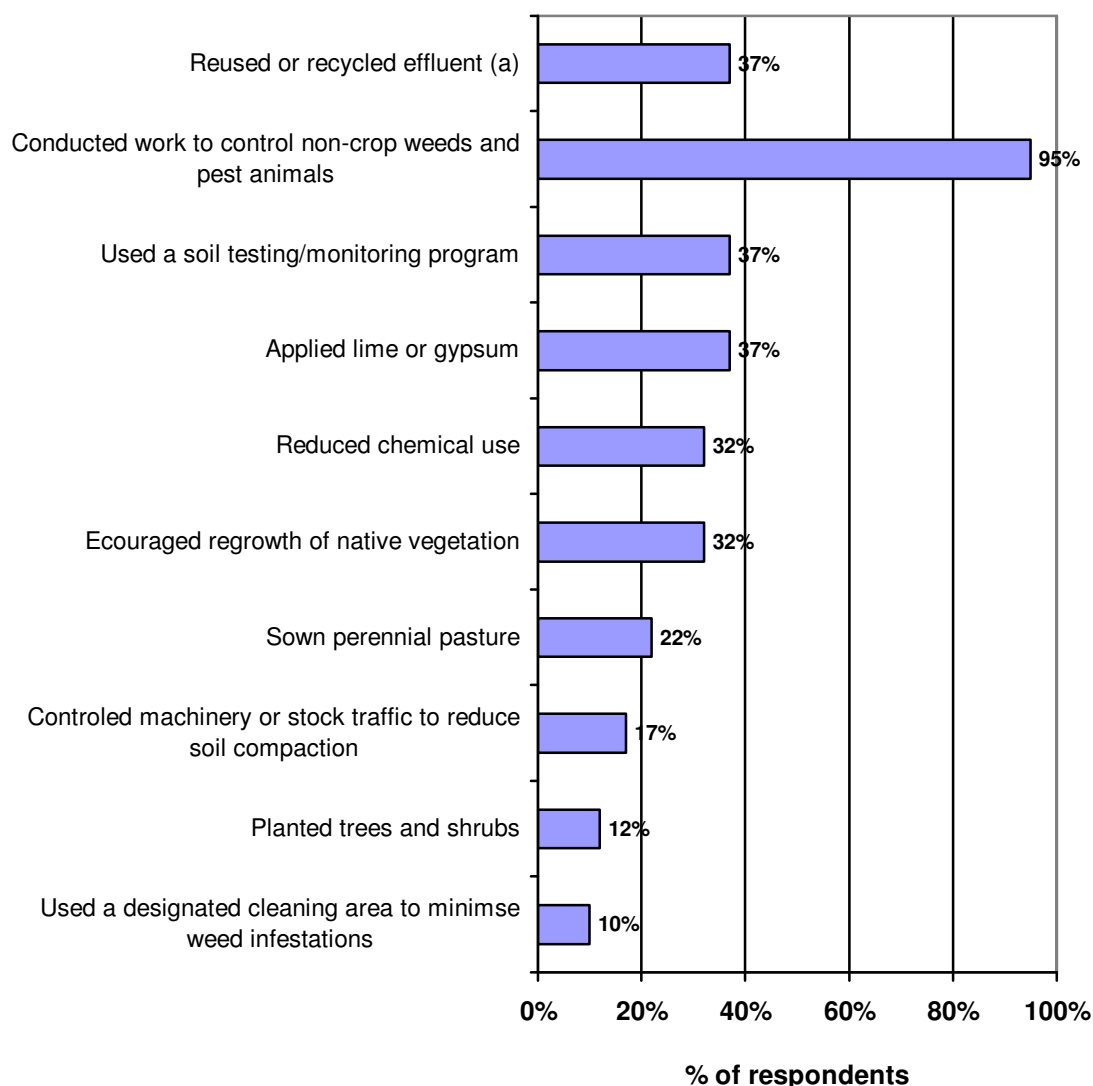
(a) = only respondents with irrigated enterprises on their property

Dairying or intensive livestock CRP

Slightly over one third of respondents with dairy or intensive livestock had adopted the CRP reused or recycled effluent. The uptake of other CRP for these respondents was similar to that of all respondents [Figure 22].

There were no significant differences in the uptake of dairying or intensive livestock CRP based on either occupation or survey sub-region.

FIGURE 22 – ADOPTION OF CURRENT RECOMMENDED PRACTICES FOR LANDHOLDERS WITH DAIRYING OR INTENSIVE LIVESTOCK ENTERPRISES



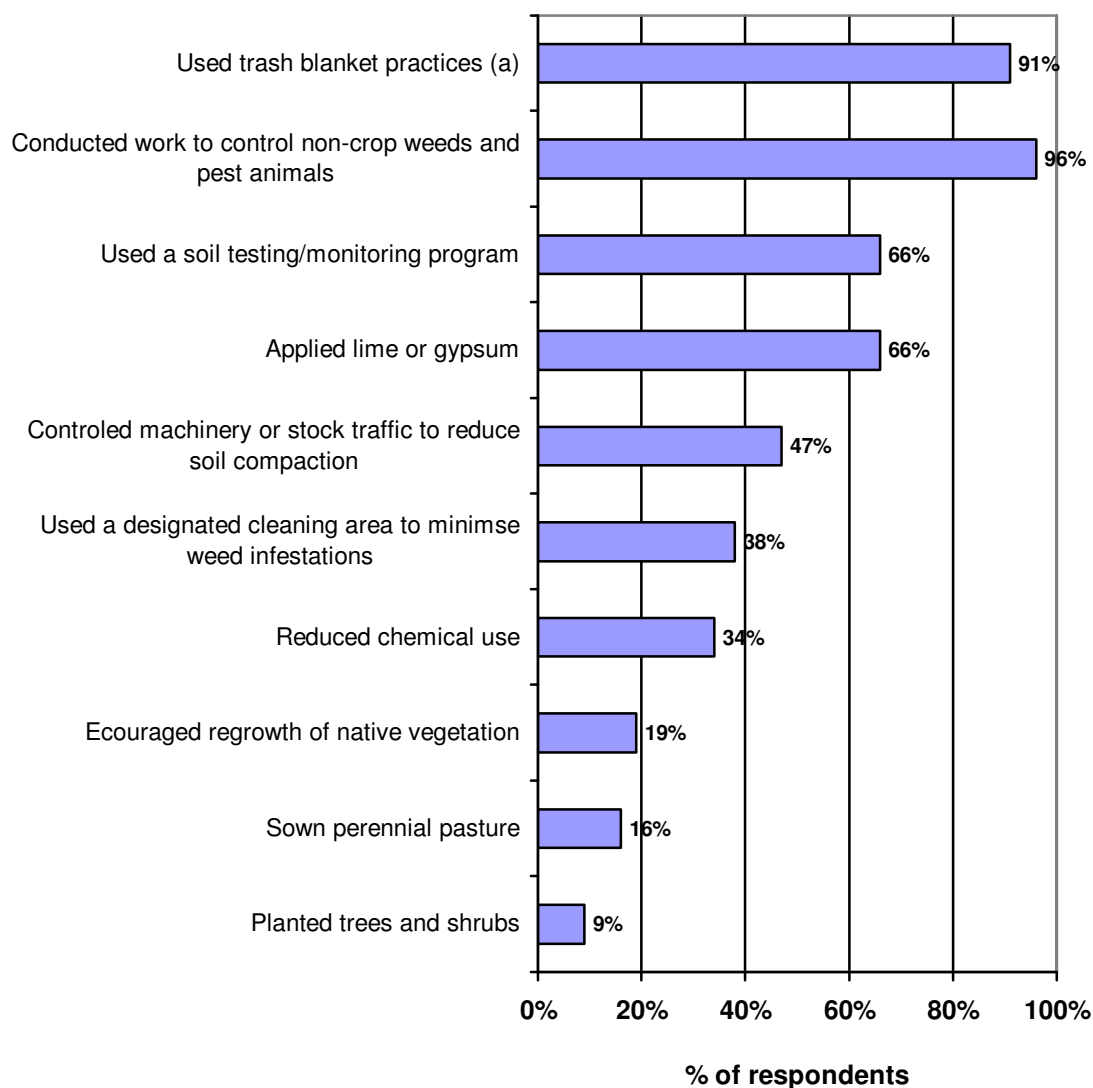
(a) = only respondents with dairying or intensive livestock enterprises on their property

Sugar cane CRP

Almost all respondents with sugar cane on their property adopted the CRP used trash blanket practices. On average respondents with sugar cane adopted trash blanked practices on 67 ha and a total of almost 2100 ha or 81% of the total area of properties survey under sugar cane. Respondents with sugar cane were also more likely to have adopted the CRP used a soil testing/monitoring program, applied lime or gypsum, controlled machinery or stock traffic to reduce soil compaction and used a designated cleaning area to minimise weed infestations [Figure 23].

There were no significant differences in the uptake of sugar cane CRP based on either occupation or survey sub-region.

FIGURE 23 – ADOPTION OF CURRENT RECOMMENDED PRACTICES FOR LANDHOLDERS WITH SUGAR CANE ENTERPRISES



Factors linked to the adoption of CRP

A series of analyses using binary logistic regression were used to explore the major factors that could best explain the difference between those who adopted each of the CRP and the non-adopters.

Guide to interpreting results from binary logistic regression

Example of results:

Using binary logistic regression, adoption of the CRP was significantly linked to respondents who:

- *said that there not being many other people undertaking a practice in the district was an important constraint to changing management practices on their property (Wald=7.674, $p=0.006$, $Exp(B)=1.597$);*
- *reported an on-property profit (Wald=3.893, $p=0.048$, $Exp(B)=1.943$); and*

- were involved or more highly involved in local action planning (Wald=9.734, $p=0.002$, $\text{Exp}(B)=1.778$).

These variables explained approximately 18% of the variation in adoption of the CRP expenditure on pest plans and animal control (Nagelkerke pseudo $R^2=0.183$).

1. Wald (or the Wald statistic) represents the strength of the relationship between two variables with higher values indicating a stronger relationship. That is, the variable that is most strongly linked to adoption of the particular CRP is the one with the highest Wald statistic.
2. p (or the probability) represents the probability that the observed relationship occurred purely by chance. For example, a p value of 0.001 indicates that the observed relationship has a one in a thousand chance of occurring purely by chance. Typically a p value of below 0.050 (or a 95% confidence interval) is used to indicate a significant relationship. That is, there is less than a five percent chance that the observed relationship occurred purely by chance.
3. $\text{Exp}(B)$ (or the odds ratio) represents the odds of a one unit change in the binary variable (in this instance non-adoption to adoption) given a one unit increase in the other variable. For example in the case of on-property profitability above, the odds of adoption of the CRP were 1.943 times higher for respondents who reported an on-property profit (that is the odds of adoption increased by 94.3%). Where the other variable has more than two levels the odds ratio reflects the likelihood of adoption versus non-adoption for each unit change on the other variable. For example respondents who reported little involvement in local action planning were 1.778 times more likely to report adoption than those not involved. In turn, the odds of those who reported some involvement adopting were 1.778^2 or 3.161 times higher than those who reported little involvement and so on.
4. The Nagelkerke pseudo R^2 value is an approximation of combined explanatory power of all the individual variables in the model to the adoption of a CRP. In the example above the three variables account for approximately 18% of the difference between respondents who adopted the CRP and those that did not.

Non-specific CRP

Applied lime or gypsum

Using binary logistic regression, adoption of the CRP applied lime or gypsum was significantly linked to respondents who:

- said that the extent a new practice is likely to address environmental issues was an important constraint to changing management practices on their property (Wald=4.460, $p=0.035$, $\text{Exp}(B)=1.341$);
- said farming was their primary occupation (Wald=6.787, $p=0.009$, $\text{Exp}(B)=1.276$); and
- were involved or more advanced in preparing a written property plan (Wald=8.007, $p=0.005$, $\text{Exp}(B)=2.210$).

These variables explained approximately 12% of the variation in adoption of the CRP applied lime or gypsum (Nagelkerke pseudo $R^2=0.123$).

Reduced chemical use

Using binary logistic regression, adoption of the CRP reduced chemical use by applying integrated pest management, GPS technology or other pest reduction strategies was significantly linked to respondents who:

- said their property was important as it provided them with an opportunity to manage a business and develop business management skills (Wald=6.090, $p=0.014$, $\text{Exp(B)}=1.541$);
- had higher knowledge about the processes leading to herbicide resistance (Wald=9.020, $p=0.003$, $\text{Exp(B)}=1.936$);
- were older in age (Wald=12.698, $p<0.001$, $\text{Exp(B)}=1.076$);
- had employed a consultant to provide advice on property management in the past year (Wald=4.921, $p=0.027$, $\text{Exp(B)}=2.797$);
- were involved or more advanced in preparing a written property plan (Wald=9.345, $p=0.002$, $\text{Exp(B)}=1.558$).

These variables explained approximately 42% of the variation in adoption of the CRP reduced chemical use by applying integrated pest management, GPS technology or other pest reduction strategies (Nagelkerke pseudo $R^2=0.415$).

Used a designated cleaning area to minimise weed infestations

Using binary logistic regression, adoption of the CRP used a designated cleaning area to minimise weed infestations was significantly linked to respondents who:

- said it is difficult to obtain reliable expert advice or assistance for natural resource management (Wald=5.143, $p=0.023$, $\text{Exp(B)}=1.525$); and
- had completed a short course related to property management in the past five years (Wald=4.589, $p=0.032$, $\text{Exp(B)}=2.203$).

These variables explained approximately 8% of the variation in adoption of the CRP used a designated cleaning area to minimise weed infestations (Nagelkerke pseudo $R^2=0.415$).

Controlled machinery or stock traffic to reduce soil compaction

Using binary logistic regression, adoption of the CRP controlled machinery or stock traffic was significantly linked to respondents who:

- said reduced advice or information from government to help manage their property was an important issue (Wald=3.989, $p=0.046$, $\text{Exp(B)}=1.320$);
- said their long-term plans were likely to include diversifying production (Wald=10.122, $p=0.001$, $\text{Exp(B)}=1.561$); and
- were involved or more advanced in preparing a written property plan (Wald=6.575, $p=0.010$, $\text{Exp(B)}=1.318$).

These variables accounted for almost 19% of the variation in the adoption of the CRP controlled machinery or stock traffic (Nagelkerke pseudo $R^2=0.193$).

Encouraged regrowth of native vegetation

Using binary logistic regression, adoption of the CRP encouraged regrowth of native vegetations was significantly linked to respondents who:

- said providing habitat for native birds and animals was an important value of their property (Wald=5.006, $p=0.025$, $\text{Exp}(B)=1.552$);
- said the time and expense of watering stock off-stream or off-wetlands was justified by improvements in bank stability, water quality and stock condition (Wald=5.225, $p=0.022$, $\text{Exp}(B)=1.695$);
- said that clearing had substantially reduced the existence and diversity of native plants and animals in the district (Wald=11.746, $p=0.001$, $\text{Exp}(B)=2.093$); and
- were involved or more highly involve in local action planning (Wald=15.518, $p<0.001$, $\text{Exp}(B)=2.899$).

These four variables accounted for just under 48% of the variation in adoption of the CRP encouraged regrowth of native vegetation (Nagelkerke pseudo $R^2=0.477$).

Sown perennial pasture

Using binary logistic regression, adoption of the CRP sown perennial pasture was significantly linked to respondents who:

- said their long-term plans were likely to include increasing the land they managed (Wald=5.051, $p=0.025$, $\text{Exp}(B)=1.377$);
- were involve or further advanced in succession planning (Wald=7.441, $p=0.006$, $\text{Exp}(B)=1.538$); and
- had higher knowledge about the processes leading to soil acidification (Wald=7.039, $p=0.008$, $\text{Exp}(B)=1.704$).

These three factors accounted for 21% of the variation in adoption of the CRP sown perennial pasture (Nagelkerke pseudo $R^2=0.210$).

Planted trees and shrubs

Using binary logistic regression, adoption of the CRP planted trees and shrubs was significantly linked to respondents who:

- said that clearing had substantially reduced the existence and diversity of native plants and animals in the district (Wald=5.437, $p=0.020$, $\text{Exp}(B)=2.171$);
- were a member of a Landcare group (Wald=6.846, $p=0.009$, $\text{Exp}(B)=9.216$); and
- said farming **was not** their primary occupation (Wald=5.822, $p=0.016$, $\text{Exp}(B)=0.016$).

These three variables accounted for approximately 38% of the variation in adoption of the CRP planted trees and shrubs (Nagelkerke pseudo $R^2=0.380$).

Conducted work to control non-crop weeds and pest animals

There was only one variable included in the survey that was significantly linked to adoption of the CRP conducted work to control non-crop weeds and pest animals. Respondents who said that their property was important as it provided a sound long-term economic investment

were significantly more likely to have adopted this CRP (Wald=7.865, $p=0.005$, $\text{Exp}(B)=1.704$).

This single variable accounted for just over 8% of the variation in the adoption of the CRP conducted work to control weeds and pest animals (Nagelkerke pseudo $R^2=0.084$).

Cropping CRP

Varied rotation according to soil test results

Results from binary logistic regression indicated that the adoption of the CRP cropped using a rotation varied according to soil tests was significantly linked to respondents who:

- said that their property or shire **had not** been drought declared over the past 12 months (Wald=4.544, $p=0.033$, $\text{Exp}(B)=0.153$);
- said that reduced employment opportunities **were not** an important issue in their district (Wald=7.098, $p=0.008$, $\text{Exp}(B)=0.167$); and
- said availability of labour was an important constraint in their decision making about changing management practices (Wald=6.735, $p=0.009$, $\text{Exp}(B)=4.483$).

These three factors explained approximately 59% of the variation in the adoption of the CRP cropped using a rotation varied according to soil test results (Nagelkerke pseudo $R^2=0.591$).

Used a rotation with spell pasture

Using binary logistic regression the only factor that was significantly linked to the adoption of the CRP cropped using a rotation with spell pasture was respondents who said that the extent there was commitment or support from family or partner(s) was an important constraint in their decision about changing management practices (Wald=3.885, $p=0.049$, $\text{Exp}(B)=3.385$). This variable accounted for approximately 17% of the variation in adoption of this CRP (Nagelkerke pseudo $R^2=0.172$).

Used minimum tillage

Using binary logistic regression, adoption of minimum tillage was significantly linked to respondents who:

- said the time and expense of controlling regrowth was an important issue on their property (Wald=6.042, $p=0.014$, $\text{Exp}(B)=5.071$);
- said property sub-division undermining the viability of agriculture was an important issue in their district (Wald=3.937, $p=0.047$, $\text{Exp}(B)=2.795$); and
- had used the services of a government advisor in the past year (Wald=5.178, $p=0.023$, $\text{Exp}(B)=8.684$).

These variables explained approximately 62% of the variation between respondents (involved in cropping) who had and had not adopted minimum tillage practices (Nagelkerke pseudo $R^2=0.621$).

Stock CRP

Used spell or rotational grazing

Binary logistic regression showed that adoption of the CRP used spell or rotational grazing was significantly linked to respondents who:

- said they had higher knowledge about the benefits of spell pasture and crop rotation in maintaining soil health and productivity (Wald=16.766, $p<0.001$, Exp(B)=4.906); and
- said farming was not their primary occupation (Wald=5.931, $p=0.015$, Exp(B)=0.277).

These variables accounted for just under 23% of variation in the adoption of the CRP used time controlled or spell grazing (Nagelkerke pseudo $R^2=0.225$).

Fenced waterways to control stock access

Using binary logistic regression, adoption of the CRP fenced waterways to control was significantly linked to respondents who:

- said the time and expense involved in watering stock off-stream or off-wetlands was justified by improvements in bank stability, water quality and stock condition (Wald=9.963, $p=0.002$, Exp(B)=3.956);
- **did not agree** that grasses could stabilise river banks as well as trees (Wald=4.320, $p=0.038$, Exp(B)=0.250);
- said that suitability of soils **was not** an important constraint in their decision making about changing management practices (Wald=9.036, $p=0.003$, Exp(B)=0.248);
- had used a consultant to provide advice on the management of their property in the past 12 months (Wald=6.139, $p=0.013$, Exp(B)=6.196); and
- were involved or further advanced in property planning (Wald=7.516, $p=0.006$, Exp(B)=1.678).

These variables accounted for approximately 53% of the variation in adoption of the CRP fenced waterways to control stock access (Nagelkerke pseudo $R^2=0.526$).

Fenced native bush to control stock access

Using binary logistic regression, adoption of the CRP fenced native bush to control was significantly linked to respondents who:

- said fencing to manage stock access was an essential part of the work required to stabilise waterways (Wald=4.015, $p=0.045$, Exp(B)=6.104);
- had higher knowledge about the processes leading to soil acidification in the district (Wald=8.653, $p=0.003$, Exp(B)=4.583);
- were a member of a Landcare group (Wald=5.971, $p=0.015$, Exp(B)=8.045); and
- said farming was not their primary occupation (Wald=8.573, $p=0.003$, Exp(B)=0.076).

These variables accounted for approximately 50% of the variation in adoption of the CRP fenced native bush to control stock access (Nagelkerke pseudo $R^2=0.503$).

Irrigation, dairying and intensive livestock, and sugar cane CRP

Analyses exploring the differences between respondents who had and had not adopted CRP become unreliable when there are only a small number of individuals in each group. Due to the small number of respondents involved in these land uses or enterprises and the even smaller number of respondents adopting the relevant CRP it was not possible to explore the factors linked to the adoption of irrigation, dairying and intensive livestock, and sugar cane CRP. Attempts to understand the reason for adoption or non-adoption of these practices would need to be based on a more targeted survey of individuals involved in the enterprises.

Discussion of major factors influencing adoption of CRP

It is clear from the analysis that the adoption of CRP is complex and strategies to enhance adoption need to balance a wide range of issues.

Respondents who said farming was not their primary occupation was one of the factors most commonly linked to the adoption of CRP included in the survey. Respondents who said farming was not their primary occupation were significantly more likely to have adopted the planted trees and shrubs, used spell or rotational grazing, and fenced native bush to control stock access. In contrast, farmers were significantly more likely to have adopted the CRP applied lime or gypsum. As outlined in Appendix 2 farmers and non-farmers had very different views on the key issues affecting the region and the value of their property. In particular non-farmers tended to have a much narrow focus on the aesthetic and environmental aspects of their property. While many farmers also valued these aspects they also valued the ability to maintain a viable business and generate income from their property.

These findings suggest that when evaluating a practice farmers have a wider range of impacts and needs to consider and if a practice is not considered to provide a viable business option the chances of that practice being adopted will decrease. This is likely to be particularly relevant for practices aimed primarily at biodiversity conservation. Demonstration sites and trial areas are likely to help highlight the viability of these practices. Drawing on the local knowledge and experience of people adopting these practices will also provide important insights into the practicalities of implementing or modifying practices and how they can improve the viability of agriculture. Where practices are largely aimed at biodiversity conservation it is important to identify any potential productivity gains or at the very least strategies that can be used to mitigate short-term loss in productive capacity. Indeed, as reported earlier, many respondents appear reluctant to forego productive capacity to achieve improved natural resource outcomes.

Respondents who reported their property was important in providing an opportunity to manage a business were significantly more likely to adopt the CRP reduced chemical use and respondents who said that their property was important in providing a sound long-term economic investment were more likely to have adopted the CRP conducted work to controls weeds and pest animals. These findings highlight a greater confidence in the viability of these pest management practices.

Involvement in property planning was also one of the most common factors that differentiated between respondents who had adopted CRP and those that had not. Involvement in the development of a written property plan was linked to higher adoption of the CRP applied lime or gypsum, reduced chemical use, controlled machinery or stock traffic to reduce soil compaction, and fenced waterways to control stock access. Involvement in local action planning was also linked to higher adoption of the CRP encouraged regrowth of native vegetation and respondents who were involved in succession planning were significantly more likely to have adopted the CRP sown perennial pasture. Given the relatively low proportion of respondents involved in property planning activities these findings highlight

considerable potential for greater involvement in property planning to help achieve improved uptake of CRP. These findings suggest that additional research exploring the reasons for limited involvement in property planning would be useful.

Landcare membership was linked to higher adoption of the CRP planted trees and shrubs and fenced waterways to control stock access. Part of the explanation for these links appears to be that members of a Landcare group were significantly more likely to have received government funding for on-ground works on their property ($\chi^2 = 27.977$, $df = 1$, $p < 0.001$). Indeed, nearly two thirds of respondents indicated that landholders should be paid for providing environmental services that benefit the wider community. However, most respondents had not had any government funded work on their property. Access to government funding can clearly help facilitate higher adoption of CRP however careful consideration needs to be paid to ensuring any application process is as streamlined as possible. When asked how they would like to be involved in funding arrangements to support improved natural resource management the most popular alternatives were rate reductions (63% interested) and tax rebates (53% interested).

Another important factor explaining the link between Landcare membership and adoption appears to be the access and links these groups provide between landholders and the knowledge they can draw upon. Analyses exploring landholder adoption found that access to information and advice played an important role in the adoption of a number of CRP. Respondents who have used a consultant to provide advice on the management of their property were significantly more likely to have adopted the CRP reduced chemical use through the application of integrated pest management, GPS or other strategies, and fenced waterways to control stock access. Furthermore, respondents who had used the services of a government advisor were also significantly more likely to have adopted the CRP cropped using minimum tillage practices. Access to advice and information is likely to be particularly important for CRP that will require considerable knowledge and skills to implement and manage effectively.

The level of confidence regarding the efficacy or need for a practice was an important factor linked to adoption. Respondents who said that the time and expense in watering stock off-stream was justified by improvement in water quality, bank stability and stock condition were more likely to have adopted the CRP fenced waterways to encourage regrowth and encouraged regrowth of native vegetation. Again these findings suggested that establishing local demonstration sites and field days that highlight the efficacy and impact of CRP are likely to help promote adoption. Providing a network or contact point with other landholders who have had success implementing new practices may also help facilitate adoption.

The common perceptions that property size and on-property profitability were important constraints to adoption were not supported by this research. Although, it is important to note that most respondents highlighted that cash flow was an important influence on their decision making about changing management practices. The assumption that the increasing age of rural landholders represents an important barrier to the adoption of CRP was also not supported. In fact, the only link between age and adoption saw older respondents being significantly more likely to adopt the CRP reduced chemical use.

Confidence in current recommended practices

Respondents were asked to provide information about their level of confidence in fencing waterways to allow controlled grazing, cropping using stubble retention, drip irrigation, low pressure overhead and solid set irrigation, and trash blanket. This information was gathered using six statements. For each statement respondents were asked to indicate their level of agreement from the following options: 'strongly agree', 'agree', 'not sure', 'disagree' and 'strongly disagree'. To simplify presentation these categories have been collapsed into three groups: 'agree' (strongly agree/agree), 'not sure' and 'disagree' (strongly disagree/disagree). Only respondents with the appropriate enterprises were included in these analyses.

The majority of survey respondents acknowledged that fencing was an important part of the work required to revegetate stabilise waterways and eroded gullies (60% agreed) and 44% agreed that the time and expense of watering stock off stream was justified by improvement in bank stability, water quality, and stock condition. At the same time, there was some concern about the efficacy of fencing waterways with 52% of respondents reporting that fencing these areas makes them more difficult to manage [Figure 24].

There was a little more uncertainty regarding the efficacy of stubble retention with just under half of all respondents reporting that the costs and difficulties associated with this practice **did not** outweigh the benefits (30% agreed and 27% uncertain) [Figure 24].

Almost three quarters of respondents with irrigated enterprises agreed that drip irrigation, low pressure overhead and solid set irrigation systems were not suitable for all plant/crops or with all soil types. Only 9% of respondents disagreed with this statement [Figure 24].

Just under two thirds of respondents did not think that higher soil temperature and impacts on ratooning outweighed the benefits of trash blanketing in cane harvesting [Figure 24].

Survey data highlighted that respondents who said farming was their primary occupation were less confident about the efficacy of CRP relating to fencing to manage stock access and stubble retention [Appendix 2].

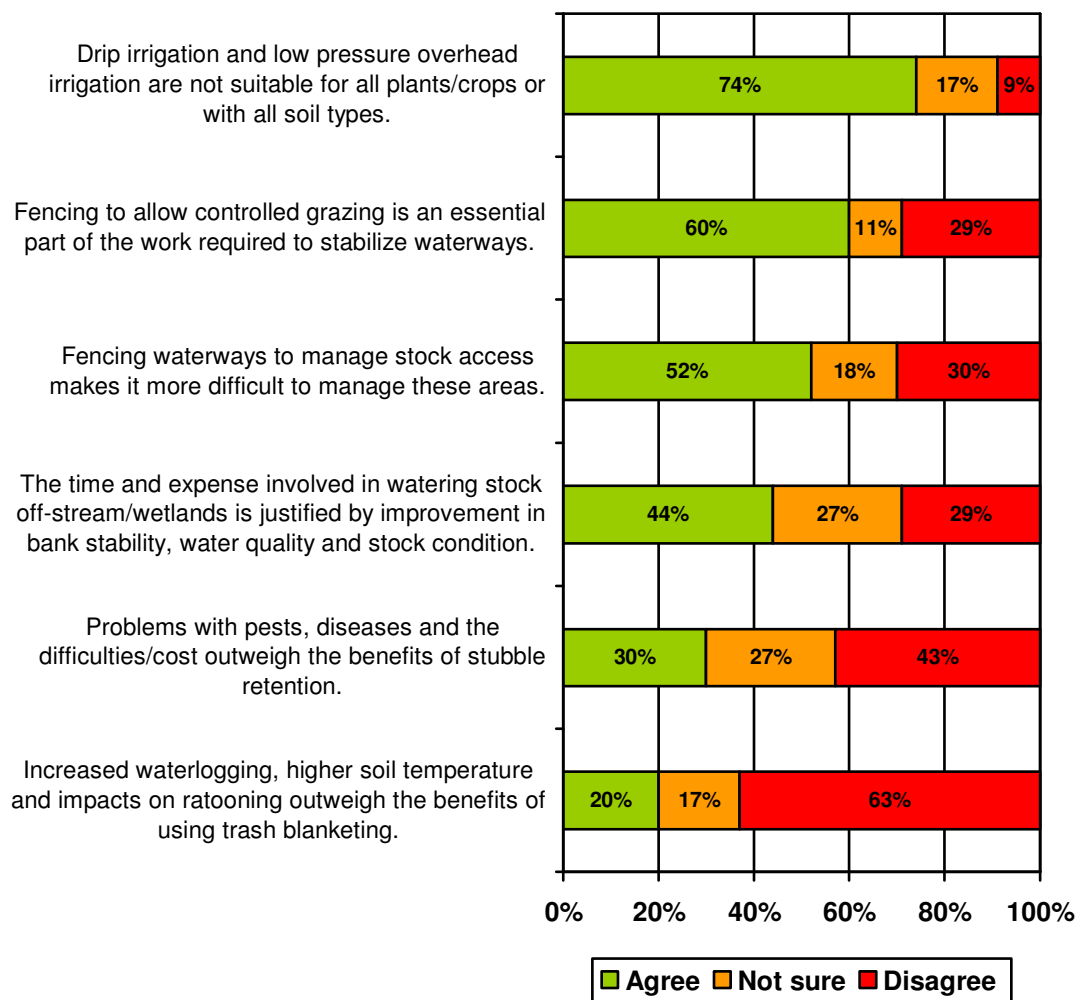
There was also a significant difference in the proportion of respondents across survey sub-regions who agreed that the time and expense of watering stock off-stream was justified by the benefits, ranging from 57% in the Mary to 37% in Kolan.

Part of the logic in attempting to engage landholders in new land management practices has been that those who trial these practices will have a positive experience and therefore promote or advocate these practices within their local district. To test this assumption analyses were conducted to compare the levels of confidence in CRP between those who adopted these practices and those who had not. With the exception of confidence in the ability to use drip, solid set or low pressure overhead irrigation for all crops or on all soil types, these analyses confirmed that individuals who had adopted CRP were more confident that the benefits of these practices outweighed any costs. With only three respondents not adopting trash blanketing practices it was not possible to conduct these analyses for this practice.

- Respondents who had fenced waterways to control stock access were significantly less likely to indicate that fencing made it difficult to manage these areas (34% of those who adopted compared to 61% of non-adopters ($\chi^2=10.610$, $df=2$, $p=0.005$)).

- Respondents who had fenced waterways to control stock access were significantly more likely to indicate fencing was essential to stabilise waterways (60% of those who adopted compared to 39% of non-adopters ($\chi^2=7.056$, $df=2$, $p=0.029$)).
- Respondents who had fenced waterways to control stock access were significantly more likely to indicate that benefits in terms of improved water quality, bank stability and stock condition outweighed the time and expenses involved (82% of those who adopted compared to 51% of non-adopters ($\chi^2=14.720$, $df=2$, $p=0.001$)).
- Respondents who had adopted minimum tillage practices were significantly less likely to indicate that the difficulties and costs outweigh the benefits of stubble retention (14% of those who adopted compared to 41% of non-adopters ($\chi^2=8.770$, $df=2$, $p=0.012$)).
- There was no significant difference between those who had used drip, solid set or low pressure overhead irrigation and those who had not in terms of respondents confidence that this practice could be used for all plant/crops and in all soil conditions (79% of those who adopted compared to 72% of non-adopters ($\chi^2=1.998$, $df=2$, $p=0.368$)).

FIGURE 24 – CONFIDENCE IN CURRENT RECOMMENDED PRACTICES



Other social and demographic variables

Time lived in the local district

The average time respondents had lived in their local district was 28 years. Approximately 25% of respondents had lived in the area for less than 10 years.

Time lived on current property

Respondents to the mail survey also indicated that they had lived for an average of 20 years on their current property.

Completion of a short course related to property management

Thirty percent of respondents to the mail survey said they had completed a short course related to property management in the past five years.

Employment of a consultant to provide advice on property management

Twenty-two percent of respondents said that they had employed a consultant to provide advice on some aspect of property management in the past 12 months.

Use of rural counselling services

A small minority (5%) of respondents had used the services of a rural counsellor in the past 12 months.

Number of family members supported by property

On average, respondents to the survey indicated that income from their property contributed to supporting two family members.

Number of individuals employed on property

Twenty-one percent of respondents said that they had employed at least one person continuously (either part-time or full-time) for a period of at least 3 months to work on-property in the past 12 months. The average number of persons employed per respondent was 1.1 or a total of 397 persons.

Conclusions/implications

This research has highlighted a number of important challenges and strategies for efforts to improve the management of natural resources on private property in the Burnett Mary region. The information contained within this report also provides critical baseline information and presents an opportunity to track changes over time to monitor and evaluate natural resource management activities across the region. The full potential of this research will only be realised if there is a follow up survey in three to five years time.

Survey findings highlighted that many of the priority issues identified in the draft natural resource management plan for the Burnett Mary region are not considered amongst the most pressing issues facing rural communities. Three of the top five issues identified by landholders related to social issues including the availability of important services, lack of long-term opportunities for young people and reduced employment opportunities. While some production and environmental issues such as the impact of pest plants and animals and decline in soil health were considered important by many respondents, others such as dryland salinity, soil acidity, decline of native vegetation, deteriorating water quality and lack of awareness about Aboriginal cultural heritage sites were not rated as important issues by most landholders.

Despite many natural resource management issues not being highly rated, almost all respondents appear to have a land stewardship ethic. Being able to pass the property on in better condition was one of the most common values attached to respondents' properties and most landholders also said that contributing to the environmental health of the district was important. While landholders attributed a very wide range of values to their property, three of the top four rated values referred to the lifestyle benefits of living and working on a rural property.

Forty-two percent of respondents to the mail survey said that farming was their primary occupation. The 58% of respondents who said that farming was not their primary occupation managed only 12% percent of the total area surveyed. Survey findings highlighted that a small proportion of large landholders manage the vast majority of land in the Burnett Mary. Only 10% of respondents managed a property larger than 1,000 ha yet these respondents managed over 77% of the area surveyed.

Over two-thirds all survey respondents and 40% of farmers said they did not return a pre-tax profit for the 2003/2004 financial year. Only 11% of all respondents reported an on-property profit that exceeded the \$50,000 threshold considered necessary to sustain a household and fund investment in a farm's natural and capital resources. Findings from the survey also suggested that respondents were relying more heavily on off-property income than they would ideally like and would prefer to have more of their total household income from on-property sources. Over two thirds of respondents reported an off-property profit and total off-property income exceeded total on-property income for 2003/2004.

Analyses exploring the adoption of CRP highlighted that one of the most common factors linked to adoption of CRP included in the mail survey was whether respondents said their primary occupation was farming or not. Respondents who said farming was not their primary occupation were significantly more likely to have adopted three of the CRP included in the survey and less likely to have adopted one CRP. Analyses exploring the difference between farmer and non-farmers highlighted that farmers attached a wider range of values to their property and thus new practices may have to meet a wider set of criteria to be considered

viable for these respondents. This is likely to be particularly relevant for practices aimed primarily at biodiversity conservation.

Where productivity benefits of practices can be demonstrated along with environmental and/or social benefits, the chances of adoption are likely to be greatly increased. Where practices are aimed primarily at biodiversity conservation it is important to highlight any potential production benefits or at least strategies that can be used to minimise any loss to productive capacity. Indeed, most respondents indicated that they did not think improvements in environmental conditions could justify a short-term loss in productive capacity.

It appears that attempts to engage landholders in natural resource management activities that focus almost exclusively on the priority issues in the draft natural resource management plan are unlikely to interest many landholders. Even though most landholders appear to strongly value the environmental health of their property, these issues only represent one dimension of the breadth of issues affecting land managers. To the extent that natural resource management activities can deliver benefits across a range of environmental, social and economic issues, the chances for uptake will be greatly increased. In particular, any benefits to the wider community, lifestyle of the landholder, and productivity need to be considered and communicated.

The mail survey included a range of questions that asked respondents to assess their knowledge about a range of natural resource management topics. Responses to these questions highlighted moderate to high knowledge of issues such as the benefits of spell pasture and crop rotation maintaining soil health and productivity, the benefits of ground cover in improving soil health, the ability of vegetation around waterways to improve water quality, and the effects of uncontrolled stock access on native. In contrast, respondents reported limited knowledge across topics including those about salinity, soil acidity, and groundwater resources. The relatively low level of knowledge across these issues is likely to reflect the finding that most landholders did not consider these important issues in their region or on their property.

Increased investment in targeted education and awareness raising activities may help increase knowledge about natural resource management. These activities should aim to provide more convincing evidence of the current and potential risk of these issues and the need to undertake mitigating action before a crisis point is reached. Demonstration sites and trial areas are one option that may help highlight the viability of CRP on a local scale. Attempts should also be made to draw on the local knowledge and experiences of landholders who have adopted these practices to provide feedback on the practicalities of implementing or modifying CRP and the viability of these practices. The potential of these approaches to help facilitate adoption was confirmed by findings that those who had trailed CRP were more confident about the efficacy of those practices and that greater confidence in the efficacy of a number of CRP was linked to adoption.

Analysis exploring landholder adoption of recommended practice also suggested that access to advice and support networks were important factors in the adoption of numerous CRP. Respondents who had used consultants or government advisors were more likely to have adopted CRP. Access to advice and support appears to be particularly important for practices that deal with new technologies and equipment.

Very few respondents were involved with Landcare or any other best management or benchmark group. However, Landcare members were significantly more likely to adopt several CRP oriented towards biodiversity conservation. In part this is likely to reflect the presence of a peer support network and ability to draw down resources. However, landholders are also becoming increasingly aware that they are being asked to implement on-

property works that have wider community benefits. Almost two thirds of respondents said they thought landholders should be paid for providing environmental services that have wider community benefits, and Landcare members were significantly more likely to have received government funding for on-ground works.

While access to government funding has the potential to help facilitate adoption of CRP careful consideration needs to be given to the mechanisms used to deliver funds for on-ground works. Only a very small proportion of landholders in the Burnett Mary region had received government funding for work on their property. When asked how they would like to be involved in government programs to improve the management of natural resources, the two highest rated options were rate reductions and tax rebates. It is important to note however, that there was no single option that appeared likely to engage the vast majority of respondents, highlighting the need for a variety of policy options and approaches. Whatever approaches are used the extent that any application process is kept simple and streamlined is likely to be a key factor in the success of those arrangements.

The median age of landholders in the Burnett Mary was 54 years. The common perception that older age represents an important barrier to the adoption of CRP was not supported in this research. In fact, the only relationship between age and adoption suggested that older respondents were more likely to have reduced chemical use through the application of integrated pest management, GPS or other strategies. However when asked about the factors impacting their ability to change, over half of all respondents said stage of life was an important constraint. This apparent discrepancy raises an important distinction between age and stage of life. Indeed, landholders in the 20-30 year age group were those most likely to indicate that stage of life was an important constraint. Respondents in the 20-30 year age group are those most likely to be in the prime family forming stage, may have high debt and limited savings and thus be more risk averse and cautious in making management changes.

Survey findings highlighted just over a third of respondents were involved in or had a completed property plan. Nevertheless, over half of all respondents had no involvement in property planning. Property planning was one of the most important factors linked to the adoption of CRP included in this survey. Ongoing promotion and greater support for landholders to implement plans appears to be an important factor in facilitating the uptake of improved management practices in the Burnett Mary region.

Overall findings from this research highlighted promising levels of adoption of CRP across the Burnett Mary region. In particular weed and pest control, the use of trash blanketing in cane harvesting, spell and rotational grazing and minimum tillage practices were quite widely adopted. It appears that one of the key challenges for efforts to improve natural resource management in the Burnett Mary is the need to develop and implement strategies able to meet the diverse drivers and values of landholders across the region.

APPENDIX 1 – DATA ANALYSIS

Statistical analysis included in this report consists of descriptive statistics, Spearman rank order correlations, Gamma correlations, non-parametric chi-square tests, binary logistic regression, alpha estimation, and the sign test. All statistical analyses used the SPSS software package.

Spearman rank order correlations were used to identify hypothesised relationships between variables. For example, higher on-property profitability was hypothesised as being linked to larger property size. Spearman rank order correlations place respondents on each variable from highest to lowest and determine the extent that there is a relationship between ranks on the two variables. For cases exploring the relationship between ordinal variables, Gamma correlations were used. A negative correlation coefficient or r_s indicates that a higher score on one variable is linked to a lower score on the other. The value of r_s can range from 1 to -1 with higher values (either negative or positive) indicating a stronger relationship.

Kruskal-Wallis chi-square tests were used to determine the presence of significant differences across continuous variables for two or more independent groups. For example, the Kruskal-Wallis chi-square was used to determine if there were any significant differences in property size between those adopting a CRP and non-adopters. The value of the chi-square statistic or χ^2 indicates the strength of the difference between groups on a given variable with a higher value indicating a larger difference. However, the χ^2 value does not indicate the direction of the relationship. The Pearson chi-square test was used to determine the presence of differences across ordinal or binomial data for two or more independent groups. For example, the Pearson chi-square test was used to determine if there were significant differences between Landcare members and non-Landcare members on the adoption of CRP.

The sign test was used to identify significant differences in the rating of a number of related variables. For example this test was used to compare the level of concern about the economic and environmental impacts of pest animals and plants. Higher Z values indicate a larger difference.

Binomial logistic regression was used to better determine the extent that a number of independent variables or factors identified by correlation or chi-square tests contributed to the presence or absence of a dependent variable, in this instance adoption of CRP. The Wald statistic provides a measure of the effect of each independent variable on the dependent variable, with higher scores indicating a greater effect. The Exp(B) or odds ratio represents the change in the odds of adoption given a unit increase in the independent variable. Odds ratios above one indicate a positive relationship, while scores below one represent a negative relationship or decreased likelihood of adoption.

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 there is more than a 95 per cent chance that an observed relationship or difference has not occurred purely by chance.

APPENDIX 2 – DIFFERENCES BETWEEN FARMERS AND NON-FARMERS

Survey question	Farmer	Non-farmer	Test
<i>Issues affecting property (% who said important/very important)</i>			
Uncertain/low returns from property	83%	44%	$\chi^2=56.742$, df=2, p<0.001
Reduced advice or information from government to help manage my property	42%	23%	$\chi^2=15.274$, df=2, p<0.001
Access to farm labour limiting management options on my property	28%	13%	$\chi^2=19.132$, df=2, p<0.001
Government policy and regulations limiting management options on my property	75%	61%	$\chi^2=8.186$, df=2, p=0.017
<i>Issues affecting local district (% who said important/very important)</i>			
Soil acidity	26%	42%	$\chi^2=10.000$, df=2, p=0.007
Altered river/stream flows threatening health of waterways	33%	54%	$\chi^2=14.657$, df=2, p=0.001
Dryland salinity	23%	36%	$\chi^2=13.032$, df=2, p=0.001
The availability of surface and ground water for agriculture	82%	69%	$\chi^2=9.863$, df=2, p=0.007
Inefficient use of water for agriculture	43%	55%	$\chi^2=12.479$, df=2, p=0.002
Nutrient, sediment and chemical loads affecting water quality	30%	61%	$\chi^2=38.045$, df=2, p<0.001
Controls on the management of privately owned or leased land	63%	50%	$\chi^2=8.357$, df=2, p=0.015
Decline of soil health	41%	53%	$\chi^2=7.104$, df=2, p=0.029
Decline of native vegetation	25%	48%	$\chi^2=27.773$, df=2, p<0.001
Lack of awareness about Aboriginal cultural heritage sites	7%	23%	$\chi^2=16.483$, df=2, p<0.001
<i>Values attached to property (% who said important/very important)</i>			
Being able to sell or pass the property on to others in improved condition	90%	79%	$\chi^2=9.914$, df=2, p=0.010
Provides most of our household income	84%	17%	$\chi^2=145.096$, df=2, p<0.001
Native vegetation on my property proved a habitat for native animals	39%	57%	$\chi^2=13.546$, df=2, p=0.001
A place for recreation	28%	59%	$\chi^2=41.258$, df=2, p<0.001
Sense of accomplishment from building/maintaining a viable business	85%	51%	$\chi^2=42.813$, df=2, p<0.001
Being part of a rural community	74%	55%	$\chi^2=16.491$, df=2, p<0.001
Work on the property is the only job I've ever done	64%	8%	$\chi^2=83.715$, df=2, p<0.001
Work on the property is a welcome break from my normal occupation	23%	59%	$\chi^2=48.306$, df=2, p<0.001
To preserve tradition as the property has been in the family for a long time	61%	25%	$\chi^2=32.457$, df=2, p<0.001
An asset that will fund my retirement	75%	63%	$\chi^2=6.762$, df=2, p=0.034
Provides the opportunity to manage a business and develop business skills	59%	30%	$\chi^2=37.872$, df=2, p<0.001

Survey question	Farmer	Non-farmer	Test
Values attached to property - Continued (% who said important/very important)			
Sense of accomplishment from producing food and fibre for others	79%	39%	$\chi^2=64.042$, df=2, p<0.001
Being able to build a business that employs other family members	65%	19%	$\chi^2=56.032$, df=2, p<0.001
Provides a sound long-term economic investment	82%	64%	$\chi^2=19.047$, df=2, p<0.001
The freedom of working for myself	91%	69%	$\chi^2=24.933$, df=2, p<0.001
Long term plans for property (% who said likely/highly likely)			
The property will be sold	29%	38%	$\chi^2=10.041$, df=2, p=0.007
Someone else in the family will make management decisions	36%	13%	$\chi^2=22.345$, df=2, p<0.001
Ownership of the property will stay within the family	68%	53%	$\chi^2=10.085$, df=2, p=0.006
Production on the property will be intensified	53%	28%	$\chi^2=24.870$, df=2, p<0.001
Production on the property will be diversified	42%	27%	$\chi^2=8.598$, df=2, p=0.014
I will increase the area of land I manage by purchasing leasing or share farming additional land	26%	16%	$\chi^2=6.237$, df=2, p=0.044
I will seek addition off-property work	26%	49%	$\chi^2=22.925$, df=2, p<0.001
Attitudes towards natural resource management (% who said agree/strongly agree)			
Landholders should be fully paid for providing environmental services that have wider benefits	72%	57%	$\chi^2=9.391$, df=2, p=0.025
Water allocations should not be permanently transferred from one river system to another	62%	56%	$\chi^2=7.025$, df=2, p=0.030
It is difficult to obtain reliable expert advice or assistance for natural resource management	55%	37%	$\chi^2=12.155$, df=2, p=0.002
I am confident in the accuracy of vegetation maps for this district	11%	19%	$\chi^2=22.067$, df=2, p<0.001
Diverting water flows could lead to problems for downstream landholders and the environment	73%	86%	$\chi^2=9.879$, df=2, p=0.007
Reduced production in the short-term can be justified by long-term improvements in resource conditions	45%	71%	$\chi^2=38.003$, df=2, p<0.001
Aboriginal communities and landholders should work together to manage culturally significant sites on private property	36%	53%	$\chi^2=13.377$, df=2, p=0.001
Clearing has substantially reduced the existence and diversity of native plants and animals in this district	36%	62%	$\chi^2=30.370$, df=2, p<0.001
Clearing regrowth plays an important part of maintaining a viable business	94%	72%	$\chi^2=31.108$, df=2, p<0.001
Confidence in CRP (% who said agree/strongly agree)			
Fencing to manage stock access is an essential part of work required to revegetate waterways	53%	76%	$\chi^2=40.529$, df=2, p<0.001
The time and expense involved in watering stock off-stream or off-wetlands is justified by improvement in bank stability, water quality and stock condition	37%	57%	$\chi^2=40.865$, df=2, p<0.001
Problems with seeding through stubble outweigh the benefits of stubble retention	27%	14%	$\chi^2=23.910$, df=2, p<0.001
Fencing waterways and eroded gullies makes it more difficult to manage these areas	63%	27%	$\chi^2=48.007$, df=2, p<0.001

Survey question	Farmer	Non-farmer	Test
<i>Knowledge about natural resource management (% who said sound/very sound knowledge)</i>			
Training available to update your business and financial management skills.	23%	14%	$\chi^2=12.425$, df=2, p=0.002
How to use results from soil tests to help manage your property.	46%	15%	$\chi^2=43.866$, df=2, p<0.001
How to recognise the signs of salinity.	53%	25%	$\chi^2=34.557$, df=2, p<0.001
The extent of water savings from water conservation techniques such as drip irrigation and irrigation scheduling.	44%	31%	$\chi^2=10.997$, df=2, p=0.004
The processes leading to salinity in your district.	37%	19%	$\chi^2=17.950$, df=2, p<0.001
Knowledge of the extent and quality of ground water resources in your district.	36%	11%	$\chi^2=43.404$, df=2, p<0.001
The processes leading to herbicide resistance in broad acre cropping situations.	27%	13%	$\chi^2=33.217$, df=2, p<0.001
The benefits of ground cover on grazing or cropping paddocks to maintain or improve soil health.	65%	34%	$\chi^2=42.408$, df=2, p<0.001
The processes leading to soil acidification in this district.	30%	10%	$\chi^2=38.527$, df=2, p<0.001
The ability of vegetation (including grass) around waterways to improve water quality.	58%	27%	$\chi^2=41.980$, df=2, p<0.001
The benefits of spell pastures and crop rotation in maintaining soil health and productivity.	75%	43%	$\chi^2=37.133$, df=2, p<0.001
The effects of uncontrolled stock access on native vegetation	52%	32%	$\chi^2=16.471$, df=2, p<0.001
<i>Constraints to changing management practices (% who said important/very important)</i>			
Extent new practice fits with work requirements of existing enterprises.	65%	39%	$\chi^2=27.065$, df=2, p<0.001
Extent new practice fits with your existing lifestyle.	65%	49%	$\chi^2=13.587$, df=2, p=0.001
Time involved before seeing returns from the new management practice.	72%	42%	$\chi^2=32.935$, df=2, p<0.001
Need to invest considerable time/effort to acquire new knowledge/skills.	64%	44%	$\chi^2=14.066$, df=2, p=0.001
Extent there is commitment or support from family or partner(s).	71%	51%	$\chi^2=17.922$, df=2, p<0.001
What others in the district see as good farming practices.	46%	28%	$\chi^2=11.958$, df=2, p=0.003
Available cash flow.	94%	61%	$\chi^2=52.933$, df=2, p<0.001
Needs a large investment of additional funds.	71%	49%	$\chi^2=16.954$, df=2, p<0.001
Availability of labour.	59%	29%	$\chi^2=31.285$, df=2, p<0.001
The extent that the new practice is likely to increase profitability.	80%	54%	$\chi^2=30.055$, df=2, p<0.001
The existence of long-term markets.	93%	56%	$\chi^2=56.874$, df=2, p<0.001
The need to reorganise the physical layout of your property.	67%	46%	$\chi^2=16.373$, df=2, p<0.001
Availability of surface or groundwater.	91%	80%	$\chi^2=8.789$, df=2, p=0.012
Access to on-going professional advice in the district.	75%	58%	$\chi^2=10.068$, df=2, p=0.007
Suitability of soils.	88%	73%	$\chi^2=12.880$, df=2, p=0.002
Extent that I am required to obtain relevant licences and permits.	73%	54%	$\chi^2=13.691$, df=2, p=0.001
Stage of life.	80%	59%	$\chi^2=16.515$, df=2, p<0.001

Survey question	Farmer	Non-farmer	Test
<i>Constraints to changing management practices - Continued (% who said important/very important)</i>			
Extent new practice will increase property value.	77%	63%	$\chi^2=8.609$, df=2, p=0.014
<i>Interest in arrangements for funding NRM (% interested)</i>			
Grant scheme administered by BMRGNRM or a government department	37%	18%	$\chi^2=19.084$, df=4, p<0.001
Tax rebates	64%	44%	$\chi^2=28.435$, df=4, p<0.001
<i>Sources of information about NRM (% who used each source)</i>			
Radio	51%	33%	$\chi^2=12.724$, df=1, p<0.001
Newspapers	77%	63%	$\chi^2=8.317$, df=1, p=0.004
Industry groups	38%	13%	$\chi^2=29.240$, df=1, p<0.001
Field days	46%	26%	$\chi^2=14.580$, df=1, p<0.001
Friends/relatives	27%	40%	$\chi^2=6.920$, df=1, p=0.009
BMRGNRM	12%	3%	$\chi^2=10.392$, df=1, p<0.001
Workshops/seminars	17%	6%	$\chi^2=10.754$, df=1, p<0.001
<i>Adoption of Current Recommended Practices (% who adopted)</i>			
Planted trees and shrubs	13%	30%	$\chi^2=14.410$, df=1, p<0.001
Sown perennial pasture (e.g. lucerne)	26%	13%	$\chi^2=9.703$, df=1, p=0.002
Used a soil testing/monitoring program	47%	30%	$\chi^2=9.862$, df=1, p=0.002
Applied lime	47%	28%	$\chi^2=13.545$, df=1, p<0.001
Reduced chemical use by applying IPM, GPS or other pest reduction strategies	39%	19%	$\chi^2=16.506$, df=1, p<0.001
Used a designated machinery and vehicle cleaning area to minimise weed infestations	19%	9%	$\chi^2=7.010$, df=1, p=0.008
Controlled machinery or stock traffic to reduce soil compaction	31%	21%	$\chi^2=4.381$, df=1, p=0.036
Encouraged regrowth of native vegetation	27%	46%	$\chi^2=12.756$, df=1, p<0.001
Used spell or rotational grazing	70%	82%	$\chi^2=4.254$, df=1, p=0.039
Fenced native bush to control stock access	33%	51%	$\chi^2=2.838$, df=1, p=0.092
<i>Background social and demographic data</i>			
Gender (% of male respondents)	86%	70%	$\chi^2=13.928$, df=1, p<0.001
On-property profit	59%	12%	$\chi^2=96.636$, df=1, p<0.001
Off-property profit	56%	76%	$\chi^2=17.414$, df=1, p<0.001
Mean property size	845 ha	84 ha	$\chi^2=134.274$, df=1, p<0.001
Employed a consultant to provide advice about property management	32%	16%	$\chi^2=14.474$, df=1, p<0.001
Landcare membership	18%	9%	$\chi^2=7.328$, df=1, p=0.007
Used the services of a government advisor in the past year	47%	21%	$\chi^2=30.351$, df=1, p<0.001

Survey question	Farmer	Non-farmer	Test
<i>Background social and demographic data - Continued</i>			
Completion of a short course related to property management in past year	52%	16%	$\chi^2=62.096$, df=1, p<0.001
Involved in property planning	48%	29%	$\chi^2=14.853$, df=4, p=0.005
Involved in succession planning	38%	21%	$\chi^2=15.999$, df=4, p=0.003
Involved in local action planning	43%	20%	$\chi^2=27.555$, df=3, p<0.001
Median hours per week worked on farming related activities over past year	60 hours	12 hours	$\chi^2=174.653$, df=1, p<0.001
Median number of days worked off-property in the past 12 months	70 days	240 days	$\chi^2=39.268$, df=1, p<0.001

APPENDIX 3 – DIFFERENCES ACROSS SURVEY SUB-REGIONS

Survey question	Baffle	Mary	Burnett	Kolan	Burrum
<i>Issues affecting local district (% who said important/very important)</i>					
Property sub-division undermining the viability of agriculture	38%	45%	31%	31%	27%
The cost of managing weeds and pests (including native species)	71%	67%	72%	81%	64%
Lack of awareness about Aboriginal cultural heritage sites	16%	24%	11%	12%	9%
<i>Values attached to property (% who said important/very important)</i>					
Provides most of our household income	44%	40%	58%	66%	45%
Native vegetation on my property provides habitat for native animals	56%	60%	36%	55%	39%
Provides a place for recreation	63%	50%	40%	40%	41%
Work on the property is the only job I've ever done	30%	26%	49%	59%	25%
Work on the property is a welcome break from normal occupation	74%	53%	37%	40%	52%
To preserve tradition as the property has been in the family for a long time	33%	33%	55%	51%	42%
Contributing to the environmental health of the district	47%	69%	48%	61%	57%
Being able to build a business that employs other family members	27%	31%	57%	50%	35%
This is a great place to raise a family	83%	74%	81%	83%	75%
<i>Long term plans for property (% who said likely/highly likely)</i>					
The property will be sold	23%	44%	24%	38%	29%
The property will be subdivided and a large part sold	10%	12%	4%	2%	12%
Ownership of the property will stay within the family	66%	50%	72%	52%	70%
Production on the property will be intensified	47%	27%	52%	42%	42%
I will seek additional off-property work	53%	36%	35%	43%	32%
I will retain ownership but no longer undertake much of the physical property work	34%	32%	41%	48%	18%
<i>Attitudes towards natural resource management (% who said agree/strongly agree)</i>					
I am confident in the accuracy of vegetation maps for this district	7%	16%	17%	22%	9%
Clearing has substantially reduced the existence and diversity of native plants and animals in this district.	45%	65%	39%	50%	53%
Clearing regrowth plays an important part of maintaining a viable business	80%	74%	92%	78%	90%

Survey question	Baffle	Mary	Burnett	Kolan	Burrum
<i>Confidence in CRP (% who said agree/strongly agree)</i>					
The time and expense of watering stock off-stream/wetlands is justified by improvements in bank stability, water quality, or stock condition	45%	57%	45%	37%	54%
<i>Knowledge about natural resource management (% who said high/very high knowledge)</i>					
Training available to update business and financial management skills	13%	21%	14%	30%	13%
Knowledge of the extent and quality of ground water resources in your district	14%	15%	26%	30%	29%
<i>Constraints to changing management practices (% who said important/very important)</i>					
The existence of long-term markets	74%	70%	85%	70%	64%
<i>Sources of information about natural resource management (% who used each source of information)</i>					
Radio	32%	30%	49%	47%	53%
Newspaper	57%	59%	81%	75%	71%
Industry groups	11%	21%	23%	37%	18%
Landcare groups	22%	31%	20%	22%	3%
Burnett Mary Regional Group for Natural Resource Management	8%	3%	5%	18%	3%
Government departments	38%	30%	22%	44%	24%
Environmental organisations	19%	16%	3%	9%	12%
<i>Adoption of current recommended practices (% who adopted practice)</i>					
Applied lime or gypsum	27%	43%	24%	44%	55%
Encouraged regrowth of native vegetation	36%	48%	27%	32%	36%
Planted trees or shrubs	24%	39%	7%	13%	21%
<i>Background social and demographic data</i>					
Farmer by occupation	26%	29%	55%	53%	42%
Gender (% of male respondents)	73%	72%	83%	68%	87%
On-property profit	13%	24%	50%	28%	32%
Mean property size	245ha	159ha	1002ha	193ha	218ha
Median time lived in the local district	22yrs	21yrs	36yrs	30yrs	30yrs
Average number of family members supported by on-property income	1.2	1.6	2.6	2.0	1.2
Average number of people employed continuously for at least 3 months on property	0.25	0.19	1.01	3.30	1.17
Used the services of a rural financial counsellor in the past 12 months	3%	1%	10%	8%	5%

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